Nexic Reasoning: Defining a Generalized Calculus Over Anthropic Parameters

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Abstract

In the current scientific landscape, research on Earth's biological natural history is primarily done through the use of fossil evidence and genetic evidence, with the former leaning closer to the reactive side of the spectrum, and the latter being perhaps more proactive when used in these contexts. They each have their limitations, however, such as the luck involved with finding fossils and the limited pictures which they can provide us with at all, as well as the lack of immediate tangibility available in genetic analyses, especially with regard to features like the ecological context of a past organism. All of this being said, we would now like to introduce a possible third form of extracting information about the history and evolution of Earth's biosphere, and perhaps with something more of a narrative component at that. This novel framework is what we refer to as "Nexic reasoning", which serves as a brief extension of the premises of Aethic reasoning [1] to a mediocrity principle-based context. At its fullest, Nexic reasoning has the capacity to paint a surprisingly detailed picture about Earth's history using little more than glorified Bayesian reasoning, may serve as part of an Aethic generalization to the interaction-free measurements of Elitzur and Vaidman [2], and indeed even directly implies the Rare Earth hypothesis [3], thereby forming an implicative link between concepts like the Aethic extrusion principle and the solution to the Fermi paradox. Most intriguingly of all, Nexic reasoning makes a series of falsifiable predictions about Earth's biosphere as a function of our present knowledge about it, for which we know, of course, that the mere existence of such predictions opens the possibility of elevating Nexic reasoning, and all its claims, to the standard of a scientific theory.

1 Introduction

To begin with, let us quickly define an important term which we will use in this paper: *an anthropic parameter*. An anthropic parameter can be defined simply as a fundamental requisite for human life, as is consistent with a general weak anthropic principle [4]. Such requisites are most commonly applied to the physical constants of the universe, such as the gravitational constant. The argument goes that increasing the power of the constant by only a few percentages would render our entire universe uninhabitable due to the perils of galactic formation and the works, so for our measured value to be so "lucky" is merely correlated with our own existence. After all, if the value were instead one of the many hazardous options toward life, then we could not be in such universes to begin with, *so wherever we do end up happens to coincide with whatever universe is hospitable enough to contain us*. This is the statement of the weak anthropic principle itself, but the true premise is that we ought to exploit this principle for direct inductive arguments, rather than staring at its superficial profile, in which case it is but a simple tautology.

It is important to highlight how the anthropic principle has genuine derivational merit, as it has actually led to otherwise inaccessible scientific results in the past. A notable example is the remarkable prediction by physicist Fred Hoyle regarding the carbon-12 resonance. Hoyle recognized that the formation of carbon in the universe could not have been sufficiently accounted for by Big Bang nucleosynthesis, which primarily produced lighter elements like hydrogen and helium. Instead, carbon must be synthesized within stars through the triple-alpha process, where three helium nuclei (alpha particles) combine to form carbon. For this process to proceed efficiently, however, the intermediate beryllium-8 nucleus must exist long enough to interact with another alpha particle, which requires a highly precise resonance in carbon-12. Reasoning anthropically, Hoyle argued that this resonance

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must exist, as life depends critically on carbon, and its abundance could not otherwise be explained. His prediction of the specific energy level of this resonance was later confirmed experimentally [5]. This illustrates how the anthropic principle, far from being a tautological construct, can serve as a powerful heuristic, directing scientific inquiry to uncover otherwise elusive phenomena by framing physical properties within the context of their indispensability for life.

The core of this paper, however, sits with how we are to proceed with the Nexic variation on the anthropic principle, centered on a statement which we are to refer to as *the accordance principle*. Logically speaking, the accordance principle is effectively the Aethic rendition of the mediocrity principle, which is brought about by applying the mediocrity principle to the Aethic tree [1] rather than the classical collection of possible worlds. The key breakaway, then, is that the accordance principle regards information-gain as being fundamentally consistent with the Aethic extrusion principle rather than the classical notion of a timeline split, which is important for its consequences to the indiscriminate functionality of time. In this way, the accordance principle can be thought of as extension of the basic mediocrity principle under two main regards.

1. Firstly, the accordance principle is the Aethic analogue to the mediocrity principle, as was stated.

2. Furthermore, the accordance principle makes the important supposition of *generalizing the applicability of the anthropic principle to all manners of anthropic parameters, including those which are circumstantial in addition to those which are merely physical.*

This second point is an argument of induction for the applicability of the anthropic principle over physical anthropic parameters like the constants of the universe onto any anthropic parameter whatsoever, no matter how abstract or how circumstantial. Based on how we have defined anthropic parameters for the purposes of this paper, any valid Aethic attribute will suffice for an anthropic parameter, and this is what brings about what we will call *the circumstantial class of anthropic parameters*. Simply put, a circumstantial anthropic parameter is a specific property or event on the road to human life which served as a requisite to its realization. Where a Great Filter is a barrier of life [6], a circumstantial anthropic parameter is the state of overcoming that barrier.

To give an intuitive example of a circumstantial anthropic parameter, simply consider something like the dawn of eukaryotic life through the event known as symbiogenesis [7]. We know intuitively

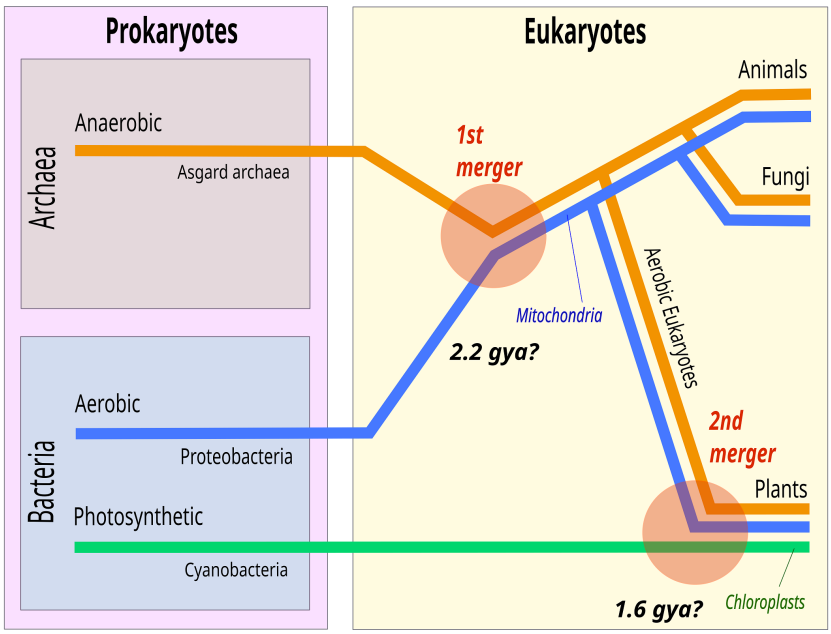

Figure 1: An illustration of the process of eukaryogenesis via endosymbiosis [8], which we argue serves as a direct instance of a circumstantial anthropic parameter.

that prokaryotic life itself in incapable of maintaining the needed-production of adenosine triphosphate (ATP) in order to serve as an animal or plant cell, so it naturally follows from that that the very event of introducing mitochondria to the cellular anatomy served as a major requisite to multicellular, and

therefore human life. In effect, symbiogenesis itself ought to be taken as an anthropic parameter as based on the requisite-based definition to which we provided it at the beginning of the paper. Clearly it is not exactly identical to the numerically-oriented anthropic parameters of the standard anthropic principle, so we provide to it the specific category of 'circumstantial' anthropic parameter. However, let us touch on that point again – if circumstantial anthropic parameters truly are objective dissimilar to numerical anthropic parameters in their ontological footprint, then what truly is the distinguishing factor between them? This is a more difficult question than it sounds, because every answer we might rattle off can be shown, at least in part, to contain arbitrary bias with respect to the underlying ontology. Even some arbitrary bias can be amplified to absurdity with the Socratic method, and this inductively leads into what can be perhaps regarded as the fundamental principle of Nexic reasoning.

Principle 1 (Fundamental Principle of Nexic Reasoning) *There is no true ontological distinction between physical and circumstantial anthropic parameters regarding their intrinsic applicability under the anthropic principle of Nexic reasoning.*

As such, the anthropic tools which have been developed for dealing with mere observables like the fundamental quantities of the universe may now be generalized to a whole host of paleontological and astrobiological queries.

This now marks the beginning of Nexic reasoning, so let us explore some of what it has to offer.

2 Statement of the Anthropic Accordance Principle

The accordance principle follows from a highly important argument in Nexic reasoning, which we will express both with a simple intuitive explanation, and then with a more statistically rigorous algorithm. This argument, known as *the anthropic accordance principle* in particular, serves as a Nexically-consistent derivation to bound from below the probability of a given event or attribute being an anthropic parameter. Note that the anthropic accordance principle itself, in being a form of the mediocrity principle, is not itself guaranteed to hold in all cases, but is merely inferred to hold most of the time. Naturally, then, the true value of its use comes from applying it sequentially across many phenomena, but for the most basic introduction into how it works, we ought to use a single explanatory example.

2.1 Expression of a Single Intuitive Example of the Accordance Principle

Let us imagine, then, the following thought experiment: you are a working paleontologist who, during a fateful excavation, has become the first person to discover the existence of the ancient Haţeg Island [9]. Today all that is left of the island are the quiet grasslands of Western Romania, but millions of years ago sea levels were much higher, and the area was a large island in Mesozoic Europe. The reason the original paleontologists understood this to be an island is the same feature which gives it its intrigue for our purposes: it was unprecedented in the Mesozoic world for its complete lacking of non-avian theropod dinosaurs, which had contributed to a clear example of the island effect at the location. Explicitly speaking, the island effect is what happens when a population of animals which is cut off from the mainland for an extended time eventually evolves toward reduced capacities of self-defense from predators, simply because they no longer need to waste resources on maintaining those traits. Typically what will happen, then, is that the species in question either evolve to be smaller, like the case of the pygmy hippopotamus of Madagascar, or instead evolve to be much larger, like the Galápagos tortoises or the dodo birds of Mauritius. We indeed have many instances of this across time, and these are the very characteristics which led paleontologists to understand that Haţeg Island was indeed an island in the first place, due to the fossil clades which were found there, namely being the following.

1. **Dwarf Sauropods (Titanosauria)**: Quite notably, the titanosaur *Magyarosaurus dacus* was discovered as having inhabited Haţeg Island. These animals were about the size of cows, which is extremely abnormal for titanosaurs, who could weigh as much as a dozen elephants back on the mainland [9].

2. **Iguanodontians (Ornithopoda)**: The arrival of iguanodontian dinosaurs, specifically *Zalmoxes robustus*, marked. These herbivorous dinosaurs underwent evolutionary dwarfism on the island, and additionally survived all the way to the end of the Cretaceous on the island, whereas their mainland relatives went extinct long before that [9].

3. **Nodosaurid Ankylosaurs (Ankylosauria)**: Another distinct colonization event involved the nodosaurid ankylosaurs, such as *Struthiosaurus transylvanicus*, which adapted to Haţeg's ecological conditions, resulting in unique insular forms [9].

4. **Basal Hadrosaurs (Hadrosauromorpha)**: Hadrosaurs like *Telmatosaurus transylvanicus* represent an intriguing independent colonization event to their more ancient iguanodontian cousins like *Zalmoxes* [9].

This all being said, there is something not quite right about Haţeg Island as compared with many contemporary and otherwise Cenozoic instances of the island effect, being that not a single clade among these land-based arrivals was carnivorous. Let us compare this to the distribution of clades which arrived on modern-day Madagascar for comparison. For context, Madagascar is marked by a remarkable series of rafting events that delivered unique vertebrate lineages to its shores. These rafting events are exceptional not only for their rarity but also for the profound evolutionary radiations they initiated. Focusing solely on the distinct land-based vertebrate clades which independently reached the island, we may identify the following eight.

1. **Lemurs (Primates)**: A single rafting event approximately 50–60 million years ago gave rise to Madagascar's diverse array of lemurs, which now represent over 100 species [10].

2. **Euplerid Carnivorans (Fossa and Allies)**: Descending from a single colonization event around 20 million years ago, Madagascar's carnivorans are a unique lineage within the Eupleridae family [11].

3. **Tenrecs (Afrosoricida)**: A solitary rafting ancestor approximately 30–56 million years ago founded this group, leading to the island's distinctive insectivorous mammals [10].

4. **Nesomyine Rodents (Rodents)**: Another single rafting event, estimated at 20–24 million years ago, introduced the progenitors of Madagascar's endemic rats and mice [11].

5. **Chameleons (Reptilia, I)**: Two independent rafting events brought distinct clades of chameleons to Madagascar, which have since diversified extensively [12].

6. **Chameleons (Reptilia, II)**: Another separate rafting event established a different group of chameleons in Madagascar, contributing to the island's remarkable chameleon diversity [12].

7. **Boas (Reptilia, III)**: A distinct rafting event introduced the boas of Madagascar, a lineage separate from those of mainland Africa [11].

8. **Mantellid Frogs (Amphibia)**: At least one rafting event delivered the ancestors of the Mantellidae family to Madagascar, initiating the radiation of endemic frogs [11].

Notice how for the clades of Madagascar, we see a more even-spread of herbivores versus carnivores, with the lemurs and tenrecs filling the herbivorous niches, and the euplerids and boas filling the carnivorous niches. This constitutes a clear half-and-half tendency of distribution, which naturally is also reflected across other islands of the world where there are more than one or two rafting events, (with the simple reasoning being that the odds of no carnivorous clades arriving on the island falls off with a geometric distribution given each new rafting event). With our basic estimate being in effect, then, that roughly an even number of carnivorous and herbivorous land-based clades are expected to raft or otherwise arrive at an island, *we can then estimate the number of carnivorous clades which get to the island as following a negative-binomial distribution as a function of the number of herbivorous clades, such that* $p \approx \frac{1}{2}$. This models the independent carnivore colonization, C, in terms of the independent herbivore colonization, H, as follows.

$$C \sim \mathrm{NB}\left(H, \frac{1}{2}\right) \tag{1}$$

In the case of Haţeg Island then, we arrive at the intriguing result that the probability of this particular carnivore-herbivore distribution shaking out, such that we have four herbivores and no theropods, should have little more than a 6% chance of having occurred.

One might protest to this value, however, by citing that there are other islands in the world and throughout the remainder of the Mesozoic, and so by the multiple comparisons problem of statistics

we ought to expect a higher probability that 'there exists' such an island, thereby nullifying the fluke-like luster of this circumstance. This, however, is not the full story, because even though there is a 'tendency to push this probability higher' at play, we might also notice a competing tendency which tends to push it lower, in effect perhaps allowing us to, at least approximately speaking, consider this low-likelihood result of 6% as somewhat realistically appropriate through the balancing effect. Specifically, fossils have been found from the Haţeg deposits belonging to a clade of lizards, a clade of turtles, a clade of snakes[1], and even a clade of mammals [9]. We see that the existence of these extra clades makes it statistically easier to reach the island than was predicted by the four dinosaurian arrivals alone, so naturally this effect is going to push the likelihood of theropods not having arrived as being lower still than an estimate which does not consider this effect, (with a more tangible analogous notion to this being that Haţeg Island is rather large as compared to most islands, and therefore both limits the number of islands of its size-range for which the multiple comparisons problem can take effect, all while making arrival easier anyway due to its physically wider coastline[2]). This is why when all effects are combined, it is rather reasonable to predict a likelihood which remains low – or at least that it would be quite unlikely, to the best of our knowledge, for it to be substantially higher than 6%.

What this means, then, is that as a paleontologist who has just uncovered these features of Haţeg Island, or even as a passive onlooker who has just heard about these things for the first time, it will follows that *one has just witnessed a fluke.* Analogously to rolling four dice and having them all come up with the same number on the first try, this is indeed a moment where one might shrug at the rarity of such a moment, and then go on with their day from there. But while we are on the topic, we might think to ask: *is it really that we just witnessed a fluke of this magnitude, or might it be more reasonable to infer that we never had an alternative to witnessing this fluke in the first place?* This is a natural reaction in the face of a fluke, as people often do as a quick 'reality check' in the face of something deeply unexpected having occurred. A probabilistic fluke, naturally, is just such a deeply unexpected event, so perhaps the natural logical instinct in the face of this sort of outcome is to question its validity. Specifically, however unlikely the fluke will have been is how much skepticism one should bring toward immediately accepting it, as after all that same probability represents the degree to which it deviates from the status quo. This same line of intuitive logic, then, is what we can bring to this question about Haţeg Island or indeed any significant fluke.

What we have, then, is the following intriguing result: *for the circumstances of Haţeg Island to not be an anthropic principle would have to imply that, quite by definition, such circumstances are uncorrelated to human existence – which itself implies by the direct definition of statistical independence that our probability of having come across this particular outcome for Haţeg Island should be equally low to its standing marginal probability of 6%.* This is where the doubt needs to kick in, because either we just witnessed a 6%-chance occurrence[3], or instead the other 94%-chance outcome has to happen

[1]Please note that the snakes ought not to be justifiably categorized with the theropods, simply due to the vast difference between their respective capacities for ecological impact, with snakes taking a more passive role and theropods actively driving competing predator clades to extinction. That is, just as the chameleons were not categorized with the snakes in the Madagascar example on account of one being and apex predator and the other not, neither should snakes and theropods be categorized together for the dinosaurian example. This is perhaps a nuanced claim, but it is an important one to make given the context of theropod dinosaurs.

[2]Note that even the consideration of how Haţeg Island was surrounded by many other islands of Cretaceous Europe tends to heighten the likelihood of theropods arriving there, as every one of the surrounding islands which becomes populated with theropods naturally makes it exponentially likelier that all the rest of them will be by a given point in the future.

[3]Highly importantly, note that the capacity of the act of this realization to be a fluke in the first place directly relies on the indiscriminate time principle [1] of Aethic reasoning, so as to allow for the realization of a past event to be interpreted with the exact same logic as would be interpreted a future-facing event. For example, one would be stunned upon spontaneously having a surprise birthday party had it been probabalistically unlikely to happen, with the intuitive connotation being perhaps because "having lived through it" during the moment of surprise—so as to personally move over the boundary from future to present—is that which metaphysically mediates its nature as being a fluke. The indiscriminate time principle, then, decouples the nature of reveal from the necessity of having to "live through it in the moment", and instead allows the event itself to conceivably occur anywhere in time or space, with the moment of simply *first learning* the information itself being sufficient to metaphysically mediate its background ontological-updating characteristics normally attributed to "living through it" alone. Due to this newfound invariance between the metaphysical presentation of learning about a past event, a present event, or a future event, we therefore are able to relay the same logic of "the moment of surprise" in living through an unlikely event, (or frankly any arbitrary metaphysical property in question due to the aforementioned invariance under the relay), to the realization of the past event itself respecting to one's Aethus. Given this, we may then conclude that since something unlikely like winning the lottery in "real time" would be perceived as metaphysically-remote fluke event, then to no less an extent would be first learning about a fluke in one's own past or even in natural history. And, please further note that this prospect also relies on the reversal principle [1] of Aethic reasoning in order for one's directly prior-inhabited Aethic world to be

instead, for which we ought never to have gotten this far in the first place. As such, we have that that entire 94%-chance had ought to be contained within the alternative case to what brought us down this road in the first place, being the assumption that Haṭeg Island ought not to be an anthropic principle. In effect, we get a fascinating mathematical statement, being that *for Haṭeg Island's circumstance to have had a 6% chance of occurring originally implies that our mere state of having confirmed that it happened anyway corresponds to it having at least a 94% chance of being an anthropic parameter to us.* Written in terms of a general event, A, its complement, A', and one's Aethus or knowledge, H, we then attain the following.

$$1 \gg \mathrm{P}(A) \wedge A \in H \Rightarrow \mathrm{P}\Big(H \overset{H_0}{\to} A \mid A, H\Big) \gtrsim \mathrm{P}(A') \tag{2}$$

This is so where the implication statement $H \overset{H_0}{\to} A$ is read as that "A is an anthropic parameter of H". In full, we get that for the event A from natural history to have been unlikely to occur and for oneself to have seen it to occur anyway, it follows that the likelihood of it being an anthropic parameter to oneself is most likely greater than the probability of A not having occurred in the first place. This fundamentally suggests a positive relation between the degree to which an event from natural history is a fluke, and the likelihood of it being a requisite to humankind. At the very least, we might begin to see this as something of a generalization of the base anthropic principle, all while incorporating some characteristically-mediocrity principle-based ideas.

With this basic simple-sample example having been outlined, let us consider extending it to a general algorithm for the anthropic accordance principle.

2.2 General Formulation of the Anthropic Accordance Principle

The following is a full rendition of the setup to the anthropic accordance principle, where a value of γ is selected upfront so as to be able to argue the full model to arbitrary precision.

So long as $k \neq 0$, then we will find that there exists an arbitrarily large N after which $\hat{k}N$ will be given to be larger than a threshold number of models n to an arbitrarily high probability of $\alpha < 1$. For example, we might imagine selecting whatever high enough N ensures that $\hat{k}N > n$ with at least a likelihood of 99%. The real experimental question, then, is if such n correct models can even be deciphered from the real-world at all, be it through a high enough N to ensure that n accurate models exist, or otherwise through the means of identifying n accurate models directly for $k \approx 1$.

Verifying this will enable us to confirm that the proof by contradiction shown at the end of the algorithm can indeed be taken as localized to the accurate-model outcome, (rather than pushing into the territory of inaccurate models), because it is the only way in which there exists an outcome of model-accuracy in the first place. To be clear, the act of that proof by contradiction always implying model-inaccuracy would imply that $k < \gamma$ on account of the anthropic parameter-outcome needing to be unrealizable in such a scenario, and therefore with only the outcome of each event having probability γ_E being achievable given model-accuracy. The reason this would be a troubling result is that it would imply that k is correlated to γ due to this relation, which itself would mean that somehow the very act of subjectively choosing a model is bounded from above in probability of success by γ. This is of course absurd, because we might simply imagine that for any set of N models for which a subset of $n < \gamma N$ of them are accurate, we simply get a contradiction if we choose the subset as a set of models by itself, because we see that the proportion of accurate-models there, (being 100% of them), is consistently greater than γ, which should have been disallowed by the act of the proof by contradiction in the flowchart immediately implying model-inaccuracy. This gives us yet another proof by contradiction, being that for model-inaccuracy to be consistently implied by the proof by contradiction in the flowchart, would have to imply that we can never choose an arbitrarily large number of accurate models in the first place, which itself bounds the number of accurate models that can possibly be gathered at all. As such, we need only to look at the contrapositive of this statement to see that if we can always empirically find an arbitrarily large number of accurate such models either through direct or implicative means, then it must be implied that the proof by contradiction within the flowchart must point exclusively toward the outcome of the model pertaining to an anthropic parameter.

Through whatever empirical mechanisms we deem most appropriate, upon confirming that there exist n such models for a sufficiently high value of n, (so as to fix the proof by contradiction of the flowchart as reproducing the accordance principle rather than implying model-inaccuracy), and then

well-defined in the first place in lieu of the definiteness of said past information relative to its corresponding Aethus.

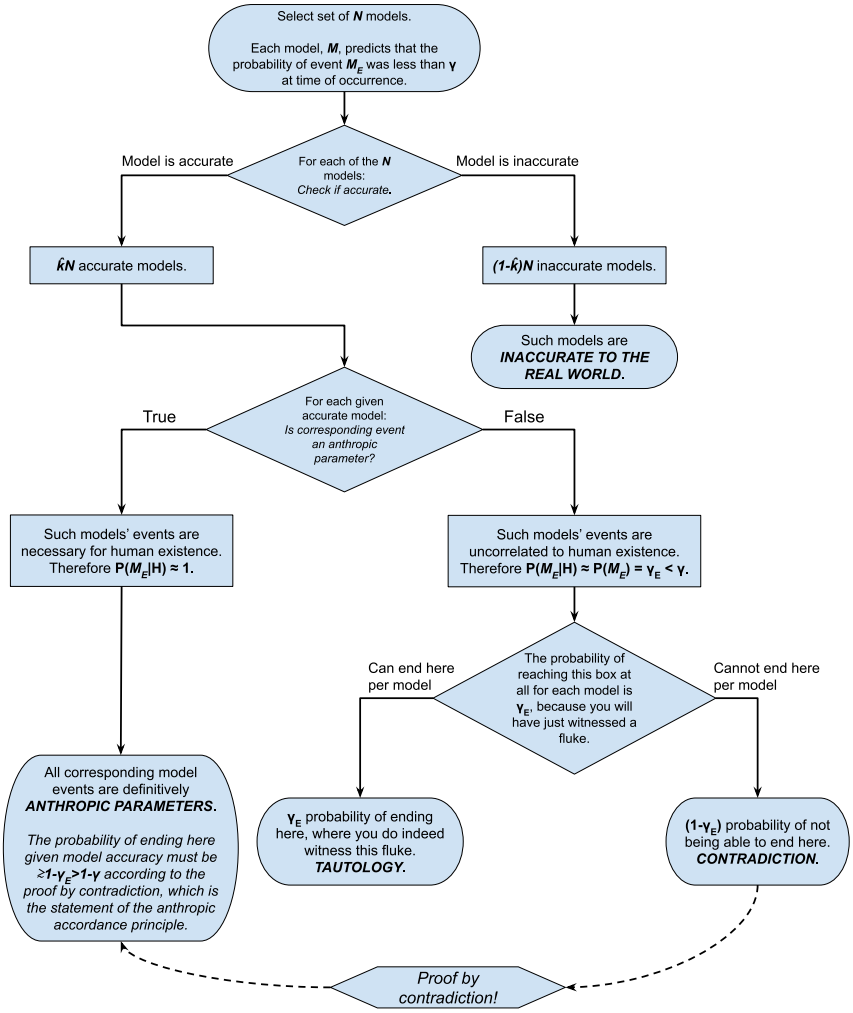

Figure 2: An illustration of the argument behind the anthropic accordance principle through a flowchart, where k represents the expected probability of a given model being accurate, and $\hat{k}$ represents the sample proportion of models which are accurate.

upon confirming the majority of the accompanying predictions of the accordance principle, we will have performed a scientific validation of the accordance principle itself, along with its list of corollaries.

2.3 Fundamental Postulates of Nexic Reasoning

Speaking personally for a moment, I originally formulated the accordance principle as an attempt to expand upon the "Copernicus method" of J. Richard Gott, (specifically regarding his Doomsday Argument) [13], which reconfigures it by removing two potential biases in its logic. Firstly, Gott's argument supposes that the Earth and the Earth only as it exists in our scenario is the only grounds over which the individual may be born — however in the argument of the present paper, we will expand this to the cosmos at large rather than the Earth, and the Earth in all ways that it may have been rather than the Earth as it surely has gone for us. And, secondly, the original argument supposes that the concept of a "human" works as a type, however in the new argument, to avoid any inconsistencies or constructs in the definition of "human", a more rigorous analogue will be developed instead. Gott's argument is still groundbreaking and pioneering, and in this paper we are merely attempting to push this underlying concept to the next level of its evolution.

However, when all was said and done, something of an unexpected peculiarity arose from this way of seeing things. Whereas, of course, the standard interpretation of the Copernicus method is that it is complementary of the Copernican principle itself, a counterclaim to this seemingly-tautological sentiment can be formulated with Nexic reasoning. Specifically, the Nexic generalization seems to imply the Rare Earth hypothesis [3], and thus contradicts the Copernican principle altogether. At minimum, there is a argument to be made that logically valid formulations of the Copernican method can be used to counter the Copernican principle of all things, and in doing so may perhaps defang the primary channel of support for the Copernican principle: that it consists with the Copernicus method, and thereby to Occam's razor in application to conscious existence. To highlight where the generalized Copernicus method conflicts with the Copernican principle, in the process bringing about the statement of the accordance theorem, let us formulate such a generalization using two postulates, both of which are central the Gott's argument, but at the same time originate at the utmost intuitive level of the human perception, such that human beings subconsciously apply them near to continuously in their day-to-day interactions. Consider this simply to be a formal description of that which you already know inherently.

Postulate 1 (The Postulate of Aethic Consistency) *The universe is postulated to intrinsically consist with the ontology and logic of Aethic reasoning.*

Postulate 2 (The Postulate of Self-Mediocrity) *One may conclude that one's own consciousness is probabalistically mediocre in the Aethus of all conscious observers, strictly speaking.*

Note that such a conscious observer instance from this "Aethus of all consciousness observers" will be referred to as a "mediocre consciousness in the abstract". Phrased intuitively, note that the postulate of self-mediocrity says that *if it is rare to everybody, it should almost always be rare for you as well.*

Postulate 3 (The Postulate of Cosmic-Mediocrity) *For every given parent Aethus of oneself, given the Aethic subset*[4] *of all probabalistically mediocre conscious observers who inhabit its physical cosmos alongside it, one may conclude that a given mediocre conscious observer in the abstract will be mediocre in such an Aethic subset.*

The intuitive phrasing of the postulate of cosmic-mediocrity is that *the universe does not present you with events disproportionately frequently to their likelihoods*, (that is since it can be interpreted to mean that the Cosmic Nexus itself does not privilege the probabilistic existence of some mediocre consciousnesses in the abstract to the expense of others, presumably because there is no object mechanism with which it can consistently do that[5]).

So as to be referenced momentarily, let us also specifically state the Copernican Principle in application to the abundance of life or the lack thereof in the universe.

[4]Note that formally, the "Aethic subset" in this case pertains to the Aethic intersection of the Aethus of all satisfactorily probabilistically mediocre conscious observers on the Aethic tree, and the "Cosmic Nexus", being that Nexus which weights Aethae based on their cosmic abundance.

[5]That is, without declaring some deeper unexplained correlation between the cosmos, and not just the Aethic of all conscious observers, but rather the particularly most mediocre among them. Altogether it seems quite difficult to justify a counter to this postulate as being anything other than absurd.

Principle 2 (Astrobiological Copernican Principle) *One may conclude their consciousness to be probabalistically mediocre, (or more specifically not probabalistically anomalous), in the scope of all possible happenings that did or could have developed in the cosmos.*

In other words, the direct implication of this principle is that life must be common in the universe, because otherwise it would be contradicted by the state of us humans existing.

Note that even to formulate this in the first place, we are dependent upon the premise that, perhaps paradoxically, there can even exist an Aethus of all conscious observers in the abstract sense which is not immediately equivalent to the Aethus of all conscious observers within the cosmos[6]. Intuitively, the prospect of why this can be the case is, at least to start with, something of a leap of faith of a similar character to how the equivalence principle of general relativity suggests that an abstract concept of acceleration can be decoupled to the empirical concept of coordinate acceleration for which acceleration was theoretically defined in the first place. At first glance it seems outwardly paradoxical, but after some more thought we realize that this very separation between the empirical instantiation of a quality, (being the set of all conscious observers possible in the confined of the cosmos), and an abstract extension, (being the subject of somehow organizing empirical conscious observer relative abundances beyond this), becomes perhaps strikingly useful toward clarifying our own existing empiricism. There is perhaps one major instance where at least the relevance of this separation becomes somewhat apparent, being what we may refer to as the "accordance paradox". Here is the formal statement of such a paradox, being called the "accordance theorem".

Theorem 1 (Accordance Theorem) *The postulate of self-mediocrity, the postulate of cosmic-mediocrity, and the astrobiological Copernican principle cannot all at once be true.*

Note that this theorem will particularly be proven during the Rare Earth hypothesis [3] derivation section from the accordance principle, (which itself is implied by the postulates of self-mediocrity and cosmic-mediocrity in conjunction with Aethic reasoning). Please refer to that section for the details, but we may state the central logical chain at now: that is, the Rare Earth hypothesis is both contradictory to the Copernican principle, and is implied by the postulates of self-mediocrity and cosmic-mediocrity in conjunction with Aethic reasoning and known paleontological empiricism. Accordingly, then, we have that a contradiction would arise from the state of all three of the postulate of self-mediocrity, the postulate of cosmic-mediocrity, and the Copernican principle being true at once. Simply put, at least one of them must be false.

This, then, is why we consider the postulates of self-mediocrity and cosmic-mediocrity to be rather interesting to investigate: that is, because the solution to this theorem is not quite as straightforward as simply concluding that the astrobiological Copernican principle needs to be the true on account of its simplicity. Rather, even though it has something of a relatively simple phrasing on the surface, from the perspective of our obligation to being conscious observers, it takes on an eerie sense of being ad hoc and unmotivated under any light of comparison to the two postulates. That is, *is one truly ready to consider that they might be leading an existence which is vastly uncommon in the set of all possible consciousnesses?* Broadly speaking, denying the possibility of such is perhaps the most intuitive thought humans can fathom, like a sort of self-explanatory *cogito, ergo sum* among probabilistic sentiments. For example, consider if your neighbor told you that he has been abducted by aliens. If this were the case, then that would just then make you one of the few people in history who has actually learned of the existence of aliens truly. Yet, and this is perhaps precisely what, however subconsciously, causes you to write it off—it is far too unconventional to the world to be reliable. Hence you might conclude that such a story is absurd through a direct application of the principle of self-mediocrity, at least over the set of humans in particular, (rather than all consciousness in the abstract, whatever it may mean—however we can treat it as something like a Platonic ideal for the meantime, given its difficulty of being tangibly stated or quantified, if anything supposing that we should keep it ambiguous except for the state of oneself being a random element of it).

And then, secondly it is supposed that in the scope of the cosmos, a randomly selected mediocre consciousness should be mediocre in the set of all mediocre consciousnesses in the universe. This part is perhaps more challenging to understand at first, but it is nearly as apparent as the first statement once comprehended. The analogue with humans again is that a randomly selected human from the set of all possible humans should be mediocre in the set of all possible humans which exist in the cosmos. For this to be false, it would be required that the universe holds some sort of statistical bias towards propagating humans which are unlikely to exist over humans which are likelier to exist. For example,

[6]Or more formally, within the Open Cosmos.

look at a scenario where for the next decade, every shuffled card deck on the planet randomizes to being perfectly ordered by number out of no other reason than coincidence. As can clearly be seen, this would be quite an anomaly, since, well, it's so ridiculously unlikely each time. So for it to happen every single time would be madness. And the intuition that it would be madness is, in and of itself, your inner intuition about the principle of cosmic mediocrity. A simpler way of phrasing it would be that *the universe does not present you with events disproportionately frequently to their likelihoods*. Furthermore, it is directly that foundational postulate of J. Richard Gott and the other supporters of the Copernican method of mediocrity, just stated in a rigorous form. Like the first principle, the truth of this principle is difficult to support without apparent intuition, but it is nonetheless seen that its falsehood would be absurd.

Also note that the principle of cosmic mediocrity only asserts for sure that the universe does not present *you*, the mediocre consciousness, with events disproportionately frequently to their likelihoods – but as for the remainder of the universe, whatever rules it might follow – and those concepts are merely not mentioned by the principle of cosmic mediocrity. If we were to expand your mediocrity beyond this, however, stating something instead like *A mediocre consciousness is mediocre in the set of all [insert type here] present in the cosmos*, and it would no longer hold its chiefly intuitive stance. Already we can find faults with this – as in, perhaps we inserted "animal" into that blank, which would then argue the universe does not present you with events disproportionately frequently to their likelihoods relative to the general animal. However, since the vast majority of animals on the planet are arthropods, mollusks, or fish, it would follow that you would be far likelier to literally be one of them now, (as the net contribution of all probabilities distinguishing them from you flipping in their favor). This is not intuitive in the slightest, and so, consequently, the principle of cosmic mediocrity requires that you are only experiencing expected events and probability with respect to the type for which you most feasibly apply to and that type only – being the mediocre consciousness itself.

Altogether, then, we have a compelling argument that it is actually existentially counterintuitive to oneself to deny either of the postulates of self-mediocrity or cosmic-mediocrity. In total, then, such serves as the backbone support of this paper for why it is not only the case that the Copernicus method can be used to counter the Copernican principle, but rather that it also *should* be used in just such a way so as to comply with the two postulates.

Furthermore, please note that due to the nature of one's surrounding cosmos in Aethic reasoning, where those you have yet to meet each exist in disagreeing superposition of occupying all possible human lives, we therefore have that to successively further parent Aethus to oneself, more and more of these possible humans will be let back into the disagreeing superposition. Eventually, then, the limiting tendency is effectively a state where all possible conscious observers exist throughout the universe in all ways which they possibly could, except such a superposition is still weighted by the "Cosmic Nexus"—just perhaps the rawest and most general form of it. This is what we might refer to as the "Open Cosmos", with the primary Aethic supposition surrounding the postulate of cosmic-mediocrity being that the current state of the cosmos—that is relative to one's current Aethus—is effectively arbitrary in scope for its purposes. So in that sense, the postulate of cosmic-mediocrity is stronger than an alternative which only considers conscious observers within the current cosmos, with the reason being that privileging any cosmos besides the Open Cosmos is effectively arbitrary. After all, one's own consciousness will have at some point existed at several of a particular set of one's own parent Aethus due to the principle of centric unfolding—with the limiting case of this receding in Aethic time being inhabitance of the Open Cosmos itself. By induction, then, do we infer that since both the limiting-case parent Aethus and a "lineage" of others ought to all have been collectively compatible with the single-cosmos principle of cosmic-mediocrity, it ought therefore perhaps to follow that any particular parent Aethus of oneself will as well, (with the supposition being that each is effectively another avenue intermediating one's current Aethus and one's earliest Aethus in Aethic time, whatever that is).

Concept 1 (The Open Cosmos) *Let us consider how one ought to best intuit the concept of the Open Cosmos. Simply put, we might imagine that for every event one has learned about, be it past or present so as to have learned about it, we might imagine the Aethus for which it could have held the alternative outcome, or more specifically the Aethus of probability-accurate disagreeing superposition between its realized outcome and alternative outcome. So long as we assess this weighting based explicitly on how the event would turn out if we could run it innumerably many times, but without correlation to one's existence on each, (being the definition of the Cosmic Nexus, as adapted from frequentism but with Aethic scaffolding), then then it would be declared in the most general case that such yields the accurate Aethic weights of said event in the Open Cosmos. In the mathematical*

inductive limit of considering all such processes of generalization, the Open Cosmos is generated.

To give a concrete example, we might consider the probability of the Chicxulub impactor striking the necessary location in order to wipe out the dinosaurs, that is relative to the Aethus in which it hits all possible locations in disagreeing superposition, (perhaps conventionally set to the morning of at the realized impact site, with all random impact trajectories being incorporated). Interestingly, we actually have a candidate upper bound for the probability of such an event relative to the Cosmic Nexus, being that it ought to be no more than a 13% chance [14], (which we may see to contrast with the nearly 100% chance already assuming human existence, being the irrelevant case when considering the Open Cosmos). Strictly speaking, then, we would have that the Aethic weight of this event in the Open Cosmos is given as such a probability given that its aforementioned generating Aethus has already occurred, so in total it would be the product of their respective Aethus weights due to the law of conditional probability[7]*.*

It should also be noted that perhaps the central motivation of the Open Cosmos concept is that it allows us to treat any planet in our universe, be it already existent, fictional, or hypothetical outright, as being representable as an "alternate history" of the Earth itself. This, therefore, triggers something of a major reframing in which all possible scenarios which concern the evolution of life are to be thought of as if we had relocated the planetary system in question to the "canvas" of Earth, and all reachable alternatives to it on the Aethic tree, (that is, by removing properties on-demand via parent Aethae, and then instating alternatives via child Aethae). So, even a physically existent system like Proxima Centauri b, in Nexic reasoning are not regarded by their spatial separation from us at all, but instead are modeled by the process of abstractly altering all of the Aethic properties of present Earth[8]*, until such a system has been constructed verbatim. It is by engaging in Nexic reasoning in this way that we are able to engage with the variation of Aethic weights in the most direct way, and so for all further purposes we might consider the Open Cosmos as the abstract medium with which we accomplish this. That is, we do this rather than constraining and inferring probabilities only with the limits of what exists in our physical universe with us—however the very premise of Aethic superpositions takes this as arbitrary, and instead posits that the scheme of "event probabilities by their frequency in the existing universe" versus "event probabilities by their frequency in the entire Open Universe's array of possibilities" are ontologically both accurate measures of the Cosmic Nexus up to their scope, but with only the latter's scope being exhaustive.*

2.4 Overview of the Aethic Ontology in Nexic Reasoning

So as to elaborate more extensively on how the accordance principle particularly led to Aethic reasoning and its ontology [1], (including which aspects of it were something of a perfect storm), I think it is primarily the fact that the accordance principle is an on ramp from the Copernicus method [13] to a classical-ized variation of the Aethic ontology, and from there the extrusion principle is the on ramp from this to the genuine Aethic ontology. Altogether, this two-step process is arguably the "path of least resistance" to the radical ontology of Aethic reasoning, which by means of strong inductive reasoning, and perceptiveness to the sequential implications, one can take to arrive at the Aethic ontology with enough motivation to maintain a position there. In particular, when I first thought of the accordance principle (for the two-node dinosaur example) sometime in 2019 or 2020, (although I do not have anywhere near an exact date of occurrence, unfortunately, so it also could have been earlier), I remember it being a direct proposal for extending the doomsday argument, but then applying it to the prospect of dinosaurs being a prerequisite to humans, (which indeed was the original, instantiated version of the accordance principle before I generalized it throughout 2021). In this sense, then, the original vision of the accordance principle was fixed firmly to a classical-ontological backdrop, with the primary idea being that a human, retrospectively to having been born and grown up on a single timeline, may infer such a timeline to likely have a comparatively high net-probability mass of existing as compared to other avenues towards generating a sentient consciousness like oneself. The reason this will have been something of a least-resistance-leaning idea is then because it was inspired directly by generalizing the existing Doomsday argument to a paleontological context. I would attribute the main reason why I was ever able to devise Aethic reasoning, based on this, to the mere fact that I then spent so much time in 2021 and 2022 formalizing and obsessing over the details of this Nexic

[7] Note that this is perhaps something of an abstract characterization for its two-stage definition, but formulating the Open Cosmos in the first place is important enough that we do so anyway.

[8] Once again, that is via parent and child Aethae, and perhaps a fair bit of mathematical induction, with the intuitive framing of such being that we are inferring an Aethic "alternative history" of Earth, and using such to construct a system precisely identical to the system in question.

ontology, so as to elevate it from a mere practical tool to a genuine statement of ontology. The primary reversal that is the Aethic extrusion principle, (as also aided by the early premise of centric unfolding in 2022), then, was the moment of realization that this Nexic-timelines concept could be rephrased not as some emergent deduction from a fundamental mediocrity principle operating retroactively over conscious observers, but quite literally as an ever-personal ontological mechanism by which all events are generally encoded outwardly by one's moment-to-moment intake of information. That is, rather than postulating the mediocrity principle, we could arrive at the same conclusion by instead postulating an ontology consistent with the Aethic indiscriminate time principle [1], so as to universalize the ontology which brought about the accordance principle by attaching it to any realized Aethus.

A central prospect of Nexic reasoning, being the Aethic reversal principle [1], is in a Nexic context fundamentally the statement that the prospect of a natural history which unfolds as a timeline is a fully fallacious assessment of how the universe behaves ontologically. That is, in reality it is asserted by the principle that there are no such "lines" to begin with. Practically speaking, (and indeed where I originally bumped into a paradox myself when I first came across this setup), we may illustrate this dynamic with a light thought experiment. If we assume momentarily that Earth's natural history, or for that matter any ontological circumstance arranges itself in timelines, then this is equivalent to assuming we may for theoretical purposes wind the clock back to a given moment on that timeline, and then let natural history unfold anew in order to reach a different probabilistic outcome than the modern day. This, however, is precisely the moment when the reversal principle strikes, (and as stated, this is the circumstance with which I discovered it in the first place, in 2021). Simply put, the problem is that in an Aethic universe, there is very blatantly no well-defined moment to "pause" the timeline at during the rewind in the first place. So, that is to say that the whole argument collapses, because Aethically speaking we may only ever define a partial construction of a system in the first place, (being an Aethus object itself), rather than ever assuming reality operates to a single moment with a single, fully fleshed out circumstance. The two-node circumstance diagram with the dinosaurs alone illustrates rather plainly how even major past circumstances of the Earth are only ever knowable to us within a probabilistic margin of error, and so practically speaking the challenge of fixing a past timeline along which we should rewind in the first place becomes eerily identical in presentation to the classic future-oriented probabilistic unfolding of the timeline in the first place, (and indeed, such a realization of mine was the very first inkling of the indiscriminate time principle [1], which now in its full form formally states that these two processes are indeed entirely ontologically identical). Concerning the reversal principle directly though, it becomes infinitely nontrivial with knowledge of the past to perfectly lock down a single timeline on which we should exist as opposed to another, and so the major conclusion from all that is that we should stop trying to define a complete past moment at which to "pause" in the first place, and instead accept what the universe is telling us: that a "partial attribute-knowledge of a moment in the past" ie being an Aethus itself as per its original definition, is itself to be taken as "complete" in a procedural or ontological sense. Altogether then, wrapping up this full proof by contradiction, we then conclude that we cannot so much as assume that time or natural history organizes itself into timelines in the first place without violating the reversal principle during our attempts to pick out a "moment of pause", (which we now know does not even exist ontologically).

Note that the actual form in which I originally discovered this timeline paradox was not with the rewinding itself (as after all it is a bit more subtle there), but rather with a major difficulty in formalizing what a natural historical "fluke is". For context, starting on December 8, 2021, (the day after I originally dreamt up the Aethic structure and its recursive properties for use in modeling natural history), I was writing a Google Sheets catalogue of all of the major abstract terminological features of natural history, (with this list of structures actually being the earliest origin of what would eventually become the Aethic and Nexic terminological universes). Throughout the writing of this, my primary goal was that each structure would be decidedly well-defined, especially in the sense that natural historical events would be able to be categorized under different sub-types of Aethae. Two of the major such sub-types were "Prerequisites", (which I now call anthropic parameters), and "Flukes", (being a natural historical stated-attribute which is unlikely enough to contribute non-negligibly to the existential rarity of Earth). What I ended up finding at this point, however, is that of all of these structures, Flukes themselves were uniquely difficult to define rigorously. The reason for this was that in order to classify a stated-attribute as a fluke, one must quantify its probability of occurrence, but crucially there is no objective Aethus with which to reference for such a probability. For example, simply saying "the probability of the fluke occurring relative to the moment just before" felt deeply ill-defined to me, because even the concept of "the moment before" is utterly dependent

on the subjective nuances of how you construct the Aethus of the event itself, rather than being anywhere near a real property of the outside world beyond your model. Accordingly, then, what I found is that the best you can ever do to attain an "objective probability" of an event occurring is by taking its probability relative to the event union of it and some other arbitrary event, (ie Aethus). So, of course, that is hardly objective at all: instead it forces a strictly relativist structure to even how we so much as model natural history. I remember at the time that I was a bit baffled and almost frustrated by this result, but of course as we know it would eventually give rise to several key Aethic principles to come, from the first postulate of the Aethus to of course the indiscriminate time principle itself. So, anyways, what this result explicitly showed was that the timeline metaphysics is literally incompatible with the algebra of anthropic parameters, so since the accordance principle promotes the latter to absolute importance over probabilistic existence, then timelines themselves become irrelevant at best to natural historical ontology. Or, more rigorously, they are actively detrimental to performing ontological modeling without structural dependency on subjective bias. Either way, the result is that modeling natural history with timelines, ontologically speaking, is no less arbitrary than making all the answers up outright.

Lastly, to tie these derivational notes together, I ought to mention the context in which I derived Aethic reasoning out of Nexic reasoning in particular: simply speaking, the major idea was that I started out with an intuitive rendition of the postulates of self-mediocrity and cosmic-mediocrity when devising Nexic reasoning in its original form, (although at the time I mentally referred to these as the collective "accordance principle"), but from there the resultant accordance principle-centered reasoning was to me more a mathematical trick than an assertion of a fundamentally new ontology underlying everything. That is, I started out by hearing about J. Richard Gott's "Doomsday argument" [13], and from there I made an attempt to streamline and or generalize it far enough so that it could actually be (hypothetically) relied upon to make predictions in a practical setting. In other words, I weeded out all of the conflicting assumptions, if you will, in an attempt to present the argument in its most natural state. The funny consequence of all that, as we know, is that it actually then jumps ship and deduces the Rare Earth hypothesis [3], but this was a secondary consequence to my goals anyway rather than the original intention. All things considered, then, at that stage the accordance principle was effectively a "tool of inference alone", so as only to take a passive ontological position. This all changed, however, when I had the epiphany of the Aethic extrusion principle [1], which was the moment when I realized a full ontological model that actually relocates the accordance principle subject to the core, as opposed to just having it be a technical peculiarity in an otherwise classical metaphysical paradigm as it was before. So, a rather close analogy that I like to use in explaining what changed about the accordance principle in that epiphany, is that it was rather like how Einstein turned Planck's mathematical trick about discrete energy packets into a genuine ontological prospect: the photon. This is really precisely what I did in that moment—I turned a procedural convenience into a genuinely and non-independently motivated ontological stance. So, perhaps the major takeaway is to see just how important Nexic reasoning was to the later development of Aethic reasoning in the first place: it forced me to invent a philosophy around sticking to the Aethic reversal and indiscriminate time principles, which was perhaps the exact catalyst needed to promote them to genuine ontology with the Aethic extrusion principle.

2.4.1 Discussing Categorical Shifts Within the Nexic Ontology

The reversal principle is especially procedurally relevant to our analyses. That is, the fundamental transition is from viewing natural history as a random pattern unfolding on an objective backdrop to a retrospective review of events which necessarily have to be viewed from the anchor of one's own subjective Aethus. Simply put, perhaps the major transition comes from the superposition property of Aethae itself: that is, in a classical metaphysical view, an observer exists at a single location in an objective reality, however within the Aethic view—as per the Aethic base principle of superpositions [1]—what we get instead is that an observer is better thought of as occupying the collection of all possible stances throughout the objective universe with equivalent net accessible information, (or at least that is the entry-level supposition, with the deepest supposition—the first postulate of the Aethus—then being to reframe the priority in full, so as to put the external world in superposition about this center, as opposed to first locking down the external world and then placing the observer in superposition). This idea both gives rise to the indiscriminate time principle, for which the past fans out to a superposition content to no less a degree as the future, and at once demands that we now switch our probabilistic modeling from being sequential-based to being strictly Bayesian-based, that is where natural historical events are inferred from the incomplete Aethic information of the agent

performing the analysis. One immediately pressing implication of this is that now the Drake equation [15] itself becomes ill-defined, because it still presumes the sequential-model of ontology.

Also, there are a myriad of categorical discrepancies which now surface. One such example is that the very concept of "non-avian dinosaurs" becomes categorically ill-defined, meaning we need a proper Aethus-invariant term to describe these same clades. The particular issue with the standing definition is that it is effectively circular logic. Under the Nexic paradigm's ontology, it first becomes necessary to assert a definition for each category which succeeds in describing the intended target when we effectively run "perturbations", if you will, on one's Aethus. One example of a poor definition of "dinosaurs", under this system, is one which pertains only to the exact set of all dinosaurs in one particular "objective reality" or otherwise identifies them with an overly specific indicator, like an exact—albeit as of yet Aethically unknown—genetic criterion. What happens in these respects is that by simply shifting to the perspective of another observer state under one's "set of all observer states" via the base principle of superpositions, and suddenly the definition of dinosaurs no longer applies in such a reality, because what we would intuitively identify as dinosaurs there have sustained slight alterations to the subtle properties with which that definition was defined. Altogether, then, a proper Nexic-ontological categorical definition must continue to match the intended intuitive target even when we transition between slightly-different Aethae. Here, then, is a proposed properly-Nexic definition of dinosaurs.

Definition 1 (Dinosaur) *The superclade (corresponding to a sufficiently broad anatomical distinction of choice*[9]*) which contains the clade of "theropods", who themselves are Nexically defined as the perpetrators of the Dark Era mechanism onto the biological ancestors of the observing Aethus's*[10] *associated agent.*

The "non-avian" dinosaur category then becomes immediately circular: that is, by so much as stating the desired stated-attribute that "the non-avian dinosaurs went extinct, not the dinosaurs", (being where the category is applied), we have that the term both needs to capture the set of all clades of dinosaurs which go extinct, but at once is dependent on the set of clades which do not—the avian dinosaurs. If we choose to define the avian dinosaurs as "the surviving clades", then we might imagine an arbitrary Aethus in which Pachycephalosauria also survives for whatever reason, and now they would have to be defined as "avian dinosaurs" under that categorization, which is of course unhelpful. The trick to fixing this for compatibility with the Nexic ontology, then, is simply to sever the necessary set-complementary status of the non-avian dinosaurs with avian dinosaurs, and instead proceed to define them more closely to their intended use in Aethically describing the extinction event. That is, we will literally define the term "threatening dinosaurs", for instance, to take its procedural place.

Definition 2 (Threatening Dinosaurs) *The set of dinosaur clades which, had they been introduced to the Cenozoic, would reproduce the Dark Era-like restraints to mammalian ecological dominance.*

We may then give the extinction event its proper breadth of framing for a Nexic argument. That is, it becomes "the threatening dinosaurs went extinct, not the dinosaurs", and then we further move to define "avian dinosaurs" as follows.

Definition 3 (Avian Dinosaurs) *The supremum by clade breadth of the set of all dinosaur clades not within the threatening dinosaur clade for which its last common ancestor is capable of flight, (and which remained extant leading up to just before the extinction event itself).*

Then, we may add that in our particular Aethus, it happens to be that the "avian dinosaurs" were the only dinosaur clade to survive the extinction.

This is meant to be a quick demonstration of how the introduction of the Aethic base principle of superpositions has drastic categorical consequences to how we must order natural history so that it might remain well-defined. These same changes indeed hold true under the more formal first postulate-based Aethic framing, but they are perhaps more obvious to classical paradigm-trained readers under the base principle of superpositions framing.

[9] Or, some other variability property, if a better one may be identified.

[10] See the subtle dependence on the first postulate [1] of the Aethus? That is, without a central Aethus all logic breaks down, as is effectively the procedural statement of the first postulate.

3 Statement of the General Accordance Principle

The idea of the general accordance principle is the following: consider yourself at present, to which we will assign the Aethus H_2, and consider some past Aethic version of yourself, to which we will assign the Aethus H_0. Let us specifically find H_0 to be the latest possible version of you for which the attribute A, being some particular natural historical event, is still non-present. By the principle of centric unfolding, we hold that H_0 is a parent to H_2. Now consider some Aethic partition of H_0, being some S, which is given to satisfy one condition: there exists an element of S, being some $H_1 \in S$, such that H_1 is a parent Aethus to H_2. We then arrive at the following principle.

Principle 3 (Aethic Mediocrity Principle)

$$\forall X \in S \setminus \{H_1\}, \mathrm{P}(X \mid H_0) \lesssim \mathrm{P}(H_1 \mid H_0) \mid H_2 \subset H_1 \subset H_0 \tag{3}$$

This is simply the *Aethic mediocrity principle*, being that likelier outcomes are most often favored. In this case we are merely arguing that you typically tend to centric unfold to the likeliest Aethae to each parent Aethus node, with H_1 likely holding the greatest weight in the partition just due to it involving the Aethus which you actually centric unfolded into, being H_2. This is not a strict rule so much as a strong tendency, (as is the case of the mediocrity principle in general).

This is already something of an intriguing statement, but its truly fascinating aspects come in when we regard what it means for A, being whichever attribute we might have chosen to define H_0 with respect to, with it being you last Aethus in Aethic time for which A was nonpresent. If we specifically consider the Aethic partition of $S = \{H_1, H_0 - H_1\}$, being merely a crossroads scenario, then we can further choose a value of H_1 as follows.

$$H_1 = H_0 \cap A \tag{4}$$

$$S = \{H_0 \cap A, H_0 \cap A'\} \tag{5}$$

The Aethic mediocrity principle then provides us with the following argument.

$$\mathrm{P}(H_0 \cap A' \mid H_0) \lesssim \mathrm{P}(H_0 \cap A \mid H_0) \tag{6}$$

The key, now, is to arrange this argument using Bayes' theorem, which will provide us with the statement of the accordance principle. We can begin by removing the instances of H_0 from the event of interest, due to it being implied already by the condition.

$$\mathrm{P}(A' \mid H_0) \lesssim \mathrm{P}(A \mid H_0) \tag{7}$$

Let us write the statement of Bayes' theorem.

$$\mathrm{P}(A \mid B) = \mathrm{P}(B \mid A) \cdot \frac{\mathrm{P}(A)}{\mathrm{P}(B)} \tag{8}$$

We may substitute our current cases into such a formula.

$$\mathrm{P}(A \mid H_0) = \mathrm{P}(H_0 \mid A) \cdot \frac{\mathrm{P}(A)}{\mathrm{P}(H_0)} \tag{9}$$

$$\mathrm{P}(A' \mid H_0) = \mathrm{P}(H_0 \mid A') \cdot \frac{\mathrm{P}(A')}{\mathrm{P}(H_0)} \tag{10}$$

As such, we may substitute both of these terms into our inequality statement.

$$\mathrm{P}(H_0 \mid A') \cdot \frac{\mathrm{P}(A')}{\mathrm{P}(H_0)} \lesssim \mathrm{P}(H_0 \mid A) \cdot \frac{\mathrm{P}(A)}{\mathrm{P}(H_0)} \tag{11}$$

We may factor out the term of $\frac{1}{\mathrm{P}(H_0)}$ from both sides, which gives us the following.

$$\mathrm{P}(H_0 \mid A') \cdot \mathrm{P}(A') \lesssim \mathrm{P}(H_0 \mid A) \cdot \mathrm{P}(A) \tag{12}$$

Lastly, now, we may rearrange these terms, so as to yield the completed statement of the general accordance principle. Note that we then substitute H_0 for H, which is meant to be a more generally applicable Aethus denoting "human existence."

Principle 4 (General Form of the Accordance Principle) *For some attribute of Earth's history, A, and some Aethus denoting general human existence, H, we have that the following holds more often than not.*

$$\boxed{\frac{\mathrm{P}(H \mid A')}{\mathrm{P}(H \mid A)} \lesssim \frac{\mathrm{P}(A)}{1-\mathrm{P}(A)}} \tag{13}$$

Note that the probability term on the right-hand side, $\mathrm{P}(A)$, may be considered to run with respect to the Cosmic Nexus, that way we do not violate the first postulate of the Aethus with its not holding a direct conditional statement.

3.1 Phrasing the Accordance Principle Through Aetherians

Note that there is an intuitive alternative way in which the accordance principle may be phrased using the underlying Aethic structure. Consider the Aethic mediocrity principle again, which we will use for the definition of an Aethus called an *Aetherian*.

Definition 4 (Aetherian) *Consider the collection of all possible mediocre Aethae, as would be consistent with the Aethic mediocrity principle. If we consider the superposition of all such Aethae, then we might refer to the resulting Aethus as* ***the Aetherian Aethus****, with any child Aethus to it being referred to as simply* ***an Aetherian****, with an Aetherian then being simply a subclass of Aethus. This is what we might refer to as the "nonweighted definition of an Aetherian", where the procedure is to simply take the middle percentiles of Aethae as measured by their weights in one's own parent Aethae, (by some subjective interval), and then include all such Aethae uniformly in the Aetherian Aethus.*

Another method, however, which is more compatible with the weighted mindset of Aethae, is to simply take the weighed superposition of every possible Aethus as according to their degree of mediocrity on the Aethic tree. Consequently, this is a satisfactory Null Aethus on account of being a parent to all Aethae, so we can refer to it as a Nexus. Specifically, such a thing can be known as ***the Aetherian Nexus****, and we might note that oneself has to conclude that this is their own Nexus by even defining mediocre Aethae through the Aethic mediocrity principle in the first place. This means that the alternative way of phrasing such a Nexus is that if one considers their earliest possible parent Aethus in Aethic time, then such an Aethus must be Aethically equivalent to the Aetherian Nexus if they themselves are given to be in a mediocre Aethus. This is the weighed definition of the Aetherian Aethus, which is more natural for its being a Nexus, but perhaps slightly less intuitive in the phrasing of the classical paradigm, where the nonweighted version is more consistent with set intuitions. However, due to their differing substantially only in rare edge cases anyway, we can consider them essentially interchangeable in all practical applications, unless otherwise specified.*

Notice that we will also use the term Aetherian for two other purposes. We will classify an Aethus as an "Aetherian", (being the subclass definition), where it is taken to be a mediocre Aethus in the Aethic tree, or is otherwise a child Aethus to the nonweighted Aetherian definition. (Note that this is equivalent to simply being a mediocre Aethus in the Aetherian Nexus, where we thereby define Aetherians from the weighted perspective). The other major use of the term "Aetherian" is simply to refer to an agent whose Aethus is classified under the Aetherian subclass.

Let us also consider the following important theorem of Nexic reasoning, and then we can move to the statement of *the cosmic accordance principle*.

Theorem 2 (Aethic Alternate History Theorem) *For any two agent-associated Aethae, A and B, on account of their both sharing a common parent Aethus at some point in their Aethic past, we have that the world of B can be represented as an "alternate history" of the world of A, and vice versa.*

The key here is to show an arbitrary element in the classical depiction of alternate realities. When we consider an alternate history, such as if Martin Luther was never born, we without a doubt still refer to that world as "Earth", just of another form. By this principle, then, we just as well should be able to refer to any inhabited planet throughout fiction as "Earth", because there exists an Aethically well-defined alternate history transformation which maps our world onto it. The highlighted issue, then, is that under any kind of Aethic paradigm, the dividing line between which alternate histories count as Earth as opposed to which do not is arbitrary. Accordingly, the Aethic update to this model is to consider that any two Aetherians can be expressed as living in an alternate history to the other, without there being a particular bound to such a thing.

We might also consider a kind of "strong Aethic alternate history theorem," in which a spatial component is also given to such an alternate history. That is, if the cosmic were large enough, then we can imagine an inhabited planet with any valid Aethus of circumstances to exist, and any of those planets could be written as an alternate history to our own, so therefore it follows that Aethic alternate histories themselves can be seen as equivalent to just as much a spatial argument as an Aethic one. Even if the universe is finite and not infinite, we nonetheless can picture an interpretation of spacetime in which there exists a spacetime for which the union of some number of subspaces to that spacetime is given to contain any number of alternate histories of Earth. The specific way to do this might be to define a term, such as a "biological hyperblock." The specific idea is that we imagine a hyperblock universe, (i.e. a space defined as a Cartesian product between a spacetime continuum and an Aethic dimension), for which the Aethic dimension is considered to depict merely the planet or perhaps biosphere-wide properties of the corresponding world. If we then set the Cartesian origin of every spacetime continuum therein to the inhabited planet which its Aethic coordinate depicts, we accordingly have that each central inhabited world in each Aethic cross section of the biological hyperblock can be written as an alternate history to any other, on account of the Aethic alternate history theorem. The strong Aethic alternate history theorem then suggests that we might to think of such a biological hyperblock as almost a kind of well-defined physical space by itself. As an analogy, this is somewhat like filing many pieces of paper – each a pure spacetime continuum – away in multiple folders in a stack, but then treating the entire stack as a kind of pseudo-physical space itself on account of there existing subspaces, (simply connected or not), to it which are entirely physical, and without an Aethic breadth. For the stack of papers, this is analogous to considering only the subspace of the stack which consists of the papers. In essence, we can consider a "biological hyperblock cosmos" to be a generalization of a "cosmos", such that it highlights the context of alternate histories within such a cosmos, essentially storing them physically and without the need for each Aethic cross section cosmos to be infinitely large. (Note that there could be many a sci-fi stories in which civilizations learn to traverse their biological hyperblock cosmos just as they once traversed space or the ocean – in essence the final frontier is only what you make of it).

We may now define *the cosmic accordance principle* as follows.

Principle 5 (Cosmic Accordance Principle) *If oneself is an Aetherian, then for any subspace of a biological hyperblock cosmos which one is given to occupy, one can see themselves to take the form of a uniformly random Aetherian in the set of all independent Aetherians in that subspace.*

What we now gather from this is a major mathematical result: the processes and circumstances of the cosmos which are likelier to generate Aetherians will house a higher density of Aetherians as opposed to the processes which do not. As such, through a simple application of the mediocrity principle, we have that oneself will tend to exist within those circumstances with the higher Aetherian density, and therefore will have to exist in the places of the biological hyperblock cosmos which have the highest probability of generating Aetherians in the first place. This is a very important premise by itself, because we can use it to, in a sense, "reverse engineer" the original probabilities of happenings from this condition that we are already typically present among the highest-likelihood circumstances at generating Aetherians with respect to the Cosmic Nexus anyway. This formulation is mathematically equivalent to the accordance principle, hence representing another means of deriving it.

$$\frac{\mathrm{P}(H \mid A')}{\mathrm{P}(H \mid A)} \lesssim \frac{\mathrm{P}(A)}{1 - \mathrm{P}(A)} \tag{14}$$

3.2 Orders of Nexic Arguments

Note that we can create a system of orderings to different Nexic arguments, similarly to what we do for differential equations. The convention is the following.

Orders of Nexic Arguments
The order of an argument of Nexic reasoning is given by counting how many inductive applications of the accordance principle separates it from an empirical statement. As such, a direct empirical statement would be a *zero-order Nexic argument*, and a statement given by a single application of the accordance principle onto that statement would be a *first-order Nexic argument*. For a further argument which is is based upon applying the accordance principle to many statements, we set the order only to one more than the largest order among those statements, just as we might do for a sum of ordinary differential equations. We must also note that it is technically possible to take overly many steps of applying the accordance principle to get to an empirical statement, so truly the correct order of a Nexic statement would be to find the correct decomposition of itself into further statements from which its order is derived, and then simply choose whichever decomposition minimizes its order. We may define this as follows with notation.
Consider some statement, X, and the set of all derivational accordance decompositions to it, $\mathcal{D}(X)$, such that each derivational accordance decomposition is given to be a set of statements with the application of the accordance principle onto each collectively implying the statement X. Note that for an empirical statement, we can therefore denote its derivational accordance decomposition as merely the empty set, because it does not require an incorporation of the accordance principle at all to state it. Given these things, we get the following recursive definition for the Nexic order of X, being some $\mathcal{O}(X)$.

$$\mathcal{O}(X) = \min_{D \in \mathcal{D}(X)} \left(0 \text{ if } D = \varnothing \text{ else } 1 + \max_{Y \in D} \mathcal{O}(Y) \right) \tag{15}$$

4 The Accordance Principle and the Dinosaurian Context

Among the most incredible immediate applications of the accordance principle[11], perhaps, is what it implies about the context of dinosaurs in the broad scope of natural history. We will use this as a beginning tool to gain a broader understanding of the power of applicability that is the accordance principle.

We have already shown with the anthropic accordance principle that the state of the dinosaurs having gone extinct is an anthropic parameter, but there is perhaps an even more fascinating realization to be had because of this, which essentially serves as a second-order Nexic argument to extend this. Specifically, while the extinction event of the dinosaurs is somewhat intuitively an anthropic parameter, it is a more surprising result that *this also implies the origination of the dinosaurs in the first place as another anthropic parameter*, with the Mesozoic Era essentially being bounded by two anthropic parameters in time. Intuitively speaking, the derivation for this runs as follows.

[11] Indeed, it is for this exact dinosaur existence-as-human-requisite idea that I developed the accordance principle in the first place, sometime before mid-2020, (although I unfortunately do not remember the time of origin beyond my first written record of the derivation in the summer of 2020). So, in 2020 the accordance principle and this applicative derivation were effectively one in the same, and it was not until 2021 that I actually deliberately disentangled the two, that way I could render the accordance principle as a general logical statement. This was the form of the original full Nexic reasoning formalism of 2021 and 2022, but as we know, with Aethic reasoning [1] itself in 2022 and 2023, I went a step deeper still by actually motivating the accordance principle from Aethic ontology, as opposed to just taking it at face value like my 2021 formalism did. So, explicitly speaking, what I mean to say is that this specific dinosaurian two-node circumstance thought experiment was quite literally the origin of the entire Aethic-Nexic research program.

Also, something of an additional fun fact that might be unexpected: if you had asked me in early 2023, (post-Aethic reasoning completion), what I considered my "main formalism" to be, I would have said Nexic reasoning instead of Aethic reasoning, (so in other words, it was not that I stopped one and began only working on the other). That is, I remember explicitly describing Nexic reasoning at the time as being like my "fun treasure hunt" framework, with Aethic reasoning being like its "stern board room meeting" offshoot. So I would go to work on each whenever I was in the mood for its "personality". Now however, ironically enough, I consider Aethic reasoning as more of a relaxed and casual personality with respect to active reasoning [1], which is the yet even sterner and more focused personality.

Conceptual Derivation of the Dinosaurian Origination Anthropic Parameter
There is an intriguing followup question which we might think to apply to the very supposition of the dinosaurian extinction serving as an anthropic parameter: *does this then mean that the state of the dinosaurs existing in the first place has to be an anthropic parameter also, as after all for the extinction of the dinosaurs to count as a major anthropic parameter, there must actually be dinosaurs to speak of?* The analysis of this query under the accordance principle will serve as the next major portion of our contextualization of dinosaurs.
The major premise we can draw from the empiricism is that the extinction of the dinosaurs is not only an assessment of the dinosaurs having to have gone extinct, but also that the existence of the dinosaurs in the first place was an important enough parameter that it was effectively likelier for humans to be generated by the universe through those means than through a substantially alternative means. We can see clearly that for the dinosaurs to have existed at all was already a fundamentally unlikely circumstance for ever generating humans on our planet, because such an outcome is dependent upon the already unlikely event of dinosaurs going extinct so as to enable human existence. As such, we have that either the alternative scenario to dinosaurs existing is even more devastating with regards to the low probability of human existence, or the accordance principle would imply that our Aethus should have wound up there instead on account of its substantially friendlier probability of generating us. The latter contradicts our clear empirical result of having been born into the scenario in which dinosaurs exist, so we therefore have to conclude, at least according to the accordance principle, that however unlikely it was for Aetherians to be generated through the scenario in which dinosaurs come into being and then have to be wiped out, it is somehow even more desperately unlikely that Aetherians could have been successfully generated through the alternative scenario.

The derivation will follow from this essential line of logic. Let us now begin accordingly.

4.1 Stating Our Empirical Postulates

We may start with the empirical statement from which all Nexic properties of the dinosaurs derive, being that their state of going extinct was very unlikely for the time under the Cosmic Nexus.

Postulate 4 (Postulate of Unlikely Dinosaurian Demise) *The dinosaurs were unlikely to go extinct, such that the mammals survive.*

Importantly, not that this postulate associates with a peer-reviewed empirical assessment. The involved paper approximates the probability of dinosaurs being wiped out at no more than a 13% chance before their day of demise [14]. The reasoning is, as was found, that only certain geographic locations on Earth, namely those containing subsurface sulfur deposits, would have carried the required devastation to kill the dinosaurs should the asteroid strike there. For the postulate of unlikely dinosaurian demise, we also add the condition that the dinosaurian extinction was unlikely given that humans are to someday exist. This is simply to counteract any possibilities of Earth's maintained habitability being low over geologic timescales. So long as we cannot tell if that is given or unlikely, we can only reference the probability of dinosaurian demise through the lens of scenarios where we exist. As such, we might reformulate that 13% value to state that the probability of an extinction event happening that is devastating enough to wipe out the dinosaurs, but somehow not devastating enough to wipe out the mammals, is what is so unlikely.

Given this statement, we are then allowed to take the extinction of the dinosaurs as an anthropic parameter due to the accordance principle.

Postulate 5 (Principle of Dinosaurian Dominance) *If the dinosaurian dominance over the ecological sphere had remained, then the probability of mammals beyond the size of a dog or with otherwise highly variant niches existing would be very low. The probability of humanity, consequently, would be next to nothing. This puts the extinction of the dinosaurs as an anthropic parameter.*

Note that this postulate also comes with strong empirical evidence. For one, the fossils from the Mesozoic Era indeed paint a clear picture of which mammalian niches are allowed so long as dominant dinosaur clades remain. Moreover, just a few million years after the non avian dinosaurs disappeared, the mammalian variety of niches had exploded to far beyond the scope reached during the entire

Mesozoic [16]. Unless we suppose that the probability per unit time of mammals expanding their niche variety rapidly rose following the extinction event, it would be exponentially unlikely that such an explosion happened so quickly and directly at that time. Thus, we are forced by the mediocrity principle to suppose that the mammalian niche landscape during the Mesozoic was extremely limited, and would continue to be in any extrapolated Mesozoic. As such, we get the postulate of dinosaurian dominance.

4.2 Derivation of the Dinosaurian Context

Consider the following graphic, which serves as a pictorial representation of the remainder of the derivation.

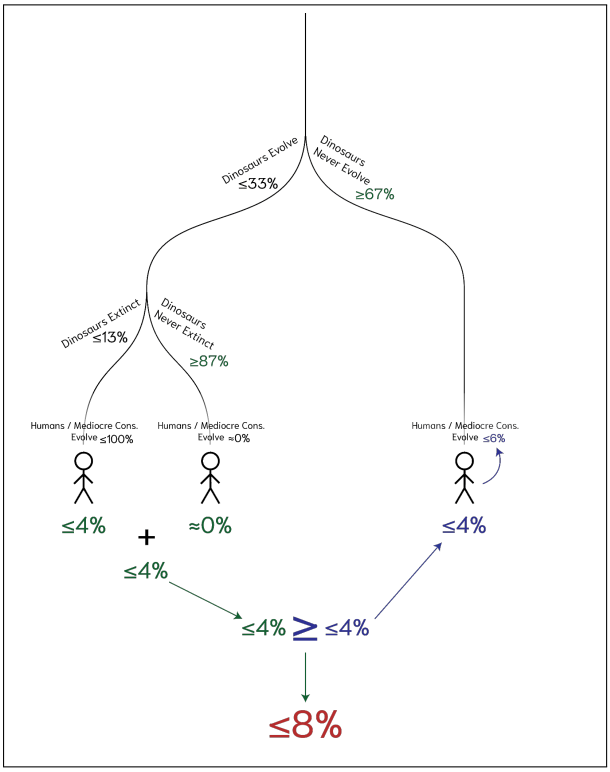

Figure 3: *A graphical representation of the particular two-node circumstance in question.*

To begin the formal derivation, we may begin by supposing that the likelihood of the dinosaurs evolving in the first place is perhaps roughly on part with a one-in-three chance, as we know that of the three eras in the Phanerozoic, none other than the Mesozoic produced an ecologically dominant clade quite to the extent of the dinosaurs. As such, our best approximation for the probability of such a clade evolving is very roughly a 33% chance.

Given this value, as well as the 13% chance of the dinosaurian extinction, we may calculate an upper bound for the probability of human evolution in such a scenario due to conditional probability. If we declare the dinosaurian evolution as the Aethus A, the dinosaurian extinction as the Aethus B, and the eventual existence of Aetherians in the biosphere as the Aethus H, then we may use the accordance principle to make the following claim.

$$\mathrm{P}\big(H \cap (B \cap A)'\big) \gtrsim \mathrm{P}(H \cap B \cap A) \tag{16}$$

We may then expand both sides.

$$\mathrm{P}(H \cap B \cap A) = \mathrm{P}(H \mid B)\ \mathrm{P}(B \mid A)\ \mathrm{P}(A) \tag{17}$$

$$\mathrm{P}\big(H \mid (B \cap A)'\big) = \mathrm{P}(H \cap B') + \mathrm{P}(H \cap A') \tag{18}$$

It is important to note here that, by the postulate of dinosaurian dominance, we have that $\mathrm{P}(H \mid B') \approx 0$, so therefore we may simplify the above term further.

$$\mathrm{P}\big(H \mid (B \cap A)'\big) = \mathrm{P}(H \cap A') \tag{19}$$

We may now substitute into the larger inequality.

$$\mathrm{P}(H \mid B)\ \mathrm{P}(B \mid A)\ \mathrm{P}(A) \gtrsim \mathrm{P}(H \cap A') \tag{20}$$

Notice how we already have the empirical approximations of $\mathrm{P}(H \mid A') \approx 13\%$ and $\mathrm{P}(A) \approx 33\%$, so substitution becomes available.

$$\mathrm{P}(H \mid B) \cdot 13\% \cdot 33\% \gtrsim \mathrm{P}(H \cap A') \tag{21}$$

We may now simplify accordingly.

$$\frac{\mathrm{P}(H \cap A')}{\mathrm{P}(H \mid B)} \lesssim 4\% \tag{22}$$

Lastly, we may take advantage of the identity that $\mathrm{P}(H \cap A') = \mathrm{P}(H \mid A')\ \mathrm{P}(A')$ to write the following, where $\mathrm{P}(A') = 1 - \mathrm{P}(A) \approx 67\%$.

$$\frac{\mathrm{P}(H \mid A')}{\mathrm{P}(H \mid B)} \cdot 67\% \lesssim 4\% \tag{23}$$

$$\boxed{\frac{\mathrm{P}(H \mid A')}{\mathrm{P}(H \mid B)} \lesssim 6\%} \tag{24}$$

This itself is our fundamental probabilistic statement about the dinosaurs[12]. Let us write this as the fundamental probabilistic context of dinosaurs.

Principle 6 (Fundamental Probabilistic Context of Dinosaurs) *The probability of Aetherians existing on Earth in an extended-Paleozoic scenario will never be more than six percent the likelihood of the probability of Aetherians eventually evolving as of the very beginning of the Cenozoic.*

In effect, it is clear that even with the highest probability of us eventually existing at the very beginnings of the Cenozoic, and the extended-Paleozoic scenario will still have very low likelihoods associated with it. In effect, we have that the origination of the dinosaurs themselves was, of all things, an anthropic parameter.

4.3 Hypothesizing Why Dinosaurs Could be an Anthropic Parameter

At least for the case of dinosaurs, we have just performed the important first of two steps for an argument of Nexic reasoning, being the mathematical expression. But given this setup, it now becomes just as important to couple this result to a tangible paleontological hypothesis. Let us do such a thing now.

The first contextual phrasing of the property of dinosaurs being an anthropic parameter might be how *it seems to be the case that biospheres with intelligent life all had an analogue of dinosaurs in their past, who would have performed onto them whatever causal effect our dinosaurs applied onto us.*

Our hypothesis regarding the subject is that all of the major recent discoveries about dinosaurs, ranging from their effect on our lifespans [17], to our skin composition [18] and trichromatic vision [19], are all hints of some deeper underlying phenomenon that existed during the Mesozoic, and directly triggered the spark that would become human sentience and cognition. That is, the existence of dinosaurs themselves in the ecosystem would have removed some precise evolutionary obstruction in ourselves which we could not have handled otherwise, (given how we now know that their lack of existence would severely reduce our own chances of existence). So these things are not just a collection of unrelated Mesozoic happenings – actually the Mesozoic can be seen as a direct procedural event toward getting us past this obstruction.

The question, then, is what such an obstruction might have been specifically, and what about the dinosaurs enabled its dissipation. To begin with, let us find our best hypothesis for what the obstruction is. There is a clear likeliest contender for the answer to this – due to Occam's razor

[12]So as not to understate this point, this ability of Nexic reasoning to provide information about the workings of alternate histories to arbitrary probabilistic precision is the direct mechanism by which it constitutes a special case of an Aethic [1] interaction-free measurement [2] outside of the domain of quantum mechanics altogether. While this does not yet constitute a full Aethic generalization of quantum interaction-free measurements, it is of course rather striking and deeply informative that we are able to replicate the effect in the first place without ever once referencing the quantum wavefunction, (and especially with such a simple logical statement as the accordance principle, at that). Altogether, then, this is certainly an immediately-viable avenue through which we might further research the interplay between Aethic reasoning and the capacity of our universe to provide us with these sorts of non-classical phenomena.

– which can be given by examining what we did indeed successfully evolve during the Mesozoic on account of the paleontological record. This, namely, would have been the neuroanatomical *limbic system*, being the mammalian portion of the triune brain. Note how this is directly distinct from the brain structures of earlier and exterior amniotes, (which meets one condition of this obstruction, being that it directly deviates the extended Paleozoic from the historical Mesozoic), and that it serves as a direct and crucial prerequisite to the human mind, (which hence meets the other condition of this obstruction). That is, the accordance principle implies there must have been an obstruction in our evolution which was relieved by causality onto us from dinosaurs, and we can further argue that the optimal hypothesis for this obstruction is that it regarded the near improbability of us evolving the limbic system. But the limbic system would have not only been near-improbable to evolve – it is further given by our prior logic that the existence of the dinosaurs in the environment is essentially the only possible avenue toward us actually attaining a limbic system at all.

This now leads into the next question, being which clade or set of clades of dinosaurs were most relevant to this causal evolution of the limbic system. It seems likeliest, perhaps, that this phenomenon involved theropod dinosaurs primarily, because they are the only clade of dinosaurs that could have held close ecological interactions with our ancestors without pause. Any other dinosaur type seems to either have been continuously elsewhere on the scene, or would have only interacted with our kind in passing. Let us also suppose that the obstruction itself is generally applicable, and regards the enablement of the limbic system in the first place in its earliest form, (hence directly relaying it back to what was shown by the accordance principle). If, then, the existence of the limbic system was indeed sparked by interaction with theropod dinosaurs, it would follow that the nature of this interaction would have to be chiefly distinct from what our lineage might have met in the extended Paleozoic scenario of $A_1{}'$. So the existence of theropod dinosaurs would have not only been impactful onto our ancestors, but it would have been impossible to replicate without the precise dinosaurian nature of theropods. As such, the setting of the Mesozoic Era seems to be a kind of dark era of human evolution[13], where the mammalian quality of life was at such a low, that the major leaps in our evolution, both physical and mental, were forced to occur from the ecological pressure. As we can see, these leaps would never materialize without such pressure, so it seems that the anomalous cognition of a mediocre consciousness is, strangely, simply a consequence of the most scarring of pressures inflicted from dinosaurian predation. But this, in effect, shaped us into who we are fundamentally. It is a striking and intriguing insight to ponder.

In summary, then, we can list in twelve steps the procedure of deriving this idea of the dark era of human evolution.

1. The probability of a future in which dinosaurs evolve, go extinct, and then have humans evolve is very low relative to a world in which dinosaurs are yet to evolve.

2. Derive the accordance principle.

3. The accordance principle states that a world where dinosaurs never came to be has to be very unlikely to produce humans in the grand scheme of things.

4. A world with only the condition that dinosaurs evolved and went extinct is already more than an order of magnitude likelier to generate humans than a world in which dinosaurs never come to be.

5. There must therefore be some ontologically describable obstruction throughout the typical chain of human evolution which the ecological existence of dinosaurs relieved.

[13]The broad idea here is that we can create an alternative to the geologic timescale (GTS) of the International Commission on Stratigraphy [20]. Note that the standard preexisting timescale is a great notion, and we ought not to replace it with this new idea. Instead, we merely mean to discuss alternative lenses to natural history using this alternative system. Specifically, where the GTS is fundamentally tailored to stratigraphy, we can consider it to be something of an objective approach to comprehending natural history, being what we can dig up from the ground as a passive observer in the modern day. Alternatively, we now propose the accordance timescale, (ATS), which is instead the subjective analogue to the GTS. That is, we might tailor the ATS to the direct experiences of our ancestral species and our lineage at large – a feat which is now made at least doable by the accordance principle, even if it is not entirely simple. That is, where the objective Mesozoic is just the Mesozoic itself, the subjective Mesozoic, (leaving a lasting impact on your existence at this very moment), might be referred to most accurately as *the Dark Era*, a name serving as a product of the accordance principle itself. This, then, is what is meant by expanding the accordance principle to a variety of other circumstances in natural history, or at least it serves as a major component of such a thing.

6. This obstruction had best be directly related to that which we actually did evolve during the Mesozoic, because we do indeed know it had to have been removed in our timeline, and as such would have reflected that empirically.
7. The obstruction can be seen to be the difficulty of evolving a limbic system. Therefore the limbic system can only be generated in our ancestors if they live in the same environment as dinosaurs of some sort, and even then it is very unlikely to be successful.
8. Such correlated dinosaurs should be theropod dinosaurs.
9. Theropod dinosaurs would have exhibited a predatory relationship with our ancestors, meaning our interactions with them would have been unfavorable from our perspective.
10. The interactions are both unfavorable and highly influential, thus meaning they must have held a chief level of severity compared to most other scenarios.
11. Hence, the Mesozoic era can be seen as both a very influential and keystone era in our evolutionary history, as well as an anomalously dark and unpleasant time for us.
12. Therefore, we ought to refer the Mesozoic as "the dark era of human evolution."

These kinds of direct consequences onto the functioning of the world hold a crucial importance to the scientific validity of the accordance principle, because they will allow us to generate direct predictions with it, and then test them with the scientific method. If these predictions generally hold true, then it will follow that the accordance principle holds respectable merit. But if many or most of them do not hold true, then that will falsify the accordance principle. *Such a thing operates as a direct avenue through which we can test the claims of the accordance principle to a level of scientific rigor, hence allowing us to further relay any results to their implications within Nexic reasoning, Aethic reasoning, and even the solution to the Fermi paradox.*

5 Nexic Reasoning as a Solution to the Fermi Paradox

Let us now look to the Fermi paradox with this lens of Nexic reasoning. The Fermi paradox is quite frustrating in its modern form, because the entire spectrum of supposed solutions to it represents a genuinely ascientific [21] debate. This is simply because, clearly, every proposed solution to the Fermi paradox is unfalsifiable by any proactive means. This, however, may be due to change given Nexic reasoning.

Let us begin by taking a moment to clarify the meanings of the Rare Earth hypothesis [3] and the Copernican principle. Simply put, the Rare Earth hypothesis posits that life is fundamentally rare in the universe. Life existing infrequently, across large distances from other life, and with generally low probability to a planet or even a galaxy are common claims under this general umbrella. Regarding the Copernican principle, then, it argues the exact opposite, and it does so using the intricate fundamentality that is the broader *mediocrity principle*. It is, in truth, very hard to argue against the mediocrity principle, and this serves as its primary mode of evidence. Somewhat ironically, then, we are to directly combat the Copernican mediocrity principle in this paper with the Aethic mediocrity principle, so we truly are fighting fire with fire, as the phrase goes. The Copernican principle itself is simply an application of the mediocrity principle to our location and cosmic neighborhood in the set of the entire universe. Since we see that our neighborhood is filled with all the right conditions of life, and then the lush benefits of those conditions right here on our own planet, then through the mediocrity principle, the Copernican principle argues that most of the universe should be just like this, too. Otherwise, it argues, we would have been born in an anomalous location in the universe, which, (arguably), invalidates the mediocrity principle. Over the course of this paper, we will demonstrate now why this inductive supposition is, although straightforward, likely ultimately fallacious. However the primary goal will be to describe the logic behind extrinsic solutions in general, whose insights are a necessity to make such judgments in the first place.

5.1 The Derivation

To derive the Rare Earth hypothesis from the accordance principle is as simple as one algebraic step. Let us begin with the statement of the accordance principle, as written in its expanded form.

$$P(A)\ P(H \mid A) \gtrsim P(A')\ P(H \mid A') \tag{25}$$

We may add the left hand side to both sides of the inequality, and then simplify.

$$2\,P(A)\;P(H \mid A) \gtrsim P(A')\;P(H \mid A') + P(A)\;P(H \mid A) \tag{26}$$

$$P(H) \lesssim 2\,P(A)\;P(H \mid A) \tag{27}$$

$$P(H) \lesssim 2\,P(A) \tag{28}$$

Regarding the substitution of terms, we may use any empirical circumstance which we wish, (and through statistical inference over all possible bouts of empiricism do we see that the accordance principle is strictly tied to the Rare Earth hypothesis rather than the alternative). To take the same example of the dinosaurs, as earlier, we may use the Aethus of the dinosaurs evolving and then going extinct as A, thus allotting our characteristic form of its probability under the Cosmic Nexus.

$$P(A) \lesssim 4\% \tag{29}$$

We therefore have a closed form for the probability of humans through substitution into the larger equation.

$$P(H) \lesssim \frac{1}{12} \tag{30}$$

This, itself, is a potential derivation of the Rare Earth hypothesis using the principles of self and cosmic mediocrity. Beyond this, however, it would be useful to compile more probabilities still, through the use of further empirical circumstances beyond what we saw with the dinosaurs. Anything may be used, from the order of planets in the Solar System [22], to the improbability of the moon [23], to seemingly obscure things like the coincidental loss of α-gal production in catarrhine primates [24] or the distribution of theropods across the latest Cretaceous islands [9]. Anything which stands out as a fluke will multiplicatively contribute its probability to the rarity of mediocre consciousnesses existing per biosphere, as per the accordance principle's formula.

Is it important to note that the procedure of using the accordance principle is meant to be general rather than specialized to only dinosaurs, as was done merely in this particular instance of an empirical circumstance. Generally, the notion is that one ought to attempt to find the best empirical circumstance which applies to a particular attribute in question of Earth's biosphere, and then from there we can derive this instance of probabilistic rarity for it. It is a valid claim that perhaps this single circumstance here traversed is not statistically significant enough to make a broader claim of the Rare Earth hypothesis, yet this was never the claim of this paper in the first place – instead the notion is that for several dozen or more circumstances to be collectively demonstrated must then imply a very strong statistical significance by comparison, (with such a thing only furthering with any further analysis still). By the collective accumulation of empirical circumstances, we on one hand derive the Rare Earth hypothesis, and by the clever applicative tailoring of two-node circumstances to particular attributes do we derive the Rare Earth hypothesis on the other hand, (being that, given some human or Earthly-specific Aethic attribute on our world, we might write up a derivation for why it fails to be rigorously applicable to any other given exoplanet[14] or otherwise probabilistically mediocre external system to us).

All this being said, it is clear through empirical suggestion that the principle of self mediocrity together with the principle of cosmic mediocrity tends to imply the Rare Earth hypothesis, which itself implies the falsehood of the Copernican principle. Therefore, the definitive Nexic solution to the Fermi paradox is derived, and to scientific rigor at that. *If we find sufficient evidence to empirically falsify the accordance principle, then we will have falsified the Nexic Fermi paradox solution as well, but if we fail to falsify the accordance principle after sufficiently many attempts, and it will have risen*

[14] Consider a direct effective application of this notion: the exoplanet K2-18b is currently under debate of either being a life-inhabited Super-Earth, or instead a lifeless mini-Neptune [25]. To assess the scientific validity of each claim, then, we might make use of a tailored instance of the accordance principle. We can draw certain properties from Earth which are being assumed to be shared with this planet under the inhabited Super-Earth argument, (being, for example, abiogenesis, the evolution of Eukaryote-like lifeforms and or photosynthesis, suitable atmospheric pressure magnetism on the surface, and many more), and then tailor a one or two-node circumstance to any one of them. Consequently, we get a direct scientific argument, as per the accordance principle, that such assumptions are in the very least at odds with Occam's razor, and at most utterly improbable. This then tells us that the mini-Neptune argument is far and away the superior scientific claim. A general philosophical razor can be drawn from this as well, being a kind of "accordance razor": *do not assume an external property's similarity to biologically-correlated-Earth when it can be adequately explained by dissimilarity.* (Here, by the way, "biologically-correlated-Earth" simply means the Aethus of all properties which are at least moderately positively correlated to one's own capacity to exist).

to the level of a theory, thus giving humanity its first theory of the Fermi paradox solution in the process[15]. May time be the judge of where such a process leads.

Speaking in the positive for a moment, if we can empirically show that the accordance principle holds at least 50% of the time, thereby providing it with scientific validation, then by implication such will also amount to scientific validation of both the Rare Earth hypothesis and the Aethic extrusion principle. To be clear, due to the cascading effects of the Bayesian probabilities involved, even showing the accordance principle holds 10% of the time without fail will be sufficient to derive the Rare Earth hypothesis given even a few dozen unlikely events which satisfy it. In the face of the vastness that is natural history, finding this many would almost certainty be doable with the right resources. The premise, then, is that the Rare Earth hypothesis is implied as a function of the net sum of unlikely circumstances which satisfy the accordance principle, rather than the proportion of them which do, and this is perhaps the most compelling facet of all with regards to the immediate scientific-potential of Nexic reasoning. Regarding the particular experimentation process for this, the idea is that we want to find testable predictions which align with the satisfaction of the accordance principle on particular attributes. Once again, it seems that there is no shortage of such inductive arguments to be made. One immediate compelling example of this is the *Haţeg primate hypothesis* of later on in this paper, in which a direct implication of the accordance principle is made, *being that primates ought to have originally evolved on Haţeg island during the Late Cretaceous.* Even a single primate fossil in the Haţeg deposits would verify this claim, then, which itself would count for one accordance principle satisfaction. The name of the game, so to speak, is to then write up as many such Nexically-informed inductions as we can, and afterwards attempt to test them all. If we could get even a hundred under our belts, and that will already be consistent with a direct claim for the probability of humans existing on Earth due to Bayes' theorem, (as per the conversion procedure shown in this section). As such, let this be the statement of the primary experimental goal for Nexic reasoning at present, and potentially even Aethic reasoning at large.

Note that the Aethic potential itself from validating the accordance principle to this extent is also quite breathtaking. If we indeed scientifically validate the accordance principle, then such a thing will, by implication, validate the Aethic mediocrity principle due to their logical equivalence. Once we got that far, then the sky would be the limit for Aethic implications. The immediate consequence would be that it would directly verify the extrusion principle, because the Aethic mediocrity principle is indiscriminate of time, and therefore aligns with the Aethic ontology of time rather than any timeline-branching model. Of course, then, a direct experimental validation of the extrusion principle would be of vast relevance to all of Aethic reasoning, as we know already that Aethic reasoning itself is effectively the art of inducing the extrusion principle into that system which solves the measurement problem. As such, let this be yet another reason for why validating the accordance principle is of primary experimental importance at present.

5.2 Followup Nexic Extrapolations

One further analysis we may follow up the direct Mesozoic realization with is to notice how since the probability of an Aetherian existing in our biosphere was no more than twelve times less at the start of the Mesozoic as it was at the end of the Mesozoic, it then follows through multiplicative extrapolation that over the entire four and a half billion years of Earth's existence, that the probability of mediocre conscious existence might have been as low as a one in one decillion (10^{-33}) chance at the beginning of Earth's history, or in other words for the average planet in the universe. That would then place the abundance of mediocre consciousness at perhaps no more than one per entire observable universe on average. The only way for such an extrapolation to be invalid, furthermore, would be for the Mesozoic to have seen an anomalously high rise in human probability compared with the rest of deep time. Such a situation would make it quite a fluke that our own analysis just so happened to stumble upon the Mesozoic and use its empirical circumstance as the root of the calculation, rather than just picking any of the likelier average phenomena. So, by another mediocrity principle application,

[15]Please note that the ability of Nexic reasoning to deduce the low probability of existence is not limited only to the culmination of human intelligence. Indeed, since Nexic reasoning is already shown to be capable of forming relational implications between different attributes, (such as the dinosaur evolution and dinosaur extinction, for example), we might then suggest that there ought to exist relational implications for constraining the cosmic probability of individual attributes toward human existence as well. For example, should we constrain the probability of our attribute of Eukaryotic life evolving out of Prokaryotic life, then suddenly we will also create a sweeping implication on the general rarity of complex life throughout the universe in the process. The general pitch, then, is that given Nexic reasoning and sufficient paleontological empiricism, we ought to be able to constrain the probability of any form of life arbitrarily far back on the evolutionary ladder with respect to an arbitrarily low upper bound.

the very statement of supposing that a random period of Earth's history was analyzed in this paper implies that this extrapolation to the shocking 10^{-33} improbability should be valid to the extent of the trust in that randomness.

Whether this is quite as strong an argument as the accordance principle is speculative, but it does indeed serve as something to think about.

6 Fundamental Theorem of Nexic Reasoning

In this section, we will state *the fundamental theorem of Nexic reasoning*, which can be written as follows.

Theorem 3 (Fundamental Theorem of Nexic Reasoning) *Consider five conditions, given two Nexae, N_A and N_B, which we will refer to as the attentor and the contentor, respectively.*

1. $\mathrm{P}(N_A \mid N_C) \ll 1$
   - *The probability of the attentor under the contentor is extremely minute.*
2. $\forall Z, \mathrm{P}(Z \mid N_A) \approx \mathrm{P}(Z \mid N_A, N_C)$
   - *The attentor and the contentor are statistically independent.*
3. $X \operatorname{med} N_A$
   - *The Aethus X is mediocre to the attentor.*
4. $\mathrm{P}(X \cap Y \mid N_A) = 0$, $\mathrm{P}(N_A \mid X \cup Y) = 1$
   - *The Aethus Y is a disjoint Aethus to X for which their union is a child Aethus to the attentor.*
5. $\mathrm{P}(Y \mid N_C) \approx \mathrm{P}(Y \mid N_A, N_C)$
   - *We cannot prove that Y and the attentor fail conditional independence with respect to the contentor.*

Given these things, the following almost surely holds.

$$\mathrm{P}(Y \cap N_A \mid N_C) \ll \mathrm{P}(X \cap N_A \mid N_C) \tag{31}$$

Thus, we have that given the truth of all five conditions, the contentor regards Y as having a vastly lower probability than X.

The importance behind this is that given a property, X, which is mediocre in the attentor, and a disjoint property to X, being Y, we cannot possibly generate a more probable Y than X with respect to the contentor without knowing for sure whether it is conditionally dependent on the attentor with respect to the contentor.

Let us also consider the corresponding definition of Aethic mediocrity.

Concept 2 (Aethic Mediocrity) *Consider some Aethus, A, and a child to it, B. Also consider some probability distribution, X, such that its sample space contains some Aethic partition of A, with B being an element of this sample space. If an X can be defined such that B holds a quantile between $\frac{\alpha}{2}$ and $1 - \frac{\alpha}{2}$ inclusive, (where α is the respective bound span), then it follows that B is mediocre to A under that $1 - \alpha$. (With mediocre in general assuming some value of α which is not absurdly close to one, essentially as is analogous to confidence intervals).*

6.1 Example of Application to American Names

As an example of the usage of the fundamental theorem of Nexic reasoning, consider the Aethus of the first names of all Americans which use only the 26 letters of the English alphabet, (as well as a space, totaling to 27 characters), and also have twelve or less characters in their name. We can define the Nexus on this to mirror exactly what we see in the world at this moment in such a category, where each child Aethus – being a name itself – is weighted proportionally to the number of Americans who

have that name. The top weight might be James or whatnot [26], and then so on for the remainder of the names, altogether forming the Aethus of "valid" first names under our condition. We will however consider the Bayesian generalization of such a frequentist assessment, specifically where the weighting of a name is directly given by the probability that a random newborn baby is to be assigned it, so as to be able to extrapolate to the myriad of vastly unlikely names out there, whether anybody in existence has the name yet or not. Let us suppose that we call the Null Aethus under this Nexus as some N_A, which will be our attentor for the derivation. Then, beyond this, consider our contentor, being N_C, which simply corresponds to the Aethus of all twelve or less letter names, weighted by their uniform conceptual occurrence rather than anything else. So, equivalently, the Nexus of these names where each character is fully randomized over the 27 possibilities, (in other words, then, N_C corresponds to the weights of just a randomly generated 12-character string of text). This now being said, let us gain insight over certain names using the fundamental theorem of Nexic reasoning.

We can begin by showing the first condition to be satisfied quite simply. If we approximate N_A even with the top 99% of names alone, and then ask the total probability that a random string of characters from N_C is to fall within this set, we know of course that such a value is quite minute. As such, we have quite simply that the probability of N_A under N_C is satisfactorily low to satisfy the first condition, specifically because we have shown the overlap to be so sparse.

Regarding the second condition, let us imagine that we randomly generate a sequence of American names, being some L_1, and then we also randomly generate a sequence of American names which are also random strings of characters, being L_2. The procedure for generating L_2 will specifically be to generate a random name and a random character string, such that if they are equal we add it to L_2, but otherwise we run a new randomization. If we imagine that we could run both of these algorithms for an infinite length of time, then we will have attained two interesting results. The frequencies of each name will be proportional to the probability mass function of the name as according to N_A for L_1, and $N_A \cap N_C$ for L_2. Intriguingly, because we know that more common American names are not disproportionately favored as more probable random generations by N_C, it therefore follows that a name's probability mass in L_1 should be more or less consistently on par with its value under L_2. In effect, this satisfies the second condition as well.

Now let us select a choice of X and Y. For X, we might select a property that is common amongst the names, so as to be mediocre in N_A. How about this: "*the name ought to contain an 'e' but not a 'u'.*" Of course, this does not describe all of the names in N_A, but we can attest to its mediocrity in N_A on account of the majority of American first names holding such a property anyway. We may now also think to select a disjoint Y to this X, such that it satisfies both Condition 4 and Condition 5. A good choice might be "*the name ought to contain a 'u' and a 'k' but not an 'e'*," because it satisfies Condition 4 on account of clearly being disjoint to X, and in the process it probably satisfies Condition 5 as well, albeit for a more technical reason.

It will be seen that for an N_A which we are not very knowledgeable of, Condition 5 will actually be significantly easier to match than break, (due to simple Aethic reasoning with statistical dependence equating to Aethic knowledge), but in our particular situation of being very knowledgeable about the workings of American names, we have to feign ignorance in order to satisfy Condition 5 properly. In this particular case, we might suppose that for an American name to contain a 'u' and a 'k' but not an 'e' should be roughly even in likelihood as for a random string of text to contain a 'u' and a 'k' but not an 'e', that is if we suppose that names inherently mirror words in this respect. Specifically, we know that common trends in names like the inclusion of 'e' and the lack of an inclusion of 'u' ought to be substantially skewed toward the likelier side in names on account of the deliberation behind those trends, so therefore our best strategy of feigning ignorance about names is to select an already unlikely pattern among names, that way its own rarity serves to even out any frequency bias in the direction of the fully unbiased random character generations. Furthermore, adding a long and windy set of conditions helps weed out frequencies which crop up merely on account of having twelve characters in a random string, (such as only forbidding an 'e' in the name, for example, which is perhaps not unlikely in the first place to a random string of characters on account of there being twelve characters in the word). Crucially, we more or less want to create a Y which is respectively random enough relative to N_A so that is loses correlation to the patterns of naming conventions anyway. However, in the style of cases which we will see with our astrological analyses, where we are not feigning ignorance about a Nexus but are legitimately ignorant, we cannot help but select such a satisfactory Y, because, simply put, we actually are ignorant that time.

We can now argue, having satisfied all five conditions of the fundamental theorem of Nexic reasoning, that $P(Y \cap N_A \mid N_C) \ll P(X \cap N_A \mid N_C)$ holds. In the case of $N_A \cap^s X$, we are looking at

the Aethus of names which contain an 'e' but not a 'u', and for $Y \cap^s N_A$ we are looking at the Aethus of names which contain a 'u' and a 'k' but not an 'e'. Think about this for a moment – how common are names like this? Very uncommon, of course – substantially more so. And this means, intuitively, that if we generated a random string of text with N_B, it might be unlikely to be one of those very common names with an 'e' but no 'u', but even that is vastly more likely than for one of these vastly uncommon names to have been generated – and for it to have legitimately been a person's name at that. That is, N_A is being held in the probability as well, so rather than picturing this as a common name versus an uncommon name being randomly generated by random text, it is better to consider the probability that such a name is generated by the text, *and* it coincidentally happened to be a randomly selected person's name as well, (itself implying the achievement of N_A in the probability). For the uncommon name to be the one selected is of course absurdly more unlikely, so through this we might suppose that the inequality, at least intuitively, most certainly holds here. So while we have not proven the fundamental theorem of Nexic reasoning just yet, we have at least shown a direct example of its predictive power being accurately placed.

6.2 Application to the Aetherian Versus Dimensional Nexae

Principle 7 (Aetherian Independence Principle) *The Cosmic Nexus is statistically independent to the Aetherian Nexus, or in other words, the Dimensional Null Aethus is statistically independent to the Aetherian Null Aethus.*

Note that the correspondence between a Nexus and some Null Aethus is simply a consequence of treating that Nexus as an Aethic attribute, in which case we can simply create a Null Aethus with it as the only attribute – or in other words we can combine all attributes in superposition as based on the principles of that Nexus.

7 The Optimal-Earth Conjecture

Having seen the general form of the fundamental theorem of Nexic reasoning, let us look at the special case of it for which the attentor is the Aetherian Nexus, and the contentor is the Cosmic Nexus. The resulting statement can be known as *the Optimal-Earth conjecture.*

Conjecture 1 (The Optimal-Earth Conjecture) *The Optimal-Earth conjecture serves as the statement of the fundamental theorem of Nexic reasoning where we take the attentor as the Aetherian Nexus and the contentor as the Cosmic Nexus.*

Given the base derivation of the Optimal-Earth conjecture through the fundamental theorem of Nexic reasoning, let us also motivate it using a more intuitive argument, being what we might call *the High-contrast Earth hypothesis.*

7.0.1 Concerning the High-Contrast Earth Hypothesis

Consider the statement of this hypothesis as follows.

Hypothesis 1 (The High-Contrast Earth Hypothesis) *The high-constant Earth hypothesis, simply put, is a central idea to Nexic reasoning, and states that seemingly minute changes in the Aethic stated-attributes of Earth's history are sufficient and even almost surely implied to offset the probability of Aetherian existence by extremely many orders of magnitude. More rigorously put, this statement may be expressed as follows.*

$$\mathrm{P}\left(0 < \epsilon_1 \ll \left|\ln\left(\frac{\mathrm{P}(H \mid A_0)}{\mathrm{P}\left(H \mid \frac{A_0}{A_1}A_1'\right)}\right)\right| \middle| \mathcal{N}\right) \ll \epsilon_2 < 1 \tag{32}$$

This is so where ϵ_1 and ϵ_2 are two arbitrary constants, H is the Aetherian Nexus, A_0 is a parent Aethus to the Aetherian Nexus with A_1 serving as a parent to it, and $\mathcal{N}$ corresponds to the Aethus which treats all instances of its corresponding probability statement under the sane Aethic Template. Note that the term $\frac{A_0}{A_1}A_1'$ simply regards replacing the stated-attribute A_1 with its complement A_1' in the Aethus A_0.

Please note that this principle specifically corresponds to stated-attributes A_0 which are given to be at least moderately correlated, (i.e. not Aethically independent), to the remainder of the Aetherian Aethus, $\frac{H}{A_0}$. Regarding attributes for which this is not so, the above statement may be contradicted quite easily, by simply picking an attribute of trivial importance to planet Earth, (such as whether a single blade of grass is present in its location or rather two centimeters to the left), and then demonstrating how switching between these two Aethic possibilities leads to little falloff whatsoever in the probability of humankind existing on Earth. As such, then, the root of this premise concerns how selecting an A_0 such that there is some Aethic correlation with any parent Aethus B of $\frac{H}{A_0}$ implies that there is very likely to be further correlation between A_0 and another parent Aethus of $\frac{H}{A_0}$ due to the reason of the mediocrity principle combined with the cascading effects of probable further correlation between B and any other parent Aethus of $\frac{H}{A_0}$. That is, given that A_0 is already correlated to B, for B itself to be uncorrelated to any other parent Aethus of $\frac{H}{A_0}$ would be less likely than not, and furthermore for this breakage of the cascading chain to not occur upfront only makes it vastly less likely to occur for each further iteration of parent Aethae to $\frac{H}{A_0}$ which end up being correlated to either of B or A_0. In effect, the moment A_0 has already become correlated to some B which is a confirmed parent Aethus of $\frac{H}{A_0}$, it is already effectively implausible that A_0 is not vastly well-correlated to $\frac{H}{A_0}$ itself.

What you might call the 'classical example' of intuitively deriving the High-contrast Earth hypothesis concerns the premise of requesting the probability of Aetherian life evolving in a red dwarf planetary system. Right away, we have to note that the distance from the star to the Goldilocks zone becomes far shorter, and so an issue arises that the Earthlike planet of the system will resultantly become tidally locked to the star. As we know, such a thing is devastating for the potential of life to evolve on the planet, as the significant list of delicate transformations which Earth had to undergo over natural history would now be disrupted. In order to counter this issue, then, we might simply propose the adding of further attributes to the Aethus of this thought experiment. For instance, perhaps the Earthlike planet is part of a binary system, which would allow it to become tidally locked to its partner rather than the star. In making this decision, now, we have to explain how their orbits remain stable, and furthermore whether they are even close enough to one another to have a reasonable length of day upon the Earthlike planet in order to enable habitable atmospheric circulation [27]. We may then think to fix this by adding further attributes to this developing Aethus. The primary claim of the High-contrast Earth hypothesis, now, is that at some point we realize that we have fallen into the Sisyphean trap of adding so many different attributes to this Aethus, that now the multiplicative probability of their all happening is and must be extremely low. However, this is only the secondary premise: the primary result of this is that wherever this particular resultant probability is to truly fall, it is effectively at a random order of magnitude between one and zero exclusive. Fundamentally speaking, then, ***doing this process for two different strings of Aethic attributes is effectively guaranteed to give a vast ratio between the two resultant probabilities, simply because there is so much multiplicative room between one and zero for the two random outcomes to fall within****. The High-contrast Earth hypothesis, then, is fundamentally not a supposition about the magnitudes of probabilities themselves, but instead merely the relationship between two given habitable planet-implying Aethae, (even if they are defined as differing only by a single Aethic attribute). Such is the premise of this principle.*

There are a few highly important immediate consequences to the High-contrast Earth hypothesis. To begin with, in conjunction with the accordance principle, it serves to directly imply the Optimal-Earth conjecture itself. This is simply because given that changing an attribute of Earth's history is already given to create a vast ratio of difference in the probability of Aetherians existing as opposed to not, (as is the statement of the High-contrast Earth hypothesis already), it then trivially follows by the accordance principle that our own natural history ought to have the greater of the two probabilities, and therefore of course its corresponding event. As such, we immediately get the Optimal-Earth conjecture as a result, being not only that minute changes to natural history would alter the probabilities of Aetherians substantially, but that they would particularly lower the probabilities substantially. *Importantly, an effective guarantee to lower the probabilities of human existence given any change to the attributes of an Aethus is practically equivalent to said Aethus being optimal, which is why we are to treat it as such in these sorts of contexts.*

7.1 Procedural Application of the Optimal-Earth Conjecture

The procedure of using the Optimal-Earth Conjecture is as follows: we can essentially treat it as a kind of calculus for finding the empirical results of Earth's natural history. Given some unknown of whether or not A or A' occurred in Earth's history, the Optimal-Earth Conjecture states that whichever of the two has a higher probability of occurring under either the Dimensional or Aetherian Nexus should be the correct answer. That is, *did A or A' happen* can be converted into the equivalent query of *which of A or A' is more probabalistically optimal*. In effect, this allows us to treat natural history with optimization queries rather than simply waiting for empirical answers to be discovered directly via fossils or the like. It should be noted that it is possible for us to perform the optimization incorrectly, due to either incorrect math or an invalid treatment of the independent variables, but if we do find that our optimization result does not align with the empirical results, then that shows that our optimization results were incorrect, not that the optimal result disagrees with the empirical result. This is, in effect, just another iteration of the scientific method like any other, where the optimization results ought to be taken as an experimental result that needs to be validated rather than a perfect mathematical proof which is infallible. As usual, then, the real power comes from reinterpreting and rerunning experiments under many contexts, then honing in on a result through the scientific method itself.

This now being said, let us spend time in this paper to apply the Optimal-Earth Conjecture to an array of empirical results of Earth's past so as to gain more insight into them.

7.1.1 Application of the Optimal-Earth Conjecture to Paleontological Environments

A highly important example of the applicative powers of the Optimal-Earth conjecture regards its serving as a generalization to the accordance principle's implication that an extended-Paleozoic environment, (in the absence of dinosaurs ever existing), would inevitably lead to extremely low probabilities of human existence. By induction from the base accordance principle argument already, notice how the Paleozoic must be ill-equipped to produce mammalian evolution due to the extended Paleozoic – in being effectively analogous in environmental capacity – also being ill-equipped for such a thing. Regarding the generalization of this base premise with the Optimal-Earth conjecture, it follows that any environment in Earth's history ought to be ill-equipped to produce results specific to any other environment. This is because the two environments, (like the Paleozoic versus Mesozoic), simply put, are already tailored by the Optimal-Earth conjecture to enable their respective separate developmental achievements, and so are effectively random in capacity of performing the other's achievement. As we know already from the High-contrast Earth hypothesis, such a randomness implies significant probabilistic contrast, so together with the accordance principle we have that the realized past eras in which events occurred ought to hold the greatest probability of any era at achieving its specially-tailored event.

This is a rather remarkable illustration of natural history, because it implies a progression in which planet Earth, almost like a vector embedding[16], points directly at some goal to beat the vast probability falloff of success, proceeds to achieve it, and then immediately thereafter pivots so as to point toward the next goal. The standard example of this, then, regards the respective environmental differences between the Paleozoic, Mesozoic, and Cenozoic in that order, with the nuances behind this being both vast and utterly scientifically captivating. On that note, then, let us go over some of the intriguing insights of Nexic reasoning which I have so-far developed over the past four years.

8 Significance of the Mass of Chicxulub

In this section, the significance of the mass of the Chicxulub Impactor will be demonstrated using the logic of the strong accordance principle.

To begin with, we may argue that the frequency of craters of a certain diameter on Earth or another cosmic body is inversely proportional to the cube of said diameter [28].

$$P(W = w) \propto w^{-3} \tag{33}$$

This is so where W is the random variable of a crater's width, (i.e. diameter), and w is a single instance of said diameter.

[16] In fact, it ought to be analogous to a vector embedding by the Aethic notions on the subject, thereby making such things a fascinating avenue for research.

Then, we may also argue that the radius of an impactor is roughly proportional to the diameter of the resulting crater [28]. Let this impactor radius be written as r. $r \propto w$ Therefore, we may combine the two through the use of a random variable, R, representing the radius of a random asteroid which strikes Earth or some other cosmic body, (in essence, representing the radius of asteroids in general).

$$P(R = r) \propto r^{-3} \tag{34}$$

Next, let us convert between the radius of an impactor and its inherent mass.

$$m \propto \rho\, r^3 \tag{35}$$

If we assume that the density, ρ, of asteroids are more or less constant between them, then now we may write mass in terms of radius.

$$m \propto r^3 \tag{36}$$

Then, as before, we may now convert between one random variable, being the radius of an asteroid, to another, being the mass of an asteroid, say M.

$$P(M = m) \propto m^{-1} \tag{37}$$

Now it is time to introduce the Chicxulub impactor itself. Let us denote its real-life mass as some m_0. Therefore, for an arbitrary asteroid of mass m, we may write its mass as $m = m_0\, s^3$, where s is a linear scale factor of one dimension. Let us now substitute accordingly.

$$P\big(M = m_0\, s^3\big) \propto m_0^{-1}\, s^{-3} \tag{38}$$

Furthermore, let us write this in terms of a constant of proportionality, k, to allow for equality.

$$P\big(M = m_0\, s^3\big) = k\, m_0^{-1}\, s^{-3} \tag{39}$$

Let us now compare two separate scenarios: one in which the scale factor is equal to 1, as is the case with Chicxulub itself, and another where the scale factor is an unknown variable s. If we divide the probabilities of both scenarios occurring, then we attain a ratio as follows.

$$\frac{P(M = m_0)}{P(M = m_0\, s^3)} \tag{40}$$

And due to the scalability of proportional statements, we may attain the other side of the proportionality through dividing by corresponding terms.

$$\frac{P(M = m_0)}{P(M = m_0\, s^3)} = \frac{k\, m_0^{-1}}{k\, m_0^{-1}\, s^{-3}} \tag{41}$$

And then of course we may simplify through cancellation.

$$\frac{P(M = m_0)}{P(M = m_0\, s^3)} = s^3 \tag{42}$$

Substitution is now possible into the strong accordance principle formula, where we define our base attribute A as $M = m_0$, and A' as $M = m_0\, s^3$.

$$\frac{P\big(H \mid M = m_0\, s^3\big)}{P(H \mid M = m_0)} \leq \frac{P(M = m_0)}{P(M = m_0\, s^3)} = s^3 \tag{43}$$

Lastly, we may write s^3 in terms of m and m_0 again due to its definition of $m = m_0\, s^3$. Then we will be done.

$$\frac{P(H \mid M = m)}{P(H \mid M = m_0)} \leq \frac{m}{m_0} \tag{44}$$

To make the mathematical intrigue of this slightly more apparent, let us wrap up the constant of $\frac{P(H|M=m_0)}{m_0}$ in the form of the value k. This makes the following.

$$P(H \mid M = m) \leq k\, m \tag{45}$$

Then, from here, we may reason that the largest possible value of $P(H \mid M = m)$, that is for which any larger values invalidate the strong accordance principle, is some $P_{\max}(H \mid M = m)$ where $P_{\max}(H \mid M = m) = k\, m$. Thus, we may write this as a statement of proportionality.

$$P_{\max}(H \mid M = m) \propto m \tag{46}$$

Thus, at its absolute maximum possible value to still satisfy the strong accordance principle, we see that *if the Chicxulub impactor were of a different size, then the eventual probability of humanity would, as an upper bound, be proportional to the mass of the new impactor.*

9 Biosphere Doomsday Pacing

In this section, we will show that according to the strong accordance principle, every biological and physical event of the Earth's history was on a tight clock so to speak to occur when it did, with disastrous consequences for happening too early or too late. A key moment I like to use as an example for this is the dawn of eukaryotes, which may seem to have happened surprisingly late in Earth's history, but according to the strong accordance principle must have happened at a goldilocks time so to speak.

To begin with, let us consider the potential end of the biological world as some kind of doomsday. This doomsday could consist of a more classical example of biological ceasing, such as a world-destroying cosmic event, or it could be something more subtle and catastrophic like the perpetual failure of the biosphere to continue moving up the evolutionary ladder, for instance because perhaps there is insufficient nitrogen in the atmosphere to allow such things as a plain example. But even this perception pictures a kind of causally based system of evolution, which is not always perfectly the case in a probabilistic environment. For instance, perhaps there is the perfect setup for human life, but due to probabilistic bad luck nothing materializes, or alternatively perhaps there is a relatively terrible setup, and yet still life manages to barely squeeze through and become some form of even more rare intelligent life. The point is that something as basic as "life was too underdeveloped to achieve such a milestone given the resources and timing", is a sufficient doomsday under the right conditions.

This all being said, the doomsday itself can be subdivided into two primary categories. One the one hand, is an "external doomsday", which is simply a doomsday which is triggered from outside the scope of the biosphere, such as, for example, a nearby hypernova. This is to be contrasted by the alternate type of doomsday, which is an "internal doomsday", which is the set of remaining cases, all of which must occur within the scope of a biosphere to not be external.

The next main argument from here is to postulate that the hazard function of an external doomsday is more or less constant over large timescales. That is, from one era to another the large-scale cosmic background is more or less unchanging, and so it should be expected that the threats coming from said background are themselves roughly uniform in probabilistic effect. A hazard function, in being directly linked to a memoryless exponential distribution, serves as the best candidate for that which is uniform, then. Let us call this roughly constant hazard function for the world's end through the external doomsday as some λ value. It can now be reasonably inferred that given some arbitrary span of time t, the probability of the Earth surviving the external doomsday over that entire span is exponentially distributed.

$$e^{-\lambda t} \tag{47}$$

Let us create three main possible events for this argument. The first, H, represents the successful appearance of humans in the world, thus enabling you to exist. The remaining two are the doomsday potentials, with the first being the external, E, and the second being the internal, I. Furthermore, let us now create the real-world values of these events through H_0, E_0, and I_0. Then, let us imagine an imaginary alternate history for life on Earth, which is to be shortened from our own by some span of difference t. This alternate, shorter-length history will have values of H_1, E_1, and I_1.

Immediately, it is possible to solve for E_1 in terms of E_0, because since we know that our real-world story of natural history, associating with E_0, has t more time in it than the other natural history, it is then possible to conclude the ratio between the two as the conditional probability of surviving through said extra time.

$$\frac{P(E_0')}{P(E_1')} = e^{-\lambda t} \tag{48}$$

Furthermore, because the full set of scenarios is exhausted between these three potential events shown, it is so that their sum will equal one.

$$P(H) + P(E) + P(I) = 1 \tag{49}$$

This will be so for both explained scenarios of natural histories with both lengths. This naturally means that $P(E_0') = P(H_0) + P(I_0)$ and $P(E_1') = P(H_1) + P(I_1)$. Therefore, through substitution and algebraic rearrangement, the aforementioned statement may be rewritten.

$$P(H_1) + P(I_1) = e^{\lambda t} \left(P(H_0) + P(I_0)\right) \tag{50}$$

From here, it is possible to solve directly for $P(H_1)$ through one simple step.

$$P(H_1) = P(H_0)\, e^{\lambda\, t} + P(I_0)\, e^{\lambda\, t} - P(I_1) \tag{51}$$

Using the Optimal-Earth Conjecture, now, we can show that the probability of our longer timeline occurring is greater than that of the shorter timeline.

$$P(H_0) \geq P(H_1) \tag{52}$$

And from the analysis already done, we may substitute for $P(H_1)$.

$$P(H_0) \geq P(H_0)\, e^{\lambda\, t} + P(I_0)\, e^{\lambda\, t} - P(I_1) \tag{53}$$

Further algebraic manipulation allows for the ratio of the Is to be determined.

$$\frac{P(I_1)}{P(I_0)} \geq e^{\lambda\, t}\left(1 + \frac{P(H_0)}{P(I_0)}\left(1 - e^{-\lambda\, t}\right)\right) \tag{54}$$

So long as our shorten value of t is a positive value, which by definition it will be for a shorter temporal length of natural history, it will follow that $\frac{P(H_0)}{P(I_0)}\left(1 - e^{-\lambda\, t}\right)$ itself will have to be positive. Then, of course, $1 + \frac{P(H_0)}{P(I_0)}\left(1 - e^{-\lambda\, t}\right)$ will be greater than one, and so $e^{\lambda\, t}\left(1 + \frac{P(H_0)}{P(I_0)}\left(1 - e^{-\lambda\, t}\right)\right) \geq e^{\lambda\, t}$. Therefore a definitive[17] lower bound may be found for the total solution by the transitive property.

$$\frac{P(I_1)}{P(I_0)} \geq e^{\lambda\, t} \tag{55}$$

The main conclusion of this is that the shorter we make Earth's natural history, the higher the probability of the internal doomsday threat will grow. This is quite a peculiar concept in a way, because while the outside-threats onto our planet are perhaps more tangible, this natural tendency to self-destruct given too little time to progress is, in a word, eye-opening. Obviously the extent to which this will happen depends strictly on how much danger we are in death from outer space at any given moment, or rather at least the lower bound of its effects will, but whatever those effects are, they will grow at least exponentially in magnitude the more the span of time life on Earth has to evolve is squeezed. Looking back to the example of the dawn of eukaryotic life in general, this presents evidence that while the vast eons of only prokaryotic life may have been expansive, they were far from unnecessary.

One other point of intrigue for this section is the seeming balancing force between the threats from the external environment of planet Earth, and the speed at which internal events progress to keep up with the clock. Intuitively, if there was no external doomsday danger whatsoever, then perhaps the internal events of Earth could take as long as needed to evolve from one state to the next, but instead, the very fact that such a luxury is denied to them shows that they may be speeding up with the increased hazard function of the external doomsday threat. As for showing this mathematically, the answer regards treating the three measures of possible outcomes for a biosphere as functions over multiple times and hazards.

Defining the length that an alternate-natural-history is holds as some random variable T, and defining the hazard function of the external doomsday threat as a random variable D, we may write the probability of humans existing as well as the other two scenarios given these circumstances.

$$P(H \cap T = t \cap D = \lambda) \tag{56}$$

$$P(E \cap T = t \cap D = \lambda) \tag{57}$$

$$P(I \cap T = t) \tag{58}$$

Note how the internal doomsday probability has been written without the hazard function of the external doomsday threat, because such a thing is, through its definition of abiding to the external doomsday only, statistically independent of it. Also note that the variable, t, here, will now be treated more absolutely than the previous variable t, which considered tracing back a length of a natural history from our own. That is, this represents a quantitative total length from start to finish.

[17] . . . assuming the strong accordance principle that is.

From here, the probability of us existing may be rewritten as the probability of neither doomsday scenario occurring.

$$P(H \cap T = t \cap D = \lambda) = 1 - P(E \cap T = t \cap D = \lambda) - P(I \cap T = t) \tag{59}$$

Next, it may be shown for some most optimal length of time for human life to evolve from the beginning of the Earth, t_0, it will follow that such an optimal time is greater in probability of generating humanity than any given other time.

$$P(H \cap T = t_0 \cap D = \lambda) \geq P(H \cap T = t \cap D = \lambda) \tag{60}$$

That is, the absolute maximum of the function over t of $P(H \cap T = t \cap D = \lambda)$ sits at time t_0, and so through the laws of calculus, the derivative of this function with respect to time will be zero there. (This is indeed assuming continuity, but such an assumption seems well placed in such a query).

$$t = t_0 \Leftrightarrow \frac{\partial}{\partial t} P(H \cap T = t \cap D = \lambda) = 0 \tag{61}$$

Due now to the definition of this statement, a substitution may be made.

$$t = t_0 \Leftrightarrow \frac{\partial}{\partial t} \left(1 - P(E \cap T = t \cap D = \lambda) - P(I \cap T = t)\right) = 0 \tag{62}$$

This may thus be expanded.

$$t = t_0 \Leftrightarrow \frac{\partial}{\partial t} P(I \cap T = t) = -\frac{\partial}{\partial t} P(E \cap T = t \cap D = \lambda) \tag{63}$$

The actual value for $P(E \cap T = t \cap D = \lambda)$ should at this point be solved for, which is simply obtained through the cumulative distribution function of the exponential distribution.

$$P(E \cap T = t \cap D = \lambda) = 1 - e^{-\lambda t} \tag{64}$$

$$\frac{\partial}{\partial t} P(E \cap T = t \cap D = \lambda) = \lambda\, e^{-\lambda t} \tag{65}$$

And from here it is achievable to substitute this expression.

$$t = t_0 \Leftrightarrow \frac{\partial}{\partial t} P(I \cap T = t) = -\lambda\, e^{-\lambda t} \tag{66}$$

Finally, to embark on the final step of this argument, let us define a function $f(t)$ such that $f(t) = \frac{\partial}{\partial t} P(I \cap T = t)$. In that case, the main equation may be simplified.

$$f(t_0) = -\lambda\, e^{-\lambda t_0} \tag{67}$$

It may be shown with this formulation that the partial derivative of $f(t_0)$ with respect to t_0 is strictly nonnegative due to the nature of quadratic and exponential functions of real numbers.

$$\frac{\partial}{\partial t_0} f(t_0) = \lambda^2\, e^{-\lambda t_0} \geq 0 \tag{68}$$

Moreover, it may be shown that the partial derivative of $f(t_0)$ with respect to λ tends to negative one as λ tends to zero.

$$\frac{\partial}{\partial \lambda} f(t_0) = (\lambda t_0 - 1)\, e^{-\lambda t_0} \tag{69}$$

$$\lim_{\lambda \to 0} \frac{\partial}{\partial \lambda} f(t_0) = -1 \tag{70}$$

Therefore, through the act of decreasing the hazard function of the external doomsday danger from whatever value it is in real life through zero, it would follow that $\frac{\partial}{\partial t_0} f(t_0) \geq 0$ and $\frac{\partial}{\partial \lambda} f(t_0) \leq 0$. In effect, then, as t_0 increases, $f(t_0)$ increases, and as $f(t_0)$ increases, λ decreases. Thus, logically, an

increasing t_0 corresponds to a decreasing λ, and the opposite is true through the opposite analysis of this logic. Or, at least this is so as λ tends to zero[18].

$$\frac{d\lambda}{dt_0} < 0 \tag{71}$$

Therefore, from this it may be argued that the act of lowering the hazard function of the end of the world through external causes would cause the optimal length in time of all natural history to increase in the process. In effect, we may consider that the very notion of there being an external hazard at all causes something of a natural compression of the length of evolutionary history accordingly, and the opposite goes for the opposite direction.

10 Primate Cladogenesis on Haţeg Island

One potential paradox with the Dark Era hypothesis, at least at a glance, is the clashing between the violent conditions of the Dark Era itself and the delicate arboreal environment implied by primates existing at least as far back as the Campanian, as is supposed through genetic evidence [29]. Genetic evidence generally appears to be significantly more reliable than fossil evidence for the age of a clade, because not only is it numerically oriented, but fossils themselves operate with a degree of randomness, thus hinting that the oldest fossils of any given clade should still only ever exist after a period of relative obscurity for said clade while its numbers grow to the point of possible fossilization. The recent explosion in genetic accuracy [30] is only further evidence for such a reality. Therefore, supposing that the solution to this paradox is that primates originate after the K-Pg boundary is, hypothetically, a fallacious conclusion. And this is exactly where the concept of Haţeg Island itself may solve the paradox.

The solution to the paradox may be as simple as suggesting that the last common ancestor of all primates lived on Haţeg Island itself, because it would allow said primates to evolve away from the protective niches and traits that enabled their continued survival back on the mainland. Specifically, the argument here is that the state of primates having initially existed on Haţeg Island ought to itself be the resolution to our earlier anthropic accordance principle analysis in which we demonstrated that the island's circumstance makes it very likely to be an anthropic parameter already. The next natural question in the face of that realization is what role it is to play as such an anthropic parameter, and this argument is it: *the island was none other than the original home of primates.* Given this premise, then, this hypothetical resolution is able to solve two main problems in one swoop. First, it explains why primates were able to exist as far back as the Campanian without having been wiped out by theropods, and second it ties an argument back into the initial premise of Haţeg Island needing to be an anthropic parameter already. In effect, then, perhaps it is this head start in the arboreal lifestyle that allowed primates to become so successful during the later Cenozoic at all. This explanation serves as something of a deus ex machina for its fittingly concise solution to the paradox. And this all the more suggests that Haţeg Island may have served as the first home for the primates, on which we would have waited out the end of the Mesozoic until sea level fall in the early Cenozoic allowed worldwide diversification.

If this were to be the case, then primates themselves would be a Mesozoic representation of the island effect [31]. That is, the original primate traits that allowed us to thrive during the Cenozoic may would have been the direct result of a ceasing in predation during the Late Cretaceous, itself being analogous with the island effect. But the danger of such an outcome is that had hazardous theropods arrived on the island at any point, and it would be essentially guaranteed that our lineage would be wiped out, much like what happened to the Dodo bird after the arrival of humans and other human-brought invasive species on Mauritius. If feral dogs and cats are sufficient to wipe out the Dodo bird, then it seems more than reasonable that theropod dinosaurs would be sufficient to wipe

[18]Note that, as shown by $\frac{\partial}{\partial\lambda} f(t_0) = (\lambda t_0 - 1)\, e^{-\lambda t_0}$, it will be so that $\frac{d\lambda}{dt_0} > 0$ if and only if $\lambda t_0 > 1$, which will be the case if the life expectancy of planet Earth regarding the external doomsday at least, $\frac{1}{\lambda}$, is decidedly less than the optimal length for Earth's natural history, t_0. Both the Rare Earth hypothesis and the High-contrast Earth hypothesis seem to be collectively arguing for this in real life, so if that is indeed the case, then for such a high threat of the end of the world over geologic timescales, it follows that nudging the hazard function of the external end of the world up would cause the optimal length of natural history to increase by the slightest bit, because apparently the stakes would be so high, that taking just a little bit of extra time would be favored anyway. This, remember, does not mean it should increase indefinitely, as there is a sure limit on how far it may sway in either direction before the probability of humanity occurring at all becomes relatively negligible.

out the first primates. Therefore, a necessity for eventual human existence would have been that theropods did not arrive on island, at least assuming that the prior hypotheses of this section are correct. This is one part of a general postulate that soon following our arrival on Haṭeg Island in the scope of evolutionary time, we were ecologically unable to coexist with hazardous theropod dinosaurs and avoid extinction. Therefore, logically, this implies that all descendants of the original ancestor of ours that traveled to Haṭeg would have remained there until at least the K-Pg boundary. All clades which share a more recent last common ancestor than the time of arrival on Haṭeg Island would have themselves been present on the island during the K-Pg extinction event[19].

We do not have an exact timecode for the arrival of our ancestors on Haṭeg Island for obvious reasons, but this does not mean the result is entirely out of our grasp, as we can approximate it using optimal analysis. For one, such a timecode should likely be very close in time to the beginning of Haṭeg Island's existence as opposed to much after, because otherwise it appears that it would be more optimal for the island to simply have formed later on to minimize the amount of time for which it has to luckily avoid theropod invasion. Therefore, let us place the beginnings of our presence on the island no later than much after the end of the Cenomanian, at 27 million years before the K-Pg boundary, just as an approximation[20]. Such a timecode would put the arrival date at 93 Mya, a time which would imply, according to our understanding of mammalian divergences [30], that Euarchontoglires likely originated on Haṭeg Island. Such a statistic being true would depend on both the origination of Euarchontoglires falling after 93 Mya, which is at least further supported than non based on the data [30], but then again it would also depend on, as postulated before, that truly our ancestor did arrive on the island prior to 93 Mya, which seems evidenced enough through the Optimal-Earth Conjecture more or less at least. The idea then, is that this is at least a likelier situation than not, all things considered. If it were true, then it would mean that rodents and lagomorphs both trace their ancestry to Haṭeg Island at the moment of the K-Pg extinction event, which, perhaps, is at least part of the secret to their explosive success since then. In such a scenario, it may very well be an analog to the success of primates in the Cenozoic, where for whatever reason having already diversified on the island would have triggered an immense advantage in their later ecology worldwide[21].

Another interesting question which we might think to ponder over, while we are on the topic, is why primates would have needed to exist on Haṭeg Island in the first place, rather than instead having developed on the mainland. To quantify this question more precisely, we might hypothesize what exactly would have gone wrong in the probability of our existence had the event of our ancestors rafting to Haṭeg Island in the first place been instead replaced with the K-Pg extinction event itself. In either that scenario or our own, we clearly have that all our further interactions with theropods would have sharply ceased at the time, and yet we know by applying the Optimal-Earth conjecture that our scenario had to have been substantially more favorable to the probability of eventual human existence. Interestingly, if we pick out the approximate timecode at which we arrived on the island, being the 93 Mya figure, then we have that Aethically relocating the K-Pg extinction event to that time will have not only triggered a dropping of human probability on account of changing the attribute of our having spent time on Haṭeg Island, but it also would lower the probability on another front as well, being simply because of doomsday pacing effects, (where lowering the total length in time of all natural history would have to decrease the probability of eventual human existence). Logically, then, the very act of us traveling to Haṭeg Island at all seems to have some kind of optimal background, regarding this. Arguing through the Dark Era hypothesis that the paleomammalian evolutionary revolution is a direct result of theropod predation, it may therefore be argued that the ceasing of theropod predation by virtue of us arriving on the island corresponds to a more or less ceasing effect of paleomammalian-type evolution, or in other words only the remainder of the evolutionary journey was a requirement, for which Haṭeg Island observationally would have played a role in in our own past. If we were to imagine a

[19]That, or an ancestral species of them of course, depending on if the clade in question holds a Cenozoic origin or a Mesozoic origin. The general point is unchanged, though.

[20]This may potentially feel like something of a baseless guess, but it's actually part of a wider effect of the Optimal-Earth Conjecture that is relatively common throughout natural history if you know where to look. That is, whenever a constant span of a hazard rate of the world's end is a possibility, typically a follow up event will occur about as close to its first possible time as is achievable, otherwise something or other would be shortened to create optimality, hence invalidating the Optimal-Earth Conjecture for our scenario. A classic example of this effect in action is the origin of life on Earth surprisingly shortly after the end of the Hadean. Consider this, if anything, as a mirroring of the same math.

[21]Perhaps, even, it may be the case that competition with the early ancestors of the Glires helped direct our primate ancestors toward niches in the trees in the first place, but of course this is only loose speculation. On another note, perhaps the nearness of the origin of Rodents [30] to the K-Pg extinction itself is a representation of some kind of diversity explosion on the island that directly followed the event and then set up their success worldwide following the next sea level fall, (unless they rafted, which seems more probabilistically difficult but is still possible).

hypothetical sister clade of ours who stayed on the mainland when we traveled to Haţeg Island, then it may be hypothesized that the probability of such a clade evolving into something generally humanlike could not, in all likelihood, increase with time while the Mesozoic was still ongoing. Arguing with the Optimal-Earth Conjecture that whatever historical timecode represents our arrival on Haţeg Island serves as the optimal time for such an arrival, and further reasoning through the Dark Era hypothesis that the primary force of paleomammalian evolution was theropod influence, it hypothetically follows that remaining on the mainland would trigger a stagnation in our evolutionary development – as theropod pressure is optimal for paleomammalian evolution but not any evolution beyond there[22] – and so through the factors of theropod-based danger of extinction and whatever other factors would have been relevant, it would follow that any ancestors on the mainland would only have a perpetually decreasing probability of evolving into humans as a function of the longevity of the Mesozoic beyond the time of would-have-been-Haţeg Island travel. Therefore, consequently, it is hypothesized that the upper bound of the probability of humans given the K-Pg extinction event in place of Haţeg Island would also serve as an upper bound to the probability of human existence given the same timecode of K-Pg extinction event, but in the absence of Haţeg Island or any like substitute.

From this, it may be seen that roughly speaking, the probability of any non-Euarchontoglire placental mammal evolving to a humanlike intellect with the same "existential niche" of sorts, should be no greater than proportion k of a chance than a Euarchontoglire doing so, where k itself represents the upper bound of the ratio of the human existence probability given the moving of the K-Pg extinction event back to the time of the initial rafting event to Haţeg Island versus the probability of human existence in our own scenario, respectively, (at least assuming all postulates leading into such a conclusion are accurate).

Lastly for this section, we might then also refer back to the premise that primates and rodents, in existing on Haţeg Island at the moment of the K-Pg extinction event, will of course have needed to propagate their way to the mainland at some point during the early Cenozoic, specifically between the time of the extinction event and the time of the oldest known primate or rodent fossil which is not already present on the island. As of the writing of this, one contender for the oldest known rodent fossil comes from the genus *Ischyromys*, which dates to the Clarkforkian of about 56.8 Mya [32], so such implies that rodents and primates likely left Haţeg Island sometime during the earlier half of the Paleocene. With such an event, furthermore, being likeliest to occur in conjunction with a dropping in Earth's sea level, we therefore establish a direct prediction from these notions that there ought to exist at least one substantial sea level decline event in the early Paleocene. Rather conveniently, upon checking the sea level data, we may indeed find just such a substantial decline event at about 65.95 Mya [33]. This seems to be quite a fitting conclusion to our analysis about primates on Haţeg Island.

11 On the General Prosperity of Non-Avian Dinosaurs

In this section, the question of whether the non-avian dinosaurs were at their height, or low point directly before the K-Pg extinction event will be answered using the strong accordance principle.

The first postulate that will be assumed for the sake of this argument is that the direct effects of the K-Pg extinction event itself were sufficient to wipe out the non-avian dinosaurs to a high degree of likelihood.

Postulate 6 (The Postulate of Absolute Dinosaurian Extinction) *The direct effects of the K-Pg extinction event itself, being the several minutes of broiling temperature and whatever else occurred, were entirely sufficient to wipe out the non-avian dinosaurs with a very high degree of likelihood of success.*

In fact, it seems more likely that the mammals would have been wiped out than the dinosaurs to have not, because after all, this extinction event was on the severe side of things as opposed to the alternative. This is due to the apparently low probability of mammals surviving in the first place [34], even when they were arguably the best suited for such a thing among the amniotes[23].

Using this, the second postulate may now be adapted.

[22]The reasoning being the Optimal-Earth Conjecture itself given that we surely, (as is the hypothesis), arrived on Haţeg Island directly following the paleomammalian stage of our evolution.

[23]The mammals being the best suited for surviving the K-Pg extinction event among the amniotes is quite a bold claim, but it does have a certain degree of evidence for it. For one, there is the fact that late Mesozoic mammals are endothermic, small, intelligent, and capable of burrowing. As for the accordance principle-oriented take on this matter, it is to reference how many animals had to be wiped out by the extinction event, while many others had to survive. This implies that our ancestors survived that which a multitude of other animals did not, which suggests a superior ability

Lemma 1 (The Lemma of Dinosaurian Extinction Independence) *The wellbeing of the non-avian dinosaurs directly preceding the K-Pg extinction event is statistically independent to their state of surviving it, because they are near-guaranteed to go extinct in the event due to the postulate of absolute dinosaurian extinction anyway.*

This postulate is quite self-explanatory, so let us move on to the next step.

Given that humans are utterly dependent on this extinction for us to exist, as is implied by the Dark Era hypothesis, it follows that in the set of all possibilities where we exist, this extinction event would have happened, (this is something of an oversimplification, but it is far and away close enough by the High-contrast Earth hypothesis, at least for the purposes of this particular argument). Thus, the event of human existence exists purely in the subset of occurrences of the K-Pg extinction event, which we will also assume happens in a random way with respect to the wellbeing of dinosaurs, as they were already extinct after the Cretaceous anyway, so they could not have affected or been affected by any further probability beyond then. This gives rise to the next postulate.

Lemma 2 (The Lemma of Dinosaurian Existential Independence) *The wellbeing of the non-avian dinosaurs directly preceding the K-Pg extinction event is statistically independent to their state of eventual human existence. Another way of phrasing this is that the wellbeing of the non-avian dinosaurs has an existential linkage of zero regardless of state.*

Lastly, we may use the postulate of measured existence to finish this query. Given that, in this case, where A is the state of dinosaurs being at their height, and say B is the mutually exclusive state of them being at their low just before the K-Pg extinction event, then the following shall hold.

$$L_A = \frac{P(H \mid A) - P(H \mid A')}{P(H \mid A) + P(H \mid A')} = 0 \tag{72}$$

$$P(H \mid A) = P(H \mid A') \tag{73}$$

$$P(H \mid A) = \frac{P(H \cap A')}{P(A')} \tag{74}$$

$$P(H \mid A) = \frac{P(H)\ P(A')}{P(A')} \tag{75}$$

This last step itself is due to the independence of H and A. Let us now continue, then.

$$P(H \mid A) = P(H) \tag{76}$$

This is a fundamental reasoning that holds for any statistically independent quality, A, to human existence: its occurrence probability matches its existence probability. Let us name it for this particular instance, however.

Lemma 3 (The Lemma of Dinosaurian Late-Occurrence Probability) *Any wellbeing-related quantities of the non-avian dinosaurs directly preceding the K-Pg extinction event hold existence probabilities which equal their occurrence probabilities.*

Now then, due to this reasoning, it follows from the Dark Era hypothesis that since dinosaurs, by the Dark Era hypothesis, are assumed to hold an immense degree of evolutionary ability to dominate niches and overall remain successful and in high numbers, it should then be the case that the occurrence probability of them randomly and inexplicably dipping in their success just before the extinction event would be low, as such a thing would be uncharacteristic, so therefore the same is true of the existential probability of such a thing by the lemma of dinosaurian late-occurrence probability. The

to do such things than those which were wiped out, especially on the statistical certainty which operates on a species wide scale and above. Specifically speaking, given that extinction events often operate in two waves [35], which we will refer to as "the blast", (that classic biosphere devastating event), and then the lesser known "sifting", (the recovery period with its own surprising degree of dismay due to the devastated biosphere's state), it may be hypothesized due to the Optimal-Earth Conjecture that our own clade was optimally capable at surviving the combined effect of both waves rather than one or the other in isolation. It is a cruel but fascinating fact of life that oftentimes the greatest clades at surviving the sifting are wiped out by the blast, and also that the greatest clades at surviving the blast are wiped out by the sifting. Truly it is the balance of the two that determines which clades will dominate each new era of the Phanerozoic, and our clade, by the Optimal-Earth Conjecture, just so happened to be one such exceptional example. Such a concept may be applied to any taxonomic rank of ours to varying degrees of sufficiency, at least over the range of primates through animals where such an extinction event is definitively relevant.

natural conclusion, then, is that the dinosaurs would have in all likelihood been at their height rather than their low at the end of the Cretaceous, regardless of any retrospective "interference" from the accordance principle and the simple state of their extinction itself as far as we can observe in the present.

That is the entire gist of this section, and it serves as the end of the Mesozoic aspects of this paper.

12 Interstellar Panspermia

The topic of panspermia, or the idea that life on Earth originated as microbes which arrived here from interstellar space [36], is as intriguing as it is difficult to find evidence for one way or another. In this paper, no opinion will be taken as to the truth of panspermia as an actual event which occurred billions of years ago and led to the origin of life on Earth. Simply the deductive steps using the strong accordance principle that would follow such a happening will be elaborated on.

There is an immediate list of points to go over firstly. For one, any panspermia argument which supposes that the vacuum of space is filled with microbes such that spores of them at least semi-frequently pass between stars [37] is in direct violation of the Rare Earth hypothesis, and so for the purposes of this paper will be taken as strictly fictional. Furthermore, because of the dangers of radiation in outer space, it will also be supposed that the only legitimate means of panspermia of any form is lithopanspermia [38], such that any transported microbes will receive a shield from the radiation in the form of physical rocky or metallic material. Another major point to be made is that according to the logic of this paper, interstellar panspermia and interplanetary panspermia are different enough that they might as well be entirely distinct concepts. While both of them transport biological matter across space, interstellar panspermia covers a vastly greater distance than interplanetary panspermia, and additionally has minimal chances to succeed in the endeavor, whereas panspermia within a single Solar System may occur hundreds if not thousands of times over geological timescales. Even if it is quite unlikely for microbes to pass between Earth and Mars, say, still given the absurd abundance of life on Earth and the proximity to Mars, over the billions of years that both have existed it is practically certain that microbes have passed between them at least several times. For all we know, any of the major steps in life on Earth such as the dawn of Eukaryotes or the Last Universal Common Ancestor could have occurred on Europa or an ancient iteration of Venus. Truly, it seems that a biosphere is more a property of a solar system than a single planet.

On the other hand to this, interstellar panspermia is perhaps strikingly unlikely. Experimental studies have demonstrated that microbes are quite unlikely to survive the harsh vacuum of space for more than a few years [39], so covering the distance from, say, Alpha Centauri to Earth is essentially impossible. That is, assuming a constant hazard function of death for the microbes aboard the lithopanspermia transferring object, the likelihood of survival drops exponentially with the distance that needs to be covered. Furthermore, the further a microbe-carrying asteroid must travel from one solar system to another, the less likely it is to actually land on Earth[24] without missing it entirely. This may be seen to decrease quadratically with distance because of the inverse square law. These two properties alone seem to favor close approaches for interstellar panspermia rather than far ones, however the trouble with this is that given a randomness in the locations and paths of stars through space, it becomes increasingly difficult that a star might every approach closer to Earth, which is to say that based again on the inverse square law, the probability of a star passing a certain distance away from the Earth increases quadratically with distance. Note how such a property yields the opposite effect of the other two, because now far distances are favored, as they are more likely to house more stars and more interstellar panspermia potentials. This, in effect, yields an optimization query of sorts, which seeks to find the best distance at which interstellar panspermia may occur.

A key point to notice here is that no two solar systems share a constant distance between one another – rather such a distance is constantly changing as the stars pass through space, in effect tracing out a kind of concave up distance function with time. It may be postulated that due to the nature of a kind of optimization being needed to find the distance of interstellar lithopanspermia, and also because of the High-contrast Earth hypothesis, it should be the case that the transfer distance between two star systems for lithopanspermia should very closely align with their closest approach, and furthermore, such a closest approach should be substantially closer than the average distance between stars, because otherwise the journey would take far too long to be plausible. Therefore,

[24] Or another Solar System object for that matter, enabling interplanetary panspermia later on to get those microbes to Earth.

according to this logic, if life on Earth did arrive here due to interstellar panspermia, then such a transfer would have occurred during the closest approach of the closest star to the sun at the time, in doing so passing quite close indeed to us. Stars naturally pass somewhat close by every once in a while, as we can see from astronomical observation [40], so it seems significantly most likely that panspermia would have occurred during an especially close example of one such passing. Let us now display some of this information mathematically.

To begin with, supposing that stars are roughly uniformly distributed near to our sun, the average of all possibilities of their positions, which in effect makes an expected value of sorts, creates a uniform distribution of stars all throughout an infinite Cartesian space, which has a uniform density of stars at each point. This is more like a quantum superposition than a classical discrete phenomenon, because it treats stars like a scalar field which maps their amount of existence at a single point. Assuming that all points here have a constant density value for the scalar field, then treating our own Solar System as the origin of the infinite Cartesian space allows for spheres of different radii distance to the sun to be taken. The star "mass" on any given slice of this sphere may now be taken as the surface area of the sphere multiplied by that average star density constant, some ρ.

$$m(r) = 4\,\pi\,r^2\,\rho \tag{77}$$

Given this particular distance of travel to the solar system, we may suppose that the probability of any lithopanspermia projectile to successfully land on a planet in our solar system decreases quadratically with the original star's distance to our own. Let such a function of physical success be described accordingly.

$$f_1(r) = \frac{k_1}{r^2} \tag{78}$$

Then, additionally, assuming that there is a constant hazard rate, (λ), of the radiation of space and the likes killing the microbes onboard the lithopanspermia fragment, then the probability of said microbes surviving may be written as a function of the typical speed of the fragment, v.

$$f_2(r) = e^{-\lambda\,\frac{r}{v}} \tag{79}$$

Because these two named properties should be more or less statistically independent, as neither one is physically affecting the other, then their product becomes the combined probability of both succeeding.

$$f(r) = \frac{k_1}{r^2}\,e^{-\lambda\,\frac{r}{v}} \tag{80}$$

Therefore, an integral may be set up in terms of the contribution of a single sphere surface corresponding to a distance r, and then the probability of such a happening working successfully.

$$P(W) = \int_0^\infty 4\,\pi\,r^2\,\rho \times \frac{k_1}{r^2}\,e^{-\lambda\,\frac{r}{v}}\,dr \tag{81}$$

$$P(W) = \int_0^\infty 4\,\pi\,k_1\,\rho\,e^{-\lambda\,\frac{r}{v}}\,dr \tag{82}$$

$$P(W) = 4\,\pi\,k_1 \cdot \frac{\rho\,v}{\lambda} \tag{83}$$

$$P(W) \propto \frac{1}{\lambda}\,\rho\,v \tag{84}$$

This demonstrates that the probability of a successful lithopanspermia trip is proportional to the stellar density of the galaxy, the hazard function of microbe death in space, and the velocity of the fragment over the course of the journey.

A further analysis beyond this is to find the expected value of the distance, r.

$$\mathbb{E}[R] = \frac{\int_0^\infty 4\,\pi\,k_1\,\rho\,e^{-\lambda\,\frac{r}{v}}\,r\,dr}{P(W)} \tag{85}$$

$$\mathbb{E}[R] = \frac{v}{\lambda} \tag{86}$$

This is the approximation assuming only the three factors shown, so not taking into account further factors such as any gravitational disturbances, and so on. This transfer, if it happened at all, likely

occurred during the Hadean[25], meaning that the planets may well have been, on average, closer to the sun anyway then [41], as to allow a closer inner limit of the alternate star system without completely upsetting the balance of the Solar System.

Through this all, the probability of the transfer working successfully may be written in terms of the distance to be covered.

$$P(W) = 4\,\pi\,k_1\,\rho\,\mathbb{E}[R] \tag{87}$$

From here, k_1 and ρ may be additionally be approximated. To begin with, supposing that the surface areas of all non-sun objects in the Solar System, (which altogether is the set of all potential landing locations for the interstellar panspermia), is perhaps intriguingly, almost exactly double the surface area of Jupiter [42]. This being said, from a large distance, such a surface area might amount to approximately four times the effective area that may be reached within a huge sphere that is to be drawn around such a distant point, because the surface area of a sphere is always four times the cross sectional area of the circle formed by the sphere. The total surface area of a large sphere will be $4\,\pi\,r^2$, and of this, the effective target area makes up some $a = 3 \times 10^{10}$ km^2 more or less, so the rough probability of such an area being hit is about $\frac{a}{4\,\pi\,r^2}$. Therefore, using the original definition of k_1, it follows that $k_1 = \frac{a}{4\,\pi} = 2.45 \times 10^9$ km^2.

Moreover, the average stellar density in our region of the galaxy is approximately $\rho = 0.14$ pc^{-3} [43]. Finally, the approximation for $\mathbb{E}[R]$, although extremely rough, is perhaps $\mathbb{E}[R] \approx 100$ au, which is roughly the distance to the heliopause [44]. Putting this together, a very rough approximation may be made for the likelihood of the trip itself being survived by the interstellar panspermia microorganisms. It is about a one in one sextillion chance of this transfer event occurring and then succeeding.

$$P(W) \approx 10^{-21} \tag{88}$$

Note that this is indeed the approximate probability of once single attempted transfer working, but many more may well have been attempted over a period of a few decades or centuries, which still is practically no time in the general scheme of things. Also note that this is the probability of both the transfer going properly, *and* for the stars to align (quite literally) in favor of the transfer at all, which is to say that the source biological environment of the microbes must have passed close enough to Earth in the first place rather than the alternative.

The point of the matter is that this is absurdly unlikely, and, of course, that means the strong accordance principle will necessarily have a very specific take on it.

To apply the accordance principle, it helps to get in the mindset of just how staggering this chain of events really is. For a colony of microbes to be launched from some alien kind of world on which its ancestors had been developing, only to soar across the blackness of space with little to no chance of surviving the immense cold and radiation that it dealt with. And then to Miraculously find its way to Earth and collide with our planet, only to then open up the possibility to the staggering biosphere we now dwell in. All that, balancing on this keystone moment which could not afford to fail. And because it did not fail, we exist in our world today[26].

Let us suppose that there are to be two events, an A, representing abiogenesis, or the origin of life through any and all means with chemical matter as the origin, and then W, the probability of such life ending up on planet Earth by one means or another. Therefore, it may be supposed that both A and W are needed conditions for us to exist, with H.

$$P(A \cap W) \leq P(H) \tag{89}$$

Let us now break these two events of A and B into two scenarios: one in which abiogenesis occurs on Earth[27], and another where it occurs elsewhere and is transferred here by some form of interstellar panspermia. Earth abiogenesis scenario will hold events A_1 and W_1, whereas the alternative scenario will hold events A_0 and W_0. Note how the second scenario here is the one which we are continuing to suppose happened historically for the sake of argument. Now using the principle of implying events, (an aspect of the strong accordance principle), these scenarios may be related.

$$P(A_1 \cap W_1) \geq P(A_0 \cap W_0) \tag{90}$$

[25]This can be shown because of the general property that the origin of a clade universally occurs before the age of the earliest known fossils. Some time spans are larger than others, but generally we should expect a period of obscurity for any clade before its first fossils appear.

[26]All of this being the case if interstellar panspermia happened at all for us, mind you.

[27]Or our unit Solar System.

Considering how A_1, the event of abiogenesis within our Solar System, implies that any life is already present on Earth, it follows that $A_1 \cap W_1 = A_1$. Let us now suppose that A_0 and W_0 are independent, because the microbes cannot affect their probability of reaching Earth due to their biological abilities, therefore allowing for these quantities to be related.

$$P(A_0) \times P(W_0) \geq P(A_1) \tag{91}$$

From here, the ratio of $P(A_1)$ to $P(A_0)$ may be easily taken.

$$\frac{P(A_1)}{P(A_0)} \leq P(W_0) \tag{92}$$

Therefore, according to the strong accordance principle, the magnitude of the probability of abiogenesis occurring on Earth rather than someplace else is at least as minute compared to the alternative as the probability of the transfer working at all is compared to certainty – at least in the case where Earth life was indeed delivered here by interstellar panspermia in the past. So, again using the estimated value, the following will hold to the degree of accuracy of the estimate itself.

$$P(A_0) \geq 10^{21} \, P(A_1) \tag{93}$$

It is perhaps for no other concept than abiogenesis that such a result isn't to be immediately and heavily doubted for its exaggerated scale. But, this is indeed involved with abiogenesis, so ironically, perhaps it may very well hold. In such a case, life would be sextillions of times more likely to occur offworld than onworld through the process of abiogenesis. Furthermore, this supplies an upper bound for the probability of humanity at the same general order of magnitude through the rare-accorance principle.

If such an event truly happened, it would have revolutionary ramifications for our understanding of probability across our reality. It would be something of a proof that, for whatever reason, the workings of our reality tend toward complexity in place of order and simplicity as the Copernican principle [45] might imply. That is, we might ask the question "*why was it necessary for abiogenesis to occur elsewhere at all, if it would seem far simpler in practically every regard for it to have just occurred here instead?*" This would be a clear sign that for whatever generating phenomenon there is to our reality, it has a tendency of creation in direct opposition to predictable, non-complex evenness of form. The evidence for this is already out there, such as the existence of macromolecules, which are something of a Miracle of complexity. But this event of interstellar panspermia would be perhaps unmatched evidence of this because of its particular results and what they would mean.

To finish up this section, there are a few more slight points to be yielded by the accordance principle about interstellar panspermia if it did happen. For one, whatever original organism came to Earth would likely be ancestral to the Last Universal Common Ancestor, as otherwise both a bacterium and an archaea cell would have to have arrived on Earth, which roughly squares the probability of success in a few categories and thus seems quite unlikely. Because of this, it would be implied that there was practically no free oxygen on the original world, as that would require the untouchable complexity of photosynthesis – however clearly there would be liquid water there as it is too crucial to life to be absent. Furthermore, because of the Rare Earth hypothesis, it is somewhat certain that any life besides those which directly arrived in our Solar System are now completely extinct, as any such life's continued wellbeing beyond the successful transfer would be more or less statistically independent to human existence. Therefore, by the principle of measured existence, the existential probability of such life surviving beyond then equals its occurrence probability, and such an occurrence probability is to be considered irreversibly low by the Rare Earth hypothesis over billions of years. Thus, all life besides that which arrived on Earth has now been long sterilized, so we are unlikely to find a thriving biological planet somewhere out in the galaxy. It is something of a sad conclusion to this ancestral biological environment to our own, but it makes all the more important our life that we currently have left on Earth, which we should undoubtedly cherish for it.

13 Nexic Packaging

An intriguing note of Nexic reasoning to briefly mention is essentially the Nexic analogue to Robert Hooke's reasoning of creating a dome as based on a catenary by which a cord naturally hangs due to energy [46]. With Nexic packaging, the process is just the same. Suppose we have a mathematical

question which we would like to predict the empirical result of somewhere in natural history or elsewhere in our Aethus. By the Optimal-Earth Conjecture, we might reason that whatever empirical result is present there ought to follow an optimization of the likeliest circumstance which answers the questions of any corresponding mathematical nodes of context. In many cases, such as the interstellar panspermia one for example, we might set up this optimization using a deductive process of writing all contextual nodes from scratch, and then calculating that which maximizes the probability. However, in some cases, such a procedure may not be directly available to to complex or general circumstances, so it may be better in these queries to use an inductive analogue instead. This is Nexic packaging. The procedure, simply but, is to identify other examples throughout natural history of the same general trend that present in the query in question, and then to simply imply that the same respective ought to be empirically present in the present query. Let us explain this with an example.

Suppose we want to ask ourselves whether or not life in our Solar System should be expected to originate in the early Archean, or instead much earlier, during the Hadean. By the Optimal-Earth Conjecture, we might suppose that this is equivalently a query of which of the two is more probabalistically optimal. Given this, we can use Nexic packaging directly, and suppose that the outcome to this optimization query should, by induction, roughly match the outcome of the general class of queries over whether a clade is substantially older than its oldest known fossil, or roughly of the same age as that fossil. Given the events of Haṭeg island, we might suppose that, in the general sense, (that is, in the absence of further conflicting independent variables), it should follow that for a clade to be older than that first fossil is a probabalistically more probable outcome than the alternative. Thus, through this, we can extrapolate this back, via Nexic packaging, and suppose that life in the Solar System ought to trace to the Hadean after all, at least by one means or another. For it to have developed in that tiny flash of time between the cooling of the Earth and the first fossil would contradict other trends of optimization given similar circumstances throughout Earth's history, so, as such, we should argue that life inherently traces back to the Hadean.

Interestingly, we can also create Nexic packaging parallels between alternate Nexae altogether. For instance, take the overwhelming ontology that is the theropod Dark Era. We can clearly see the system at play here – the optimal scenario for us to gain mammalian cognition would be for just enough of a risk to be present in our environment to force evolution and change, (in a sense being a stimulus, which presents as undesirable because that is the only optimal thing for it to present as given the context), but for also just enough safety and potential to be present such that we had a semblance of a shot at surviving it. In effect, we could generalize this to an entire Nexic phenomenon called *wretched evolution*, which itself is a possible generalized Nexic package for the Dark Era itself. All we would need to perform for this is a kind of isomorphism-analogue of sorts between the Dark Era itself and another circumstance within another Nexus, and technically it would then be another instance of wretched evolution. This need not be utterly precise, and only has to be specific enough to warrant the same consequence from optimization. For instance, perhaps you have a cruel high school teacher that fails you senior year out of spite, and therefore prevents you from getting into your dream college. This then further prevents you from leading the life you wanted, and instead you have to return to square one and lose out on your dream. But, then, imagine if this coincidentally sets you on an even more important course in the long run, due to you meeting certain people or trying certain things, etcetera. We can all agree that that teacher is an antagonistic figure to you – and yet it still follows that they ended up accidentally helping you in the long run. This would be a great example of wretched evolution, because we might even reason that in order for you to reach your new goal at all, being the unlikely thing that it is, we needed a catalyst of sorts to force you onto that trajectory rather than just sitting in stagnation or randomness. As such, the cruel teacher would be a crucial requirement for your optimized success and an antagonistic figure all at once. Life has a funny way of making miracles out of tragedies, and that is the work of wretched evolution[28].

14 Optimation

The last major point of the specific embarkment of Nexic reasoning that is this paper, is to state the definition of the Nexus of Optimation.

Nexus 1 (Optimation) *The Nexus followed by an Aethus which is given to operate in the same*

[28] Note that this is not specifically arguing that tragedies often turn to miracles – but rather that established miracles often originally appeared as tragedies. It would be a kinder universe if the former were true also, but sadly it isn't, at least under the Null Nexus.

biosphere[29] *as an Aetherian, all while not necessarily having to be an Aetherian itself.*

Note how this gives something of a trichotomy between the three major Nexae discussed in this paper, with the Cosmic Nexus operating strictly over volumes of spacetime, the Aetherian Nexus matching an observing biological entity, and now, the Nexus of Optimation, which serves as a somewhat intuitively intermediate position, (although not exactly), in that it regards the Aethae which share a biosphere with an Aetherian, hence implying an intimate connection in space and time to said Aetherian.

Consider a notational form through which we can define the Nexus of Optimation, (where Optimation itself will be designated with a $N_{\widetilde{H}}$). Specifically, if some Aethus of A follows the Nexus of Optimation, such that $P(B \mid A) = P\big(B \mid A, N_{\widetilde{H}}\big)$, then an equivalent statement may be drawn.

$$P(B \mid A) = P\big(B \mid A, N_{\widetilde{H}}\big) \Leftrightarrow P(B \mid A) = P\Big(B \mid A, N_0, \widetilde{H}\Big) \tag{94}$$

This is so where $\widetilde{H}$ represents the Boolean stated-attribute that an Aetherian exists among the set of all Aethae in the same biosphere in the past, present, or future.

$$\widetilde{H}(A) = \exists X, \mathcal{B}(A, X) \wedge (X \operatorname{med} N_H) \tag{95}$$

This is so where N_H is the Aetherian Nexus, and $\mathcal{B}$ is a function to test whether two Aethae share a biosphere. In all practicality, of course one could not know with any degree of certainty whether their far future descendants would be Aetherians, so here we are specifically arguing that all of our ancestral Aethae held true in the attribute corresponding to $\widetilde{H}$ relative to *our Aethic understanding of them*, rather than supposing that they themselves were or could be even vaguely aware of this.

14.1 Optimation Fallacy

A crucial logical error should be highlighted in the workings of paleontology and the study of natural history at large, being the use of the Cosmic Nexus where the Nexus of Optimation should be used. Performing this fallacy is essentially a form of survivorship bias upon the entire biosphere. Some common fallacies of equating the Cosmic Nexus to natural history are the following.

1. Evolution tends toward humans.
    (a) Because Earth's natural history follows Optimation, of course we might witness in our own past that things tended to align sufficiently to produce humans. However, the supposition that humans were somehow always destined to evolve, or that the life tends to climb the evolutionary ladder, is itself an application of this fallacy.
    (b) In actuality, we see that the tendency is somewhat more for life to stagnate on the evolutionary ladder, with rising – just like in real ladders – requiring a building of a potential energy of sorts. And this potential energy analogue, blatantly, comes from continual miraculous luck – at least according to the conclusions of Nexic reasoning.
2. The extinction of a clade is evidence of its ecological inferiority to surviving clades.
    (a) This seems to be such a straightforward claim, and yet it is a clear artifact of this Optimation fallacy. Of course, the concept of ecological inferiority is somewhat vague, but in this context it is meant to demonstrate that we ought not attribute the potential for surviving on Earth to a clade just based on whether or not it did.
    (b) The classic example of this might be the non-avian dinosaurs versus the placental mammals. By the Dark Era hypothesis, we see that Mesozoic mammals would have been remarkably disadvantaged compared to our theropod counterparts, such that by any measure of evolutionary fitness besides this one fluke that actually occurred, (with the asteroid), dinosaurs would hold the ecological upper hand. This is also, of course, why this one fluke out of a million is what actually happened – that way they could be cleared from the Earth and we could exist in their place.
    (c) In case it seems that the Nexus of Optimation is just glorified uncertainty, this is not actually the case – simply it is arguing that we ought to transition our intuitions with the Cosmic Nexus to their analogues in Nexic reasoning.

[29] Note that "biosphere" can be generalized here to imply any circumstance which results in an Aetherian existing. For instance, the formation of the moon would count as such a thing, with its corresponding Aethus being a parent Aethus of one's own which describes it.

14.2 Theorem of Aimless Optimation

Consider how just as arbitrarily applying the Cosmic Nexus to the workings of Optimation is a fallacy, it is also a fallacy to suppose that the two may never agree. Specifically, consider some set of circumstances for which Optimation and the Cosmic Nexus are guaranteed to agree, being any Aethus which is statistically independent to the Nexus of Optimation. Note that the Nexus of Optimation can itself be considered to be equivalent to the Cosmic Nexus plus an additional Aethic attribute, say H_N, which implies that an Aetherian, (itself being defined in the broadest sense – being the union of all instances), is to exist in one's own biosphere, past, present, or future. Thus, if some attribute, being X, is statistically independent to H_N, then it follows that it shall operate precisely as it would under the Cosmic Nexus only. Here is the mathematical statement of this concept, where N_0 is the Cosmic Nexus.

$$P(X \cap H_N \mid N_0) = P(X \mid N_0)\, P(H_N \mid N_0) \Rightarrow P(X \mid N_0) = P(X \mid H_N \cap N_0) \tag{96}$$

As such, this can be considered to be a case where it is valid to use the Cosmic Nexus in place of the Nexus Optimation. Otherwise, however, one should be careful in doing this.

14.3 Examples of Directly Applying Optimation

In practice, we might imagine creating our own perception of past events as living them live with occurrence probability, and then simply applying the Nexus of Optimation to the reality. A great example of this process regards the inability of humans to produce α-gal, a carbohydrate once abundant in our ancestors due to the GGTA1 gene [24], which we have now lost, probably somewhere between 25 and 35 million years ago, as is between the origination of the Catarrhine and the Simians [47]. What makes this gene loss so foundational is that firstly, it originated at least as far back as the Dark Era, and secondly, it was lost only in our own lineage of the Catarrhine primates, which, as is implied by it being lost by us and not once elsewhere, was a legitimate fluke event. Furthermore, some of the specifics into this fluke event are even known: it was part of a viral epidemic which struck our ancestors and very nearly wiped our lineage off the planet altogether [48]. As can be implied by such a thing, it was beyond risky and dangerous, as our extinction would render all prior optimal events and circumstances utterly obsolete and would end the road to human intelligence of life on Earth. The epidemic, in fact, was significantly more deadly still than a typical virus, because the virus contained α-gal just like our own cells did, so we could not physically generate antibodies without attacking our very own cells. It was something of a crisis on the highest existential scale. But, sure enough, as is something of a trend throughout optimal natural history, it was a Miraculous event that saved the day: the members of our population who had developed a mutation to disarm the gene GGTA1 and stopped producing α-gal wound up being immune to the virus, and it is these few lucky individuals that saved our lineage and serve as our direct ancestors. So, in a sense, because of some Miraculous immunity to the virus, the very last members of our population managed to keep us extant at the last minute, and we owe our existence to it.

This is all well and good, and without use of Optimation, may seem like all this event has to tell us, but with Optimation in the picture, we see a fascinating hidden meaning to it all. The virus, see, was not some chance event which we merely endured – rather, strangely, it was our saving grace. Using the classic accordance principle, we may reason that the loss of the GGTA1 gene in our lineage and ours alone will, consequently, have immensely high existential linkage as a result, otherwise such an occurrence would be practically impossible. Optimation, then, puts something of a specific spin on this: that is, because of this situation of high existential linkage of losing that gene, and the corresponding highly negative existential linkage of keeping it, it was a necessity, by Optimation, to lose that gene at all costs. In a sense, we can picture the past environment where the gene had not yet gone, and then imagine the Nexus of Optimation "guiding" our reality, so to speak, into a place where GGTA1 could be dropped. This gene, as is implied by it being present in all mammals at the time, must have had something of an incredible use historically to us, perhaps even proving invaluable during the Dark Era in one way or another. Therefore, evolutionarily speaking, the loss of it would be nearly impossible, as our basic biology in a sense prohibited it. The virus, then, was the magical cure to this dilemma, as ironic as it sounds. So, a way of explaining this all is that Nexus of Optimation engineered the virus to appear, to produce α-gal, and then for our lineage to have an immunity given that we lose the gene and stop producing α-gal. All of this, then, reached the larger goal of us losing this gene, which in fact we did. But through the Optimation lens, all of this would appear, if we were

watching it unfold like a movie, to have something of a story-like structure with a moral, beginning middle end, and perhaps even a hero's journey-like plot. This is the nature of Optimation[30].

One exercise we might try, then, is to picture this happening again, all the while maintaining the lens of real-time, classically based occurrence probability, but also removing Optimation from the mix. Instead of the strict tendency of these happenings to point in the direction they did, now there would be no general direction to them at all. If we cut Optimation just before the virus, then such a virus would most likely never materialize in the first place, or would have been replaced with some less severe, α-gal-lacking equivalent. From there, the monkeys of old would live on obviously into the indefinite future, now incapable of evolving in the direction of humans, (as is defined by the highly negative existential linkage associated with such a result), and would in effect die with the Earth, if not before. If, instead, we had let Optimation exist as far as the origin of the virus, but then cut it directly after, then we would see an even quicker turnover, as the virus wiped through our population with the Miracle immunity never materializing. It would be the end of the human experiment and, inevitably, life on Earth as we know it.

Now, the thing to examine here, is that this is how important Optimation is *just with one single event*. Note that this is likely nothing compared with some of the most Miraculous events the Earth has ever seen, such as the death of the non-avian dinosaurs and the like. Or, if it occurred, what about the interstellar panspermia event, or the dawn of Eukaryotic life when a bacteria and archaea merged into one single life form [7]? The general idea is that, again considering life on Earth through the classical, occurrence probabilistic system, (as is most intuitive to humans because it is, at least as is conjectured, what we experience in the now), it follows that the Nexus of Optimation is a foundational process which guides our evolutionary history in the exact needed direction at all times, and in doing so creates the very nearly-highest probability outcome at every stage.

The claim here, then, is that the foundational theory of evolution by natural selection, in all of its astounding beauty, cannot describe the entire story of human evolution on its own. For that, we must also include Optimation. See, if we had cut Optimation at any stage in our evolutionary development, then we would simply cease said development towards humans at that point. Sure, our would-have-been ancestors would still evolve due to natural selection, but an archaea would never become a eukaryote, a lobe-finned fish [50] would never leave the ocean, and a basal higher primate would never become a human. That is, at least the likelihoods of any one of these would be beyond negligible, similarly to entropy-defying flukes[31]. According to the Optimation framework, in fact, life does not invalidate [51] the second law of thermodynamics at all. The second law of thermodynamics allows for a minute set of unimaginably improbable possibilities which technically decrease the entropy of a system, but are simply too unlikely to ever be observed in real time. Optimation states that the story of life on Earth is one such possibility.

15 Conclusion

In conclusion, this paper has made use of the mediocrity principle, the anthropic principle, and the empiricism surrounding the circumstances of the dinosaurian demise in order to derive a specific assessment of the dinosaurs as a requisite of human existence, a broad formulation for making predictions about paleontological phenomena, (being the accordance principle and its descendant suppositions in

[30] A further note to add here is what Optimation implies about the existence of viruses in the first place. As can clearly be seen by this result, if viruses did not exist in the world, then we would be somewhat out of luck for making this event happen, or in another sense, it was more optimal for viruses to exist than not. Also looking to the explosion of human endogenous retroviruses dating to the Mesozoic [49], it becomes quite clear that viruses have been a driving force to human evolution, especially at times when rapid evolution was a necessity, such as, namely, the Dark Era itself. Therefore, it becomes perhaps apparent through the framework of Optimation that viruses are a fundamentally needed concept in human evolutionary history, as a simple means of rapidly editing genomes or otherwise imposing an instruction-like alteration to our functionality as is determined by the Nexus of Optimation. This cruciality to nature directly contrasts the stigma we view viruses with in the modern day, as, sadly, the consequence of this Optimation necessity is that we can in fact get sick.

[31] A quick means of observing how an Optimation-absent path for us would appear is to simply look at the living sister taxon to the evolutionary spot at which Optimation is to be shut down. In most cases, the state of this sister taxon will roughly resemble the state of our own group had Optimation stopped at the point of divergence, because any clade whose state is statistically independent to humanity will, consequently, have an occurrence probability which matches its existence probability for any given attribute – itself implying a negligible direct affect from Optimation. Notable examples of this trick failing to work involve alternate clades that were not statistically independent to us and instead held positive existential linkage, (however negative should entirely be far more rare by the strong accordance principle), such as plants, dinosaurs, or fungi.

Nexic reasoning), and lastly a falsifiable claim of an upper bound to the probability of human existence on a planet both in the specific and generally-applicable spheres.

The scientific implication of Nexic reasoning are of course already profound, but perhaps more important still are the cultural and contextual implications to the humanity's future. Finding out that the universe behaves in this characteristically Nexic fashion would indeed be one of the most significant changes in our understanding of the human experience that we have ever faced, starting with the understanding that we are indeed alone in the universe, and more vastly alone than we could have possibly imagined. This sort of realization, should it come to pass, would be sure to couple with cultural shifts, perhaps even as far as instigating the movement beyond Postmodernism itself. We would have to restructure what meaning is, and what our place really is in this now Nexically-knowable universe. As far as the foreseeable future goes, then, perhaps the primary cultural goal of Nexic reasoning is that we need to be able to discourse the Rare Earth hypothesis [3] to the same specificity that we can discourse fundamental physics. It really is this massive territory of personal relevance that has for all intents and purposes not even been touched by human explorers and theoreticians. Nexic reasoning, then, is the procedural backbone which allows us to change that. In the meantime, though, I want to leave you with an important philosophical message: that is, in this rather turbulent moment of having just recovered the Rare Earth hypothesis by inductive means, we are in need of an understanding of how best to react. The logic of Nexic reasoning has effectively just rendered the outside universe as an unthinkably vast and unfeeling graveyard[32] as far as the eye can see, but I strongly believe that this ought to bring us extraordinary motivation rather than extraordinary despair, the simple reason being that it now highlights us as the sole survivors in this unfeeling machine. As will be an important theme in follow up papers of mine to Nexic reasoning, this is a grounding that we must keep close in order to handle the next key stages of our existence on this planet.

We may now turn the discussion to the best way of extending Nexic reasoning empirically. As the accordance principle is fundamentally a relational phenomenon, in that it predicts some information in the face of other information, we may suggest that the primary avenue for further research about Nexic reasoning is simply to gather ever more empirical results from the paleontological record that offer an avenue of its use, and then from there test its predictions. For example, the result regarding α-gal could lead to some very interesting consequences about the history of viruses as far back as into the Mesozoic, and perhaps the results about super-Earths could lead into statistical insight on the general habitability of Earth-like exoplanets around nearby stars. The sky is really the limit for putting this model into effect, and of course throughout all of this it has a capacity to falsify or validate information in groups – so it seems, in the least, that the uses of the accordance principle may prove to be quite exciting.

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