Divine Creation and Evolution

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Abstract

It is widely accepted that divine creation of human beings, except maybe for the souls thereof, is compatible with neo-Darwinian evolution. I shall argue that, on the contrary, neo-Darwinian evolution is at least rationally and perhaps logically incompatible with a plausible understanding of what it means to say that God intentionally created human bodies. I will do this by examining three different accounts that try to make compatible the idea of creation with a neo-Darwinian account: determinstic evolution with God setting initial conditions, stochastic evolution with God having middle knowledge and stochastic evolution without God having middle knowledge.

1. Introduction

It is widely accepted that the idea of divine creation of human beings is compatible with evolutionary theory, except perhaps in regard of the human soul, and that evolutionary theory provides an explanation of speciation and of complex features of organisms that undercuts Paley-style teleological arguments, whether or not the evolutionary mechanisms are truly random or deterministic. I will argue that this "orthodoxy" is wrong on a plausible reading of the doctrine that God intentionally created human beings.

On the contrary the doctrine of the creation of human beings, read as I will recommend, is logically incompatible with deterministic evolutionary theory. How compatible it is with indeterministic evolutionary theory will depend on whether God in creating makes use of "generalized middle knowledge" (GMK) which would allow God to know what outcome a stochastic process would have were it initiated. If God is understood to make use of GMK, then creation will be logically incompatible even with

indeterministic evolutionary theory. If God does not make use of GMK (e.g., because he lacks GMK), then there will be logical but not rational compatibility: one ought not believe that God does not make use of GMK, that God created human beings (in the sense I will define) and that indeterministic evolutionary theory is true.

What is particularly surprising about the argument is that I am willing to grant that all the first-order claims of evolutionary theory are rationally compatible with western monotheism, with the possible exception of the issue of the special creation of the human soul. Thus, I accept as compatible with western monotheism the claim that human bodies, as well as all non-human organisms, are genetic descendants of a unicellular common ancestor of all organisms on earth ("common descent") and the claim that the differences between successive generations (apart perhaps from the possible exception of the production of the human soul) are caused by naturalistically explainable genetic mutations and recombinations ("no miracles in genetic history").

2. The creation doctrine

I will need to elucidate the creation doctrine. I take the claim that God created human beings to imply that God intentionally and specifically brought it about, immediately or mediately, that human beings exist in such a way that the overall design of the human species, including human bodies, can be attributed to that intention, in the way that the design of an artifact can be attributed to the craftsman, to borrow the analogy in Isaiah 64:8 and Romans 9:21. This implies that the existence of a species having the mental and physical features of the human species is explained by God's intentional activity. This is quite compatible with a naturalistic story about human beings came into existence (leaving aside considerations of the soul—a qualifier that in the interests of brevity I will now stop making). God might have, after all, carefully arranged the initial conditions in such a way that eventually human beings would be determined to arise, and carefully picked these initial conditions so that the they would have precisely the features God wanted them to have. The notion of creation thus does not beg the question against theistic evolutionary account, since it is compatible with God using any chain of intermediate causes he might wish to in order to fulfill his plan.

But this doctrine of creation is meant to rule out *some* alternative stories that are *prima facie* compatible with God's being the first cause of the universe. On one story, God created an initial mix of

stuff without any intention that the human species should arise from it. He then observed what arose, deterministically or not, and when human beings evolved, he, as it were, applauded. On this view God would indeed the first cause of human beings, in that he would have initiated the chain of causes leading to the existence of human beings, but he would not have been the *intentional* cause of the existence of human beings. The fact that he might foreknow that human beings would arise from the initial conditions does not change this, since, even without committing oneself to the full Principle of Double Effect, it is clear that one can intend something to happen without caring at all about other effects further on down the line. Thus, one might know as one sets out to write something that one's hand motions will cause agitation in the air, without in any way caring about this agitation or intending it.

Nor is the doctrine of creation as I understand it compatible with the idea that God produced an evolutionary process merely intending that it would lead to some interesting result or other, and then when he saw that the interesting effect would in fact be the arising of something like human beings, he put some minor finishing touches on their bodies, say miraculously intervening to make them hairless. On this story, God did initially intend human beings to arise, since he intended that something or other interesting should happen and human beings in fact were that interesting thing, but he did not specifically intend that human beings should arise. The finishing touches would be a sign of a subsequent specific intentional activity, but this intentional activity would not count as responsible for the overall design of the human body.

I will call the doctrine I am elucidating "the creation doctrine" for brevity. Strong predestinationist views will imply the creation doctrine. If God intended that specifically Paul should be saved, then God intended that specifically Paul should exist. And since Paul is essentially human, God intended specifically that the human race should exist. Moreover, arguably, if God were not responsible for the overall design of the human body, then God's intention to predestine, and hence create, Paul would not be prior in the order of explanation to all events in the created universe, in the way predestination requires.

But one does not have to accept strong views of predestination to find the creation doctrine plausible. The doctrine seems necessary in order to do justice to the notion that God is our author, that his relation to us is like that of a craftsman or artist to what is produced.

There is still an ambiguity in the creation doctrine's use of the term "human". On a strong reading, "human" means precisely that: a biological human being, at least a member of the genus *homo*.

On a weaker reading, "human" means any animal capable of love, intelligence and sophisticated rationally-guided engagement with the physical world.

I will thus talk of a stronger and a weaker creation doctrine, and there are differences in the conclusions of this paper for the two. Both doctrines are logically incompatible, I shall show, with evolutionary theory on either a deterministic reading or a GMK-based indeterministic reading. Both doctrines are, as far as this argument goes, logically compatible with an indeterministic no GMK version of evolutionary theory. However, the stronger doctrine is not *rationally* compatible with this theistic evolutionary variant. Currently, the weaker version *is* rationally compatible with it, but this may change with additional empirical data. The conclusions of this paper are strengthened by the fact that I will also give an independent argument against the idea of genuinely random stochastic processes in a theistic cosmos without GMK. If this argument is sound, then we are left only with the two versions of theistic evolutionary theory that are *logically* incompatible with even the weaker creation doctrine.[1[1]]

3. What in evolution is fully compatible with the creation doctrine?

I will use the term "the full ancestral history of x" to denote a proposition reporting the complete first-order causal history of the descent of an individual organism x going all the way back to a very simple (admittedly a vague term that obscures the fact that the simplest organism may still be a complex being) organism, or group of very simple organisms, that does not itself have an ancestor. This history includes such conjuncts as *that ancestor* x_{112} *resulted from the sexual union of ancestors* x_{113} *and* x_{114} *whose DNA was recombined and/or mutated in such-and-such a way under the influence of such-and-such causal factors*, as well as conjuncts reporting the first-order causal facts causally responsible for various ancestors surviving to reproduce, e.g., *that ancestor* $x_{29949431}$ *killed a saber-tooth tiger with her tusks at* t_{440}. I shall further assume that if humans are composed of body and soul, the ancestral history only concerns the body.

[1[1]] Jonathan Wells has catalogued a compelling history of Christian theologically-based design claims in "Darwinism and the Argument to Design", *Dialogue & Alliance* **4**, no 4 (1991), also available online at: *http://www.discovery.org/scripts/viewDB/index.php?command=view&id=102*. These claims suggest that at least Christianity involves an intentional creation doctrine not just in connection with human beings. This, of course, strengthens the arguments of this paper.

If an organism is not ultimately descended from very simple organisms, then I shall say it lacks a "full ancestral history".

What I claim to be logically compatible with the creation doctrine (in either the strong or the weak form) is the claim that all organisms now alive have full ancestral histories and the events in these histories are naturalistically caused and such as one would expect given evolutionary theory.

The *first-order* claims of naturalistic evolutionary theory are causal stories about all the currently extant organisms entailing that these organisms have full ancestral histories that consist of reports of events that are naturalistically caused and such as one would expect given evolutionary theory. These first-order claims are compatible with the strong creation doctrine, I take it. The argument for this compatibility is quite simple: God being all-powerful and all-knowing could surely have created a very simple common ancestor and arranged the initial conditions in such a way that the events that would eventuate would be such as a naturalistic evolutionist would accept, and there is nothing in the notion of a creator God to logically rule out that this in fact happened.

A powerful objection to this claim is that it would be deceitful for God to act in such a way, since it would mislead people into naturalism. But this objection would fail if God in fact took safeguards against such misleading (e.g., by speaking in the hearts of the people who might be deceived, or by producing other evidence for design), and it is rationally compatible with both western monotheism and the first-order claims of naturalistic evolutionary theory that he took such safeguards. Moreover, there might have been other benefits in God's acting this way, e.g., because it might allow for more uniformity in the laws of nature.

4. Where the incompatibilities lie

4.1. The deterministic and generalized middle knowledge cases

4.1.1. The argument

What, then, is problematic in evolutionary theory vis-à-vis the creation doctrine? It is the ambitious claim that evolution provides a true explanation of why such marvelously complex and adapted animals as horses, pine trees and frogs exist, with complex organs such as equine eyes and human brains, and why intelligent animals like humans exist, an explanation whose possibility competes with, and undercuts, Paley-type teleological arguments. If evolutionary theory undercuts Paley-type teleological

arguments, then plainly it does so not by showing that Paley was mistaken as to the empirical fact that there are intelligent animals or that organisms have much complexity, but rather by giving a naturalistic explanation of the same facts that Paley and his fellow teleological arguers sought an explanation for.

That evolutionary theory in fact claims to provide such an explanation is, I think, clear from the history of the debate on the evolutionary theory. Of course, the complexity and well-adaptedness of organisms and the existence of intelligent life is not *all* evolutionary theory purports to explain. It also purports to explain, say, facts about the geographic distribution of species, the diversity of the species, and so on. But it is the ambitious claim to explain such things as intelligence, the mammalian eye or the elephant's trunk that make evolutionary theory particularity interesting to our culture. And it is *this* ambitious claim that is incompatible with even the weak creation doctrine, given determinism. As we shall see, however, it is quite possible that evolutionary theory could be weakened to make correct and less ambitious explanatory claims while at the same time not changing its first-order claims. It could well be that the resulting theory would (a) be compatible with the strong creation doctrine and (b) still be sufficiently powerful explanatorily in this less ambitious realm so as to justify belief in itself through an inference to best explanation. But such a weakened evolutionary theory would not compete with theistic teleological explanations.

However, even though a monotheist accepting the creation doctrine cannot consistently hold that a deterministic evolutionary theory making the ambitious explanatory claims is true, she can still reasonably hold that the *epistemic availability* of such a theory undercuts Paley-type arguments. I will not argue that there is empirical evidence of divine design. However, the weak creation doctrine logically entails the presence of a kind of design. This yields non-scientific evidence for Intelligent Design if (as I believe) there is non-scientific apologetic evidence for a monotheism accepting the creation doctrine. I also hope that once a philosophically-inclined theist sees that she must, if she is to remain consistent to her religious beliefs, abandon the truth of the ambitious explanatory claims, she will be motivated to explore whether there might not be empirically-grounded arguments against the truth of the ambitious explanatory claims, arguments perhaps like those that the proponents of Intelligent Design offer, though it is also epistemically possible at this point that no such arguments will succeed.

Enough has been said about the incompatibility claim and its implications. It is time to show that the claim is true. Now, evolution can only purport to fulfill what I have called the "ambitious" explanatory goal through statistical explanations. It is clear that there is no hope arguing that the mammalian eye *had to* evolve. No doubt there are multiple possible solutions to any one evolutionary problem. Not even the weaker claim that the mammalian eye *or something equally adaptive to the circumstances* had to evolve is true. After all, evolution is grounded in the existence of *random or quasi-random* mutation and recombination processes as well as the fact that the descendants with genotypes that produce more adaptive phenotypes are more *likely* to survive. There are no guarantees here, even in the deterministic case. For in the deterministic case, while it is possible in principle to explain physically why such-and-such a feature now exists by showing how the feature had to arise from the state of the universe in the past, such an explanation would not be a neo-Darwinian one. It is essential to an ambitious neo-Darwinian evolutionary explanation of a complex feature of an organism that the explanation be statistical in nature. The explanation will involve the claim that it is *not improbable* that the mammalian eye or something about as adaptive would evolve over the millions of years available for nature to experiment. In other words, the ambitious explanatory goal is supposed to be satisfied through statistical explanation.

Less ambitious evolutionary explanations can afford to be simply causal in nature, simply listing the causal factors in the ancestral history of an organism. But such less ambitious explanations are not sufficient for undercutting teleological arguments in the way that ambitious evolutionary theory claims to do through its explanatory account. To see this, suppose that the naturalistic history of the development of the human body was that first dogs developed, and then a bunch of cosmic rays struck a dog and caused its DNA to mutate into the DNA of human beings. While this would yield a *causal* explanation of the existence of human beings, still, given the astronomical unlikelihood of the event in question, the causal story here would do nothing to undercut a teleological argument. Given the data that the above sequence of events in fact happened, it would be quite reasonable to suppose that an intelligent agent aimed the cosmic rays in such a way as to produce the DNA of human beings, just as it would be reasonable to suppose an

intelligent aiming agent to be involved should cosmic rays striking an empty memory chip produce all of Shakespeare's *Hamlet*.[2][2]

That is why evolutionary theorists emphasize the great amount of time that was available for evolution and the large number of organisms in which random mutation occurs. For instance, Darwin writes about the evolution of the eye that

> we must suppose that there is a power, represented by natural selection or the survival of the fittest, always intently watching each slight alteration in the transparent layers; and carefully preserving each which, under varied circumstances, in any way or in any degree, tends to produce a distincter image. We must suppose each new state of the instrument to be multiplied by the million; each to be preserved until a better one is produced, and then the old ones to be all destroyed. In living bodies, variation will cause the slight alterations, generation will multiply them almost infinitely, and natural selection will pick out with unerring skill each improvement. Let this process go on for millions of years; and during each year on millions of individuals of many kinds; and may we not believe that a living optical instrument might thus be formed as superior to one of glass, as the works of the Creator are to those of man?[3][3]

It is precisely the genius of Darwin to have realized that random variation over millions of years in millions of organisms is not unlikely to produce very new phenotypes and that the better of these will be selected for. Without this amount of time and without the number of organisms involved, while the first-order causal stories plainly could still have happened, the probabilities of the emergence of something as complex like the eye would have been astronomically small, and hence the ambitious explanatory goals would not have been met.

Or take Dawkins' claim:

> We have seen that living things are too improbable and too beautifully 'designed' to have come into existence by chance. How, then, did they come into existence? The answer, Darwin's answer, is by gradual, step-by-step transformations from simple beginnings, from primordial entities sufficiently simple to have come into existence by chance. Each successive change in the gradual evolutionary process was simple enough, *relative to its predecessor*, to have arisen by chance.[4][4]

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[2][2] Note that in fact the difference between the DNA of a dog and that of a human, over two billion base-pairs, is several orders of magnitude greater than the content of *Hamlet*, about three million bits (in HTML format).

[3][3] *Origin of the Species*, 6th edition, London: John Murray, 1872, p. 146 (online version at http://pages.britishlibrary.net/charles.darwin/texts/origin_6th/origin6th_06.html).

[4][4] *The Blind Watchmaker*, London: Penguin, 1986, p. 43. Italics in original.

The probabilistic explainability of the successive steps, if not of the sequence as a whole, seems to be crucial here.

No claim is made here that *all* neo-Darwinian explanation proceeds through natural selection. But a claim *is* made that ambitious neo-Darwinian explanations involve natural selection and genetic variation to some degree, and involve them in a statistical way.

The details of how the statistical explanation works in the Darwinian case are of course controversial. Perhaps it is the case that there is a high probability that complex solutions to problems raised by the environment would evolve. In this case, the explanation would be like the statistical explanation of the fact that a thousand coins thrown from a high building landed about half heads-up and half tails-up: it is highly probable that such an arrangement would happen. Or perhaps the probability is relatively low, but at least not astronomically low, and so the explanation of why intelligence evolved is like saying that Fred got paresis as a result of having had syphilis, where paresis is a not very probable but still not very improbable result of syphilis. It does not matter, however, which story we take. It will still be logically incompatible even with the weak creation doctrine, if we are either working with a deterministic evolutionary theory or if we assume God has GMK.

One might wonder how a *deterministic* version of evolutionary theory could involve statistical explanations. There is a real difficulty here, akin to the question of how 19th century deterministic thermodynamics could yield statistical explanations. I suspect that any successful answer would involve in both cases something like an assertion that we can do statistical explanation provided we impose some canonical probability distribution (e.g., a uniform one) on the state space of initial conditions. The details are difficult, but since scientists *did* in fact propose statistical explanations on the basis of deterministic thermodynamics, the analogous procedure in the case of evolutionary theory seems at least epistemically possible.[5[5]]

[5[5]] The parallel between thermodynamics and evolutionary theory was exploited by Ronald A. Fisher, *The Genetical Theory of Evolution* (New York: Dover, 1930). A good discussion of the issues in statistical evolutionary explanation, as well as a controversial new statistical account, has recently been given by Denis M. Walsh, "Fit and Diversity: Explaining Adaptive Evolution", *Philosophy of Science* **70** (2003), 280–301.

So far we have made various simple observations about evolutionary theory. Consider now the weak creation doctrine that God intentionally and specifically brought it about that intelligent life exists, in such a way as to be the author of much of the design of the life forms. Now, plainly, God could have designed his creatures through causal processes reported by full ancestral histories that are in fact compatible with evolutionary theory. Nor is the problem just that the creation doctrine purports to provide one explanation of an event (the arising of intelligent life) while the evolutionary theory purports to provide another. For a given event can have more than one explanation: "Fred died because his heart stopped beating. It is also true that Fred died because he was shot to death." Rather, the problem is that the design claims, if true, would undercut the *statistical* explanations that evolutionary theory makes use of to make good on its most ambitious claims.

To see this, suppose that Fred has dropped a thousand coins one by one from a high building, and 485 of them landed heads-up. Bob now wonders: "Why was the percentage that landed heads-up between 45% and 55%?" There is a simple statistical explanation here, it seems:

(1) The probability that between 450 and 550 of the coins would land heads-up is about 99.9%, and this is why somewhere between 45% and 55% of the coins landed heads-up.

But suppose now we learn a further fact. Fred in fact calculated at what angle and velocity he would have to throw each coin in order that the coin should land heads-up and the angle and velocity needed to get tails. Then he carefully chose the angles and velocities so as to guarantee that between 45% and 55% of the coins would land heads-up. I submit that this extra fact falsifies The probability that between 450 and 550 of the coins would land heads-up is about 99.9%, and this is why somewhere between 45% and 55% of the coins landed heads-up.. It falsifies The probability that between 450 and 550 of the coins would land heads-up is about 99.9%, and this is why somewhere between 45% and 55% of the coins landed heads-up. not by falsifying the probabilistic claim made. That claim is true, providing that we are careful to specify that we are looking at probabilities given no information on the angles and velocities the coins are tossed at. What is seen to be false now is the claim that this probabilistic fact *explains* the result. For it no longer does. The reason is that the probability stated in The probability that between 450 and 550 of the coins would land heads-up is about 99.9%, and this is why somewhere between 45% and 55% of the coins landed heads-up. is no longer conditioned on the relevant background condition, since now the

relevant background condition is that Fred tossed the coins in such a way as to ensure that between 45% and 55% of them would land heads-up. The conditional probability conditioned on this piece of background knowledge is 100%, not 99.9%, and it is *this* conditional probability that is explanatory of the result. The same is true if one is dealing with statistical explanations involving low probability.

For an even clearer example suppose that Fred is extremely good at tossing coins in such a way as to get them to land as he wishes. He tosses the coins in such a way as to make them land all heads. However, his method for tossing coins has a small probability of failure, say 1%, and as a matter of fact not all coins land heads up. Let K_1 be the claim that 1000 coins were tossed. Let K_2 be the claim that 1000 coins were tossed by Fred who is extremely good at tossing coins to get the result he wants, with a failure probability of 1%, and who intended to have the coins land *all* heads-up. Let E be the event that not all the coins land heads-up. Consider the following two claims:

(2) $P(E|K_1)$ is extremely high ($P(\sim E|K_1)$ is astronomically low).

(3) $P(E|K_2)$ is low but not astronomically so.

Both claims are true. But it would be simply false to say that P(E|K1) is explains the occurrence of E. For given that the coins were tossed by a skilled coin-tossing agent with a specific intention, proposition K_1 is no longer the relevant background knowledge, even though it is still a true proposition. For it is clear that in this case the occurrence of E is explained by Fred's failure, not by the high likelihood that a bunch of coins tossed will contain some coin that lands heads-up. The latter is irrelevant in cases where the initial conditions have been "cooked" by an intelligent agent with a specific intention.

It is thus clear that

The fact that $P(E|K)=p$ explains the occurrence of E

can only hold if K is appropriately chosen, no matter how high p is. Alas, philosophers of science do not have a full story about what background information K counts as appropriately chosen, but we can often decide this on a case by case basis. For instance, apart from cases of self-explanatory propositions, the claim that $P(E|E)=1$ does not explain the occurrence of E, even though we have here the highest probability we can. Or consider the following case. Let E be the event that a die thrown landed 1, 2, 3, 4 or 5. Given just the information K_1 that we have a six-sided die that was tossed, by the principle of indifference we will say that $P(E|K_1)=5/6$, and might use this to explain why E in fact occurred. But if we have the additional

information that the die is loaded in favor of sixes in such a way as to produce a six 90% of the time, then our previous attempt at explanation is undercut, at least in most ordinary contexts, even though it is still true that $P(E|K_1)=5/6$. For plainly we should make use of the more relevant information K_2 that we are dealing with a six-sided die that produces sixes 90% of the time.

In fact, in general, information about the intentional activity of agents working to tweak the initial conditions so as to produce or prevent the effect E is relevant background information. The failure to include this information in the background information relative to which conditional probabilities are computed vitiates the claim that these probabilities are explanatory of E. In particular, if the initial conditions are deliberately chosen by an intelligent agent in such a way as to guarantee the occurrence of E, then any attempt at probabilistic explanation that does not in some way involve the intelligent agent is a failure: the claim that an explanation is provided is simply false. Note that this illustrates the general claim that it is not always the case that

(p explains q) $\supset \Box$ ((p & q) $\supset$ (p explains q)).[6[6]]

That my analysis of relevancy applies in the case of pseudo-random but actually deterministic phenomena should be clear. If Fred set the initial conditions for the coin toss in such a way as to guarantee that 45%-55% of the coins would land heads-up, then it is false to say that there is a probabilistic explanation of them thus landing which explanation does not involve Fred.[7[7]] This shows that if it is the case that God definitively intended to produce some animal or feature of an animal, then a naturalistic statistical evolutionary explanation of the existence of the animal or feature is incorrect, if the processes

[6[6]] Cases of preemption provide another class of counterexamples. That Fred was pushed off a high building in circumstances C and that the laws of nature entail that anyone pushed off a high building in C will die will, normally, explain why Fred died. But in a possible world where Fred is shot dead on his way down, it may still be true that Fred was pushed off a high building in circumstances C and that the laws of nature entail that anyone pushed off a high building in C will die, but this will not explain why Fred died. At the same time, the principle is true in some cases. For instance, if p says that x intentionally brought it about that q, then in any world where both p and q hold, p explains q.

[7[7]] Of course there might be a probabilistic explanation involving Fred, say one that assigns a high probability to Fred's deciding to rig a series of coin tosses as described.

behind the evolutionary processes are really deterministic. For the probability that such-and-such a feature would arise relative to background information that does not specify the possibility of the initial conditions being arranged by God is explanatorily irrelevant in this case.

Thus, the presence of the ambitious evolutionary explanatory claims is in fact incompatible with the weak creation doctrine, provided the evolutionary processes are ultimately deterministic. The same negative result holds providing God is able to make use of something analogous to middle knowledge for indeterministic processes. Recall that according to the controversial position of the Molinist, God has *middle knowledge* of what a person *would* do were she created and placed in circumstances *C* that specify in as great a detail as possible everything that happens before the person's decision. Similarly, one might think that God has generalized middle knowledge (GMK) of how a random process would turn out were it allowed to run. Thus, given an indeterministic coin flipping experiment described exhaustively under description *D*, God knows whether the coin would land heads up or whether it would land tails up were an experiment satisfying *D* actually executed.[8[8]]

Now, if God has generalized middle knowledge and can make use of it while creating (a separate assumption!), then God knows what any given set of initial conditions *would* result in. Presumably, then, he would be choosing the initial state in such a way as to guarantee the existence of the animals or features that he intends to produce. But then this intentional act of God's is again a piece of background knowledge that would undercut the evolutionary explanation.

Our intuitions are weaker here because we are not used to the idea of middle knowledge or generalized middle knowledge in our daily lives. But suppose now that Fred has generalized middle knowledge of the outcomes of indeterministic coin tosses. An indeterministic coin toss presumably involves the coin's path being subject to indeterministic processes, though also affected by the initial conditions. Fred now knows that there is a set of initial conditions that *would* result in 45%-55% of the coins landing heads-up, and he knows *which* sets of initial conditions are such. He chooses one of them. I think it is still true that the statistical explanation of the result is incorrect. It is incorrect because the

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[8[8]] As a strategy for making design compatible with evolution, this was discussed by Del Ratsch, "Design, Chance and Theistic Evolution" in *Mere Creation*, ed. William Dembski (Downers Grove: InterVarsity Press, 1998), pp. 303 ff.

information about Fred's knowledge and intentions is clearly relevant, and the purported statistical explanation is then based on background information that fails the test of saliency.

Consider a simpler case. Suppose that Fred goes to a casino and knows, e.g., because God told him, which ones of the slot machines would hand him a win on the next game. He chooses one of these and plays. Let us suppose there is a 30% chance of winning. It is surely incorrect to say that there is a statistical explanation of his winning in terms of the probability being low but not astronomically low. Rather, Fred wins because he picks a slot machine that he knows would give him victory. Nothing in what I have said in this paragraph is affected should the chance of winning be very high or very low. Fred's knowledge of how to rig the initial conditions and his intention to do so must in some way enter into the background conditions in any correct statistical explanation.

Or consider a different case. A casino owner that has GMK and is omnipotent in regards to slot machine construction is about to construct a number of indeterministic slot machines from scratch that have a statistical propensity of generating a 5% payoff in the casino's favor. She then employs her generalized middle knowledge and chooses to build those slot machines which are such that she would in fact be guaranteed approximately a 5% payoff in the first fifty years of operation. I claim that the statistical explanation of the 5% payoff in terms of the great likelihood of this outcome is then undercut by the agency claims. One way to see that it is undercut is to note that even if the designs were ones that had a propensity to generate, say, a 12% loss, using the procedure of choosing to build those that would *in fact* guarantee the desired result would still ensure a 5% gain. The statistical propensity does not yield a statistical explanation of the outcome, though it may enter into an explanation in a different way[9[9]], e.g., by explaining why the casino owner chose these and not other machines.

Note, however, that while the statistical propensity would not yield a statistical explanation, we might get a *causal* explanation of the outcome, since the processes inside the slot machines are presumably causes of the outcome. Likewise, then, the first-order naturalistic ancestral histories would give an explanation of the existence of the species. But it would not be an *evolutionary* explanation, since ambitious evolutionary explanations are essentially statistical in nature as we have already noted.

[9[9]]I am grateful to Mark Murphy for this suggestion.

One might be worried that what I have said proves too much, e.g., that my argument shows that God's making use of middle knowledge about libertarian-free actions in deciding whom to create would undercut the freedom of these actions. But that worry would be unjustified, at least in connection with, say, Chisholm's classic agent-causation account. For just as generalized middle knowledge does not undercut naturalistic causal explanations but only statistical ones, so too the present argument would only present a danger for freedom given middle knowledge if the libertarian explanation of the free actions were a statistical one. Admittedly, some libertarians have attempted to give statistical explanations of why one action rather than another was chosen, but one need not take this view, or at least one need not take it that the availability of statistical explanations is *essential* to human freedom.

Note that the above arguments about evolutionary theory used only a weak version of the creation doctrine. What the argument needs is that God intentionally set things up so that *K*s should exist, where *K* is a kind (natural or not) of relatively complex organism (say, *intelligent animal* or *sexually reproducing organism*) that evolutionary theory claims to give a statistical explanation of.

It is of course essential to my argument that one of the claims of evolutionary theory is to explain the instantiation of this kind. Some evolutionists may shy away from the claim that the existence of humans is explained in an evolutionary way, and insist instead that what is explained is that *some complex and well-adapted species or other* is exemplified. But insofar as that explanation is also statistical, and since it follows from the weak creation doctrine that God intended something (the existence of intelligent embodied animals) that entails the existence of what the evolutionary theory purports to explain statistically (the presence of a complex and well-adapted species), the problem persists.

There is also a variant of the above argument that was developed in a discussion Austin Dacey and I had, which variant I will briefly sketch as a more careful development would require undue space here. It is a basic assumption of neo-Darwinian theory that the probabilities of mutations leading to a particular genotype are independent of the adaptiveness of the phenotype that the genotype codes for. Adaptive mutations are no more likely simply in virtue of being adaptive than maladaptive ones are. However, this statistical independence is destroyed once one supposes that the initial conditions were chosen to produce intelligent life. For without any divine design, the probability that a series of mutations leading to a genotype coding for an intelligent life-form would occur is less than 1. But given that the initial conditions

were rigged, as per the weak creation doctrine, so as to ensure the evolution of intelligent animals, the probability that a series of mutations leading to a genotype coding for an intelligent life-form is precisely 1. Thus, God's creative design removes the independence between mutation probabilities and adaptiveness, thereby undercutting one of the pillars of neo-Darwinian explanation.

4.1.2. Objections

I. The argument proves much too much.[10[10]] This argument seems to show that statistical explanations *in general* are incompatible with Western theism. After all, nothing in the argument depended on the specific way that statistical explanation works in the evolutionary case. Hence, if this account is correct, it seems that we cannot explain why the cream spreads throughout the coffee cup by alluding to standard random molecular motion considerations.

However, there *is* something important about the case of the arising of the human species that the argument depended on. The creation doctrine said that God brought it about that human beings exist and had a specific intention to do so. Moreover, on the deterministic and GMK readings, we assumed that God set up the initial conditions in order to guarantee this goal. If God has a specific intention to make the cream spread throughout the coffee and sets up the initial conditions in order to guarantee this goal, then it is false to say that the statistical facts explain the spread of the cream. If God did not set up the initial conditions in order to guarantee the diffusion of the cream, then it may well be quite appropriate to explain the diffusion in statistical ways. Remember that crucial to the statistical relevance argument was the claim that when the initial conditions are intentionally set up specifically in order to produce or preclude the explanandum, then this intentional set up is a part of the relevant background conditions. Without such an intentional arrangement, no such conclusion need follow.

And it is highly plausible that God does not always specifically intend everything that happens under every description true of it. Agents intend things under descriptions. As the Principle of Double Effect illustrates, one can know that something will result from one's action without intending that outcome, and one can intend something under one description without intending it under another that one knows applies. Thus, a polio vaccine manufacturer may have intended the production of the vaccine under

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[10[10]] This objection was in effect first made online by Brian Weatherson (http://tar.weatherson.net/archives/001002.html).

the description "production of a vaccine that overall would save vast numbers of lives and would be profitable", but did not intend the manufacture under the description "production of a vaccine that would kill a small number of patients", even though it is reasonable to expect some people to die due to side-effects of the vaccine.

In fact, it seems quite necessary to say that God does not intend everything that happens under every description that applies to it. For instance, if an evil happens to an innocent person, we probably do not want to suppose that God intended it under the description "an evil happening to an innocent person". Rather, God presumably intended it under another description. What the details of that description would be will depend on what theodicy is in fact right. Perhaps the description will be "the event naturally necessitated by initial conditions *I* chosen so as to produce a good effect *E*" or "an event that would give Smith an opportunity to grow even more in courage".

II. Evolutionary explanations can be non-statistical.[11[11]] Consider the following naïve arm-chair biology account of why northern Europeans have long and narrow rather than broad and short noses. Many thousands of years ago, a comic ray hit a DNA molecule and this resulted in Helga's having genes that code for a long and narrow rather than broad and short nose like her parents did. This was passed on to Helga's descendants. The long and narrow noses in Helga's descendants warmed the cold air and enabled them to stay out longer hunting and fishing in the long northern winter. And this made them be better nourished, and hence better able to survive, and their improved hunting abilities also made them be more desirable mates. Thus, Helga's descendants did better than their broad short-nosed cousins. After a number of generations, people began to find long, narrow noses attractive, and Helga's descendants dominated the gene pool. This story is not statistical. It is simply a description of a sequence of events together with causal explanations in terms of the phenotype coded for a novel genotype found in Helga.

As it stands, however, this story is not an ambitious one in the sense earlier indicated. Ambitious evolutionary explanations undercut Paley-style teleological arguments. The story as given above does nothing to undercut such an argument. To see this, suppose that it turned out that any long-narrow-nose-coding (LNNC) genes would have to include hundreds of precisely specified base-pairs differences from

[11[11]] This objection was first made during the discussion when I presented this argument at a Philosophers in Jesuit Education group meeting at the Eastern APA (2004).

short-broad-nose-coding (SBNC) genes. If that were so, then the likelihood that a cosmic ray could change DNA including SBNC genes into DNA including LNNC genes would be so astronomically small that an inference to a designer would seem quite plausible. The claim that a cosmic ray was responsible would not by itself weaken a design argument based on the fittingness of long narrow noses in northern climes, if the likelihood of a cosmic ray hitting the DNA molecule with that precise angle and energy level it hit it with were all but infinitesimal. Rather, it would shift the design question to a query of why the cosmic ray thus hit the DNA molecule.

Ambitious neo-Darwinian evolution is supposed to make seemingly unlikely changes more likely, given appropriate redescriptions (e.g., redescribing "mammalian eye" into "high resolution sensory device") and given sufficient time and a sufficient population pool that would make the changes not astronomically unlikely. Thus, in order to make the story given above be an *ambitious* one, one needs further information. One piece of further information could conceivably be that only one base-pair would need to be changed to move from SBNC to LNNC genes. But even this piece of information would not be enough to make the explanation ambitious, unless it is coupled at least implicitly with the claim that a cosmic ray causing that change is not astronomically unlikely.

Now, it is true that in many cases evolutionary stories will be unambitious, the way the original story here was. That is perfectly fine, and the problems for the creation doctrine do not arise in these cases. But the evolutionary story in the case of the existence of human beings *is* ambitious and hence irreducibly statistical. To see this, suppose that if it turned out that evolutionary theory did not increase the likelihood that intelligent animal would arise from unicellular organisms beyond the likelihood that a high energy solar flare striking a mineral-rich planetary surface would *all at once* produce a mature intelligent animal. Then evolutionary theory would not be particularly exciting. The astronomically unlikely theory that intelligent life arose through a high energy solar flare all at once producing intelligent animals would do little undercut a design argument based on the existence of life, and too the evolutionary theory would just as little. In the case of both theories, even if the theory were known to be true, the design argument would be largely intact: one would ask *why* the solar flare happened or *why* the astronomically unlikely sequence of mutations happened. Since evolutionary theory *does* undercut Paley-style design arguments, it must be more ambitious than that—it must include at least handwaving statistical claims.

III. The statistical claims are not a part of evolutionary explanations. One might also object that the probabilities are not a part of explanations. All the explanatory work is done by the first-order causal relations in the full ancestral histories, perhaps as in my largely made-up story of the long-nosedness of northern Europeans. However, probabilistic claims enter the theory not in an explanatory way but in order to defeat teleological arguments. Thus, if the probabilities involved were very low, the ancestral histories would call out for a *further* non-evolutionary explanation. But as it is, no further explanation is called for because the probabilities are not that low and so the full explanation is that given by the first-order claims. Thus, the probabilistic claims are extrinsic to evolutionary explanation, even ambitious evolutionary explanation. They only come in to defeat alternate hypotheses, namely the ones that posit design.

This interpretation of the explanatory work of ambitious evolutionary theory, however, is implausible. It is part of the *explanatory* attractiveness of evolutionary theory that it yields, assuming for the sake of argument that it does indeed so yield, probabilities for the development of complex organisms that are not astronomically small. Suppose cosmic rays strike a memory chip and produce junk rather than *Hamlet* and we want to know why it produced just rather than *Hamlet*. It surely should be part of the *explanation* that the production of junk is much more likely than the generation of *Hamlet*. When we realize that the production of junk is highly probable under the circumstances, we feel that we now *understand* why there is junk there. It may be that our understanding is not complete, but surely the probabilistic data is a crucial part of our understanding. Merely being told the causal fact that the junk in memory was caused by the cosmic ray would not be as satisfactory.

And even if the above claim about explanations were not correct, in any case, claims about mutation probabilities must enter into any robust neo-Darwinian evolutionary story. If the probability of mutation were sufficiently small, for instance because all cells implemented highly redundant error-correcting coding, then neo-Darwinian stories would have no plausibility at all as a scientific theory. It is going to be a part of the evolutionary story broadly conceived, at least, that mutations have a certain probability that is not so small that it will probably never occur in the history of the universe. And no doubt more precise claims need to be a part of the story.

Now, it might be argued that, nonetheless, these kinds of statistical claims do not enter into explanations, and hence need not have the kind of relevance on which our arguments above hinged. But

this is incorrect. Take the above example that the probability of mutation cannot be too small. If the probability here is computed relative to an irrelevant specification of initial conditions, then it is useless. This is particularly clear in the deterministic case where any event E will have conditional probability 1 relative to initial conditions specified as "those initial conditions that lead to E", and conditional probability that is can be made arbitrarily small for an appropriate choice of state space S and a description "initial conditions falling in S", assuming a state space with an absolutely continuous probability measure and assuming that E is not probabilistically inevitable.[12][12] And it is plausible that relevance conditions will not be very different here from the explanatory case.

4.2. The indeterministic no generalized middle knowledge case

4.2.1. The argument

What if, on the other hand, God lacks generalized middle knowledge or is not able to make use of it while creating (e.g., because doing so would lead to some absurdity like that raised by Robert Adams[13][13] for the case of middle knowledge)?

We may start off here by criticizing the very idea of this possibility as contrary to sovereignty. For while one might have to understand divine sovereignty in a way that is compatible with libertarian free will either in order to avoid the problem of evil or to avoid both the Scylla of universalism (the doctrine,

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[12][12] Suppose for simplicity that probabilities are proportional to volumes of state-space (in general, use absolute continuity). I say an event at t_1 is probabilistically evitable starting at t_0 providing that there is a subset T of state space having positive volume and such that one arrives at E at t_1 from every state in T at t_0. Something is probabilistically inevitable, then, basically providing that from almost every point in state space one arrives at it. Now, if E is not inevitable, then choose a subset T of the state space such that one cannot arrive at E by time t_1 starting anywhere in T at time t_0, and choose T so that T has non-zero volume. Suppose we want the conditional probability of E to be less than ε. Then let U be a subset of state space whose volume is less than ε times the volume of T. Let S be the union of U and T. Then, the probability of arriving at E given that one started in S is going to be no greater than the ratio of the volumes of U to T, since one cannot get to E from T. Hence, that probability will be less than ε.

[13][13] "An Anti-Molinist Argument," *Philosophical Perspectives* **5** (1991), 343–353.

rejected by all the major western monotheistic religions, that no one receives God's ultimate punishment) and the Charybdis of thinking that a loving God predestines some to damnation, there is no similar reason to allow for random events that God doesn't have generalized middle knowledge about. If God had generalized middle knowledge, then the threat to divine sovereignty would be less because God might then know, before ("before" understood in the order of explanation if God is outside time) deciding what to create, that things would turn out as he wished. This is perhaps not a very strong argument against the very idea of randomness, however, because God could still get whatever he wanted done simply by letting random events happen and as soon as they happened overriding the outcome if it did not fit with his plan.

Alternately, one might proceed more metaphysically. Quantum random events would then be mere brute facts. Why event *A* rather than *B* happened would neither be explained by science nor by the choice of any agent. While one might argue that libertarian free choices can be explained by the agent's activity and/or the agent's reasons[14][14], perhaps nothing like this can be said in the case of quantum random events which are not things done for a reason. Thus, they would be a violation of the Principle of Sufficient Reason (PSR). If this doesn't bother one by itself one might further note that it threatens God's role as the First Cause that there should be events, e.g., the occurrence of *A* rather than *B*, that are neither directly caused by God nor by anything standing in a chain of causes that goes back to God. Admittedly, as Haldane has noted[15][15], one might think of quantum systems as engaging in the same kind of "substance causation" that libertarian agents are often thought to engage in, and if so, then God would stand at the beginning of a chain of causes terminating in the existence of a substance followed by the event caused by that substance. But it is not clear whether the notion of substance causation makes sense once extended to cases of indeterministic non-personal causation. For instance, one might think that indeterministic quantum causation is a violation of the PSR, and that no instance of genuine substance causation is a violation of the PSR.

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[14][14] Alexander Pruss argues that in fact libertarianism *must* say this to overcome the randomness objection in his forthcoming book *The Principle of Sufficient Reason*, Cambridge University Press (2005).

[15][15] Smart, J. J. C. and Haldane, J. J. (1996). *Atheism and Theism*, Oxford: Blackwell.

But let us suppose that the in-principle arguments against genuine randomness in a theistic world fail. We need to, then, examine the evolutionary proposal in detail. Let us grant the possibility of randomness without generalized middle knowledge.

It still is possible for God to intentionally guarantee the existence of the desired features of the universe without undercutting statistical explanations. To do that, God can first set up initial conditions in such a way as would make the statistical explanations provided by evolutionary theory correct. Since God does not know, or cannot make use of the knowledge, which initial conditions would result in which outcomes, he can do all this. God can ensure that the background conditions in the evolutionary statistical explanations are indeed the relevant ones.

Of course, this does not guarantee that the outcome God intends should occur. But we can now make one of two moves. First, we could weaken the creation doctrine even further to claiming only that what God intended (in the strong sense of "intend" in which whatever an omnipotent being intends happens) was not that certain features should arise, but that they should be *likely* to arise. Especially in connection with the existence of the biological human species this seems to be shortchanging the religious views. But, more plausibly, one could follow a modified version of a suggestion by Del Ratsch[16[16]]. God *intended* that certain things should be generated. To that end, he set up processes that would be likely to lead to them, with the probabilities predicted by an ideal naturalistic evolutionary theory. In order to go from likelihood to certainty, however, God planned that should something go wrong, he would intervene and thereby ensure the desired result. It would be likely that, say, humans would evolve, but if they didn't, God would miraculously intervene. On both accounts, to have compatibility with the first-order claims of naturalistic evolutionary theory, we need to assume that things turned out well—the biological human species in fact arose without the need for miraculous intervention.

This account is logically possible, and hence indeterministic evolutionary theory is logically compatible with a creation doctrine and the denial of GMK. But nonetheless, as we shall now see, this conjunction of views is quite unlikely. The reason for this is the high plausibility of the claim, made by Stephen Gould, that according to indeterministic evolutionary theory, it was in fact *unlikely* that these precise organisms would arise that did arise:

16[16] *Ibid*., p. 306.

> A historical explanation does not rest on direct deductions from laws of nature, but on an unpredictable set of antecedent states, where any major change in any step of the sequence would have altered the final result. This final result is therefore dependent, or contingent, on everything that came before—the uneraseable and determining signature of history.[17[17]]

If one could turn back the clock, it would be likely that *other* solutions to evolutionary problems would arise, and in particular it is highly unlikely that the human species (even considered only in respect of the body and not the soul) should be exemplified, or any other particular species from the actual world, except for any species containing the initial organisms from which evolution was supposed to have started. If this is true, then the account currently under consideration presupposes God having been very lucky to get precisely what he wanted—it was very unlikely for him to have been so lucky. And this makes the account quite improbable, both on the theological grounds that God shouldn't need to be "very lucky" and on the purely logical grounds that an account that entails that a particular event both happened and is very unlikely surely has correspondingly low prior probability.

Thus, this is an account that it is not rational to believe in. As an analogy, suppose that we believe that Fred intended that fifty coins that Bob indeterministically tossed in the air should land heads-up, and that they do indeed land thus. But suppose that we also know that Fred has psychokinetic powers that would allow him to supernaturally determine the outcome of any coin throw experiment by making subtle changes in the flight of the coins, and we believe that Fred was absolutely set on the coins landing heads-up. Then can it be rational to believe, on the evidence so far presented, that the coins simply happened to land thus? Surely not. It is very unlikely that the coins would have *happened* to land thus. But it is not at all unlikely that Fred would have modified their path in flight.

Going back to the evolutionary case, given God's deliberately bringing about the existence of the human species, as per the strong creation doctrine, we have three possible scenarios if GMK is not available:

(S_1) it simply *happens* through the operation of natural causes that the biological human species arises;

(S_2) God intervenes in the process in some supernatural way that we would by now have empirically discerned; and

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[17[17]] *Wonderful Life: The Burgess Shale and the Nature of History* (London: Penguin, 1991), p. 283.

(S_3) God intervenes supernaturally in the process in some way that we would not have by now empirically discerned.

So now the question is which of the three scenarios it is or is not rational to believe in. Suppose K contains full information about the state of the physical universe at the time of the beginning of the evolutionary process together with the claim that the creation doctrine is true and the denial of God's use of GMK. For simplicity, add to K the claim that God only intervenes in the evolutionary process if he has to. If this claim doesn't hold, then the credibility of S_1 will go down, so it is a fair assumption to make. Then $P(S_1|K)$ is very small, since it is equal to the probability that naturalistic processes, starting with the K-specified initial conditions, would bring about the existence of the human race. Let us say, for definiteness, that $P(S_1|K)<0.000001$, though the actual number is surely much, much smaller—remember that we are talking of the probability of beings with precisely the genetic code distinctive of humans arising. Moreover, $P(S_1 \text{ or } S_2 \text{ or } S_3|K)=1$, since S_1, S_2 and S_3 exhaustively describe the three mutually exclusive ways that the creation doctrine could be true without GMK being used. Since $P(S_1|K)$ is very small, $P(S_2 \text{ or } S_3|K) = P(S_2|K) + P(S_3|K)$ is very close to 1, indeed greater than 0.999999.

Now, let E be the event of God's noticing that the natural evolutionary processes are not leading up to the existence of biological human beings and need to be tweaked. Both S_2 and S_3 include E, and conversely, if E happens, then given K, either S_2 or S_3 must happen, since K includes the claim that God intentionally created the human species. Now, when E happens, God has to decide whether to intervene in such a way that his action would be noticeable by the early 21st century or not. It seems not unlikely that he would act in a way that would be unnoticeable, e.g., because it seems not unreasonable to believe that God would have a *prima facie* preference for letting the natural causes that he has created to work as much in accordance with their natures as is compatible with God's plans, and hence smaller miracles would be preferred over bigger ones. Consequently, it would be not unlikely that God would intervene simply by controlling some or many mutation/recombination events, and if so, we would be unlikely to have any direct evidence of this, and it is not that likely that we would have indirect evidence, either.

If we add, as we may, to K additional background information implicit in the great monotheistic religions about God's apparent preference for often working "behind the scenes" (consider, for instance, Christianity's assurance that God does hear prayers together with the fact that overtly observable miracles

are relatively rare—few people experience more than one or two of them in their lives, while prayers seem to have to be answered much more often for the promises of the Gospels to hold), then the above point becomes even clearer. Thus it seems that $P(S_3|K\&E)$ might even be more than 0.5, but in any case, very plausibly, $P(S_3|K\&E)>0.001$.

Now, if the advocates of Intelligent Design (ID) are right, then we actually have strong evidence in favor of an agent's intervening in the evolutionary process. In that case, it is very easy to make the case that it is unreasonable to believe S_1, and reasonable to believe S_2. Suppose, however, as many scientists think, that ID-advocates are wrong and we do not have empirical evidence of God's intervening in the evolutionary process. If we can show that in *this* case it is unreasonable to accept S_1, we will be done. Let F be the fact that we do not have any empirical data indicating God's intervention. Now, S_3 entails F and $K\&F$ holds if and only if $K\&(S_1 \text{ or } S_3)$. Hence:

(4) $P(S_3|K\&F) \geq P(S_3|K) / P(F|K) = P(S_3|K) / P(S_1 \text{ or } S_3|K) = P(S_3|K) / (P(S_1|K)+P(S_3|K))$.

Now, $P(S_3|K) \geq P(S_3|K\&E)P(E|K) > 0.001\ P(E|K)$. Observe next that, given K, E happens if and only if S_1 does not, since God intervenes if and only if he has to, we have assumed. Thus, $P(S_3|K) > P(-0.001\ (1S_1|K)) > 0.000999999$ as $P(S_1|K) < 0.000001$. Using both this estimate of $P(S_3|K)$ and the claim that $P(S_1|K) < 0.000001$, we get from $P(S3|K\&F) \geq P(S_3|K) / P(F|K) = P(S_3|K) / P(S_1 \text{ or } S_3|K) = P(S_3|K) / (P(S_1|K)+P(S_3|K))$. that $P(S_3|K\&F) > 0.999$, and hence that $P(S_1|K\&F) < 0.001$. Therefore, even if there is no empirical evidence of God's intervention, it is not rational to believe that it did not happen—assuming something with epistemic probability less than 0.001 is not rational to believe in.

We can look at the argument this way. Suppose we start epistemically with the acceptance of the strong creation doctrine. We are, let us suppose, first religious people, and only secondly scientists. We then realize that if God were to make use of something like indeterministic evolutionary processes to produce human beings, he would very likely have to miraculously intervene, perhaps once, perhaps more than once. Thus, should we learn on scientific grounds that something like indeterministic evolutionary processes in fact occurred, we would have reason to suppose that somewhere in the process at least one miraculous event occurred, unless there is evidence specifically against the occurrence of such an event. Since our fossil record is plainly not sufficiently detailed to provide significant evidence against such a miracle, and there does not appear to be any other relevant evidence here, the theory that God used

something like indeterministic evolutionary processes *together with at least one miracle* to produce human beings is going to be less probable than the theory that God used *just* indeterministic evolutionary processes. It is thus not rational to believe the latter theory.

Similarly, if we start with science and then come to accept western monotheism, learning that the human species was originally intended by God for exemplification should make us think that there was a miracle in its full ancestral history, over and beyond any infusion of soul. It is no longer rational at this stage to accept a full evolutionary theory.

4.2.2. Objections

I. A step-by-step decision-making process. The first objection relies on a fairly literal reading of Genesis 1. Given that it relies on specifics of Genesis 1, it only applies within Christianity and Judaism. Schematically, the central portion Genesis 1 is a sequence of texts each saying something like:

God said, "Let *x* occur." And *x* occurred. And God saw that this was good.

These claims occur successively. Without insisting on the literal specifics, one might take the text to imply that God did his planning bit-by-bit rather than all at once. He created one thing. Evaluated it. Then decided to create another. And then created it. This reading takes the "*vayomer*" (God said) to mean "God decided", and to imply a sequence of decisions each made after finding out the outcome of a previous decision.

This allows for a model of creation as follows. God actualizes some initial total state $S(t_0)$ of the universe at t_0 intending that a partial state P_1 of the universe should occur at t_1. God chooses which state P_1 to indent in part in the light his knowledge of $S(t_0)$ in such a way that P_1 should be very likely given $S(t_0)$, and of course in light of other divine purposes. God then waits until t_1. He observes that he was lucky—P_1 indeed occurred as part of a total state $S(t_1)$ of the universe. Note that God did not intend all of $S(t_1)$, but only the portion P_1 (e.g., the state of the existence of multicellular life). Now that God knows about $S(t_1)$, he decides in the light of this knowledge to produce P_2 at t_2, where in fact P_2 is very likely to occur given $S(t_1)$. And in fact P_2 happens to occur without God's intervening. This process continues.

On this model, God did not have an *initial* plan to create human beings. Rather his initial plan was to produce state P_1 at t_1. Perhaps God only formed the intention that human beings should exist shortly before the time that their bodies evolved, at a time t_{999} at which such an evolution was all but inevitable.

Nonetheless, it is true that God designed human beings, viz. by allowing the continuation of a process—and perhaps by sustaining the process in existence if one thinks that God sustains all things in existence—that was likely to lead to the existence of human beings, while being ready to step in and intervene should the process go astray. It was very unlikely that human beings should come to exist given $S(t_0)$. But it was not unlikely given $S(t_{999})$, and it was only at t_{999} that God formed the intention to produce the state P_{1000} which included the existence of human beings.

A problematic part of this model will be that even if it is highly likely that P_{n+1} should occur given S_n for each given n, the probability that God would be so lucky *every* time is going to behave like the product of these probabilities.[18[18]] Unless these probabilities are all astronomically high (i.e., unless they differ from 1 by an astronomically small number), the product of these probabilities will still be small, and so it is a model that is unlikely to occur. But perhaps this response can be overcome. Maybe, for instance, before the final time when God formed the intention that human beings should exist, God's intentions made such weak claims on the total state of the universe that they *were* extremely likely, and then God formed the intention that human beings should exist very close to the time that human beings came to exist.

At first sight this model seems to require that God be in time, something denied by very important parts of the traditions of the three great monotheistic religions. But this requirement is illusory. For while I have described God as making decisions at a time t_n, all I need to do is to describe God as making decisions *timelessly* but based on the information available about what happens at t_n, in such a way as avoids explanatory loops (e.g., we need to rule out God deciding that E should happen at t_{n-1} on the basis of information about F happening at t_n and where F's occurrence is in fact an effect of E[19[19]]).

Maybe the most powerful response to the model is to note that the Western monotheistic religions take God's design of the universe to be analogous to a craftsman's or artist's workmanship. Suppose now that Fred thinks of himself as a "shrub sculptor". Fred plants a shrub and watches it grow. As the shrub develops, he keeps on forming intentions for the next stage in the shrub's development in the light of his knowledge of the present state. The stages are sufficiently close together that it is highly probable that Fred

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[18[18]] I say "behave like", because an exact calculation would require accounting for the way that different possible total states that could occur at t_n will give different probabilities.

[19[19]] Cf. Adams, *op. cit.*

would always get what he wants without having to intervene by trimming or bending branches. Fred then shows people the final shrub and brags that he has designed its shape. While Fred might be able to make *some* claim about designing the shrub, the claim would be very weak.

A sculptor holds a copyright over her work, but, plausibly, there would be no more copyright held by Fred in the above case than in a case where Fred simply finds a shrub that *already* has the desired shape. Fred's hands-off role, with successive intentions formed at intervals of time in such a way that it was very likely that each intention should be fulfilled, does not make him *much* of a designer. Certainly, it would be dubious to praise Fred for designing the details of the shrub's arrangement, though if the shrub is indeed beautiful it would be appropriate to praise his good taste and his decision not to intervene, but that is different. Thus, this model while permitting one to make design claims, weakens the claims to the point at which, I think, they would not be acceptable within the western monotheistic tradition.

Furthermore, it is not clear that the neat claim that God's intentions were formed by stages as described survives closer textual analysis of Genesis 1. Verse 14 says that God created the sun and the stars for various purposes including reckoning the seasons. But if so, then he must already be taken to be planning to create those sorts of animals for whom reckoning the seasons would be an option, i.e., intelligent animals.

III. Convergent evolution. A powerful argument for the rational compatibility of the creation doctrine and evolution is a different model of creation, based on the work of Simon Conway Morris[20[20]]. Morris believes that evolution is convergent. Similar phenotypic features evolve in different species. Presumably, if natural selection is to be the explanation, this has to be due to some fact such as that there are only a few possible solutions to some problems set to a species by the environment, and so if a solution is to be found, it is likely that it be of a particular form. If Morris is right and Gould is wrong, then it might have been antecedently likely that humanoid intelligent life should evolve, at least somewhere in the universe. If so, then God did not need much luck, assuming his intention was only to produce humanoid intelligent life.

[20[20]] Cf. Simon Conway Morris, *Life's Solution: Inevitable Humans in a Lonely Universe*, Cambridge and New York: Cambridge University Press, 2003.

Now, I think it would be clearly implausible to claim a high antecedent probability of the *human* species coming into existence: thus this is not going to give us a rational way to accept the strong creation doctrine and evolution. But a high antecedent probability of some intelligent humanoids or others coming into existence is a different matter altogether. Let us, then, grant Morris his probabilistic claim, for the sake of the argument, and consider whether it in fact shows rational compatibility between weak creation doctrine and evolution.

First, note that if one had very good *a priori* reason to think that naturalistic evolution would exhibit the radical unpredictability that Gould claims, then any empirical evidence brought up by Morris in favor of the claim that there *is* predictability would be evidence against naturalistic evolution and, by extension, in favor of some guided form of evolution. If so, then this evidence would not in any way harm an argument for rational incompatibility between the weak creation doctrine and evolution.

To hold on to both the sort of theism that has been accepted in the West and naturalistic evolution on the basis of the work of Morris would require one to simultaneously accept (a) an interpretation of predestination claims that did not require God to initially intend the existence of the human species, (b) an interpretation of creation and design claims on which God did not particularly intend the human species from the beginning, (c) Morris's claim that the empirical evidence supports convergent evolution and (d) the claim that this does not provide one with good evidence for guidedness in evolution and hence for the denial of some of the first-order claims of naturalistic evolution. Any one of these statements is not impossible, maybe even has a rational probability of the order of, say, 3/4—but surely no more than that at this stage. But that all of these claims are true together is then less probable than 1/2.[21[21]] And besides all this, one would have to conjoin here the denials of the at least somewhat plausible in principle arguments against the conjunction of theism and mere randomness.

One might be able to overcome this objection if one thought that there was strong independent evidence for the conjunction of western monotheism and *naturalistic* evolution. However, there is no strong evidence for the claim that there was *no* divine interventions *anywhere* in the genetic history of the human species, and surely we cannot ever expect to have any such evidence.

[21[21]] Intuitively (a), (c) and (d) are independent, though (a) and (b) are interdependent. Thus, the probability of them all holding is no more than $(3/4)^3$ which is about 0.42.

IV. Multiple worlds. A referee suggested the following objection. Even though the probability of the human race arising *on earth* is small, once one has enough universes to work with, the probability can become quite large, indeed equal to 1 in the limit as the number of universes goes to infinity. Hence it seems that a multiple universe hypothesis would let one accept a strong creation doctrine and evolution.

Here, by a *universe* I mean a maximal spatio-temporally connected aggregate. There is, thus, no self-contradiction in supposing several universes. All the universes that in fact exist are parts of the actual *world* on the terminology I will use. Had different universes existed, a different world would have been actual. Thus, in any given world there will exist zero, one or more universes, and perhaps some non-spatio-temporal entities. Thus, the argument does not presuppose any deeply controversial Lewisian notion of multiple possible worlds all being ontologically on par. Rather, it is a theory that supposes multiple universes—"island universes" one might call them—within a single world.

Several responses are possible. The easiest is to insist on interpreting the notion of the human species in the strong creation doctrine so strongly as to rule this out. What makes two populations be different species is not just that they differ genetically, but that there is no significant genetic interchange between them. This means that if, completely by chance, a species, B, arose in the Tau Ceti system that was genetically indistinguishable from the human species, A, that evolved on earth, it would not be the same species. It follows from this that the human species could not have instead evolved in another stellar system. For suppose that there were a possible world, w_1, where a species, B, arose in the Tau Ceti system, where B was in fact genetically identical with the actual world's human species, A, and no intelligent life evolved on earth. Then, we could imagine another world, w_2, where on earth there evolves a species, C, genetically identical with the human species, A, which has exactly the same evolutionary history as the human species has in the actual world, and in the Tau Ceti system there evolves a species, D, genetically identical with w_2's species B, and with the same evolutionary history as B. Then, $C \neq D$—they may be genetically identical but they evolved separately and have no significant gene-interchange. Now, surely locational, genetic and historical sameness is sufficient for species identity. Hence, $B=D$ and $A=C$. Therefore, $A \neq B$. In other words, the species B in w_1 is not the human species.

Hence, the human species could not have arisen in another stellar system. Generalizing, it seems highly plausible that it could not have arisen in another universe. If this is right, then the chance that the

human species would have evolved is equal to the chance that it would have evolved on earth, and the supposition of additional possible universes is of no help, since only one contains the earth, "the earth" being a proper name.

But it may be reasonably asserted that a creation doctrine that involves such fine individuation of species is unduly strong. It is at least *reasonable* to accept an interpretation of the creation doctrine that involves a weaker species identity criterion. Let us do that, then.

Now, for the multiple universe story to refute the claim of rational incompatibility between the strong creation doctrine without GMK and evolutionary theory, it would have to be not irrational to accept the existence of the multiple universes. But it is plausible that it is irrational to accept the existence of entities that have overall no evidence for their existence, which most people disbelieve in and whose existence is strongly counterintuitive. Now, without theism, there may be evidence for the existence of multiple universes in the anthropic coincidences since the existence of multiple universes helps explain why it is in fact the case, as is observed, that at least universe has natural law constants that allow for laws of nature. But this is evidence for a non-theistic multiple universe theory. It is not evidence for a *theistic* multiple universe theory, since within a theistic system, multiple universes are not needed to explain the anthropic coincidence. God's choice can fulfill that explanatory task, so God plus multiple universes is an unduly complex hypothesis when God alone will do, absent independent evidence of multiple universes. Of course, we have no observational evidence for multiple universes. Moreover, within Christianity, at least, there seems to be overall no revelation-based evidence for multiple universes.

But perhaps there is philosophical evidence for multiple universes. There are three kinds of evidence that have been cited. (1) Considerations of divine generosity. (2) The problem of evil. (3) The theoretical benefits of Lewis's extreme modal realism. I will not discuss the third here. The proposal I am interested in here is one of island universes within a world, and I have criticized Lewis's proposal elsewhere[22][22]. Considerations of divine generosity do not seem to provide overall any evidence, since divine generosity could be fulfilled in many different ways, and we have no overall reason to think that it would be fulfilled through creating multiple universes. Thus, God could simply create a single universe,

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[22][22] "The actual and the possible", in Richard M. Gale (ed.), *Blackwell Guide to Metaphysics*, Oxford: Blackwell, 2002, pp. 317–333.

but gift it with an overall unity and elegance that would not be possible in a "messy" multiple-universe world. Or God could create a single universe containing many far-reaching galaxies, thereby allowing for a great diversity of causally interconnected systems, and an interacting system seems better than one consisting of a number of isolated parts, and, one might add if one thinks that creation is in the image of God, better at expressing God's unified nature. Or God could create a diversity of beings that does not involve other universes, but other kinds of reality—say, non-physical beings like angels. Speculation that God created multiple universes is mere speculation, and it is not rational to accept it absent evidence.

The most powerful reason to accept multiple universes plus theism is Donald Turner's multiple universe theodicy[23][23]: God creates all universes above a cut-off line, below which it would be worse for the universe to exist than not to exist. It is not surprising if there is a lot of evil in this universe—there are others that equally exist that are better, but it is better that they exist and ours exist than that they exist alone. This is an elegant plenitude theodicy. But there is philosophical evidence against it, for instance the fact that there is no set of all possible universes above the cut-off line[24][24]. Another problem is that had I not written this paper, a different universe would have eventuated, one plausibly also above the cut-off line, and one that contains me as well. Thus, both universes have to exist, since they are above the line, and hence I exist in two equally real universes, which is absurd. Without reason to accept the multitude of possible universes, it is no more rational to go for the more complex hypothesis than it is to suppose that in addition to Oswald there was a crowd of CIA agents standing in the wings to kill Kennedy if Oswald failed.

In closing, one may also note that the multiple universe approach takes away much of the explanatory value of ambitious neo-Darwinian evolutionary explanations of why intelligent animals do. For given enough universes, one will get intelligent animals (i.e., animals with bodies and brains capable of

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[23][23] "The Many-Universes Solution to the Problem of Evil", in Richard M. Gale and Alexander R. Pruss (eds.), *The Existence of God*, Aldershot, England: Ashgate, 2003, pp. 143–159.

[24][24] It has been argued that there is no set of all possible universes. See, for instance, Alexander R. Pruss, "The cardinality objection to David Lewis's modal realism", *Philosophical Studies* **104** (2001), 167–176. There does not seem to be any problem with adding enough happy mathematicians to the worlds constructed in that paper in order to push them above the line, and hence there is no set of all worlds above the line.

supporting intelligence) in many universes even without any evolutionary processes. In one universe lightning will strike a swamp and a humanoid will rise out of it, while in another an avalanche of just the right chemical composition will form an animal that looks like a dog but is much smarter. Neo-Darwinian evolution is no longer needed to remove puzzlement about why there are highly complex organisms—the multiplicity of universes will do the job. Whether making these limitations of the explanatory power of neo-Darwinian evolution would amount to saying that the previous theory is false is not clear. It certainly would leave something to be accounted for on neo-Darwinian grounds: for instance, why there are highly complex organisms *here*.

5. Conclusions and final reflections

The first-order claims of naturalistic evolutionary theory are logically compatible with the creation doctrine. At the same time, some central ambitious explanatory claims are not compatible in their deterministic version or GMK-equipped theistic version with even the weak creation doctrine. This means that the Christian, Jew or Muslim who accepts the weak creation doctrine cannot accept a full deterministic evolutionary theory, though she can accept such a theory that makes less ambitious explanatory claims while making the same first-order claims.

Moreover, she can only accept indeterministic evolutionary theory in its full form if she denies that God makes use of generalized middle knowledge when creating. And while this position is logically coherent, nonetheless on this view the claim that God succeeded in producing the human species via the processes of naturalistic evolutionary theory is an unlikely one to be true, unless there is strong evidence against there being *any* miracles in the ancestral histories of organisms, which of course there is not.

What a theist who accepts the creation of the human species can rationally believe about evolution thus depends on whether the evolutionary theory is deterministic or not, and whether the Creator can make use of generalize middle knowledge. If the theory is either deterministic, or the Creator is believed to have been able to use generalized middle knowledge, the theist can only accept a weakened form of evolutionary theory that backtracks on the more ambitious explanatory claims, but continues to make the first-order claims.

On the other hand, if the theory is indeterministic and the Creator cannot have used generalized middle knowledge, then the first-order claims of naturalistic evolutionary theory are implausible: the

believer has good reason to think that at least one miracle was a part of the ancestral history of human bodies. However, paradoxically, in such a case some of the ambitious claims could perhaps work. For it might be that evolutionary theory will be or is in a position to assign a high probability, say, to the generation of animals exhibiting intelligence, even though, as is plausible, the generation of specifically humans was unlikely. If so, then one might be able to tell a hybrid story including a statistical explanation of why animals exhibiting intelligence evolved, and an explanation involving divine intervention explaining why specifically humans came about. God might have, while keeping the overall probability of the development of intelligent life (understood as the life of animals exhibiting intelligence behavioristically, without any claims being made about mind, since after all dualism might be true) fixed, intervened in such a way as to ensure that the intelligent life that were to result, it would be human life. A part of the story would then also be that if it looked like intelligent life were not to result, God would have intervened, but that in fact it turned out that intervention was unnecessary.

There are difficulties in this story, though. It is not completely clear that it is probable that God could intervene so as to be the designer of human life without these interventions affecting the probability of the development of intelligent life. But neither do I have an argument at present that this is impossible. And this approach does abandon the conjunction of the first-order claims of naturalistic evolutionary theory.[25[25]]

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