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Intelligent Design and Selective History: Two Sources of Purpose and Plan

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Intelligent design arguments follow a familiar pattern. They first specify a seemingly unobjectionable fact. Next they claim that no natural process could produce it, but a powerful, rational, intelligent designer could. *Voilà*, a powerful, rational, intelligent designer and creator, presumably the God of Abraham, therefore exists.

In *Warrant and Proper Function* (1993) and then again in *Knowledge of God* (2008), Alvin Plantinga gives the following intelligent-design argument.[1] First, we correctly apply the teleological terms "function," "purpose," "proper functioning," "design," and "design plan" to various parts of living organisms, just as we correctly apply these terms to intentionally designed, created artifacts. Second, naturalism cannot explain these applications; there is no adequate naturalist account of function, purpose, proper functioning, design, and design plan. In particular Plantinga argues they all face a devastating counter-example involving a Hitler-like madman and his henchmen. Third, the supernaturalist can explain the applications. From the supernaturalist perspective "it is easy enough to say what it is for our faculties to be working properly: they are working properly when they are working in the way they were intended to work by the being who designed and created both them and us."[2] So we possess a "powerful argument" that God exists:

> . . . suppose . . . you are convinced . . . that [there are] such things as proper function, damage, design, dysfunction, and all the rest. . . . if you think there is no naturalistic

[1] Plantinga gives another related argument against naturalism, the Evolutionary Argument Against Naturalism. I shall not state or discuss it here.

[2] Plantinga (1993: 196–7).

analysis of these notions, what you have is a powerful argument against naturalism. Given the plausible alternatives, what you have, more specifically, is a powerful theistic argument; indeed, what you have is a version of Thomas Aquinas's Fifth Way.[3]

Plantinga offers this argument while developing a proper-function reliabilist theory of warrant. That makes him an intelligent-design reliabilist.

Like most words in English, the word "function" has more than one use or meaning. One use involves *purpose*, where a function of an item is *what the item is for*. Ballpoint pens are for writing; that is their function or *purpose*. The function of the heart is to pump blood; that is what it is for. Another use involves capacity or ability, where a function of an item involves what it *can* do; functions in this sense are causal role *capacities* or *dispositions*. A third use involves how an item with connecting parts *works* or *operates*; this use involves how the item functions. Mechanics know how cars work; they know automotive design. Physicians study how our bodies operate.

The present debate concerns the first and third uses of "function": purpose and plan. I contend that there are at least two sources of purposes and plans: intelligent design and selection over variants in a population over generations. The first source is familiar to everyday life. The second source is best understood with a layman's grasp of evolution by natural selection, but applies to all sorts of items, not just biological traits.

In the first section I explicate deliberate, conscious, intelligent design as one kind or source of purposes and plans. In the second I explicate selective history as another. In the third I state and criticize Plantinga's counterexample. Plantinga's case does not withstand a thorough understanding of the two sources.

The discussion concerns the *kinds* or *sources* of purposes and plans, not the kinds of things that *have* purposes and plans. Any item that undergoes selection could have purposes and plans from selection. And any item that can be created by an intelligent designer could have a purpose or plan. So artifacts could have purposes and plans from artificial selection, and if Plantinga is right, the traits of living organisms have their purposes and plans by virtue of intelligent design. The intelligent design/selection distinction thus differs from the artifact/organism distinction.

I. PURPOSES AND PLANS FROM INTELLIGENT DESIGN

I'll begin with purposes and plans from conscious, rational, intentional design. Plantinga relies upon this source in his account of warrant. I will

[3] Plantinga (1993: 214–15).

first state his account to get the relevant teleological terms on the table, reserving discussion of their use in epistemology for another occasion:

> a belief B has warrant for you if and only if (1) the cognitive faculties in the production of B are *functioning properly*…; (2) your *cognitive environment* is sufficiently similar to the one for which your cognitive faculties are designed; (3) the triple of the *design plan* governing the production of the belief in question involves, as *purpose or function*, the production of true beliefs…; and (4) the design plan is a *good one*…[emphasis added].[4]

So how should we understand *design plans*, *proper functioning*, *good design*, and *cognitive environments* from intelligent design?

The design plan for a device includes the *specifications* for how it is *supposed* to work. The design plan is the item's *blueprint*.[5] It's a normative notion for correct or proper operation of the item. To work or operate properly *just is* to work or function according to the design plan.[6] Plantinga uses the phrase "proper function" as short for proper functioning, and by *proper* functioning he means functioning (operating, working) *according to the design plan*.

But we don't simply build devices to work or operate a particular way (though sometimes we might, just to discover what it would do). We also build devices to produce a certain effect. We want them to work a certain way to do something, to solve a problem or produce a desired outcome. In so doing we invest them with *purposes* or *functions*.

A *good* design plan is *effective*. Plantinga is well aware—as we all are—that things do not always go according to plan: some design plans are not very good; they do not produce their desired effect, even when followed to the letter. Some devices work just fine; others do not work at all.

The possibility of *poor* design drives a wedge between proper functioning—operating according to the design plan—and function fulfillment—fulfilling the purpose or function of the item. You can work "properly" without doing what you are supposed to do for you are poorly designed:

> Another important distinction is that between what a thing is designed to do (its purpose, say) and how it is designed to accomplish that purpose (its design, we might say)…a thing works properly when it works in accordance with its design plan…I aim to make a refrigerator that will keep its contents at a constant temperature of 33F; through incompetence and inattention, I fail; as a result of a lamentably inferior design, its internal temperature varies between 70F and 85F. Then the thing

[4] Ibid. (194).
[5] Ibid. (13).
[6] Ibid. (21–2).

works properly in one way: it works just as it was designed to work. But in another way it works badly: it does not do what it was designed to do.[7]

So an item can function properly (work according to specifications) without fulfilling its function (without producing the effect it was made to produce).

Additionally an item can function properly without fulfilling its function for it is not in normal conditions. When you take your car to the shop and the mechanic puts it up on the lift, it can work exactly as it was designed—your car is in mint condition—but it is not hurtling you down the highway at 65 miles per hour.

This takes us to our last question: what counts as your "cognitive" environment? "Cognitive" environments are simply normal conditions for belief-forming processes. So in general what makes conditions normal?

The answer is straightforward. Normal conditions are those conditions the designer had in mind, either intensionally (the designer had a description of the circumstances in mind) or extensionally (the designer simply pointed at some circumstances or placed the device in those circumstances), for the use of the device.

The overall picture is this. "Intelligent designers" find themselves with the desire or motivation to create an item that will produce a certain effect. That effect is the *function* or *purpose* of the item. The designer will come up with a *plan* for the device, the blueprint for how the device will work so as to achieve the intended purpose. Once constructed, the hope is that the device will turn out to be a *good* one, that it will achieve the intended effect when working according to the design plan. And all of this is relative to intended circumstances for the use of the device. When all goes well, when functioning normally in normal conditions, it will fulfill its function. We can now explain three further features of devices with purposes and plans from intelligent design: the distinction between functions and "accidental" side effects; the plurality of functions; and change in function.

Devices produce a number of effects. The intended effects are functions; the non-intended effects are "accidental" side effects. The function of your watch is to tell time. The noise it makes, or the mark it leaves on your wrist, is but an "accidental" side effect. Your watch was not designed in order to make noise or to leave a mark on your wrist, even though it does both.

A device may also be designed to produce a number of effects. A knife is for cutting all sorts of things. It may also be used as a weapon, a gift,

[7] Plantinga (1993: 26–7).

or a ceremonial device. It may even be a work of art or a status symbol. Items intentionally designed can be designed to produce any number of effects.

We can also *redesign* devices for *new* purposes. The items thereby acquire new purposes and design plans. Such alteration can lead to unproblematic cases where an item functions properly according to the *new* plan, but not according to the *old* one:

> a thing can obviously acquire a *new* purpose and a *new* design plan. I construct my refrigerator and then make a minor adjustment; now the refrigerator works and is intended to work slightly differently. *It has acquired a new design plan. Relative to its old design plan, it is not functioning properly; relative to the new, it is.* Most drastically, I turn my refrigerator into a food warmer by reversing a crucial circuit; then when it functions *properly* according to its *new* design plan, it works *badly* indeed according to the *old*. So suppose our cognitive faculties are redesigned by Alpha Centaurians, whose aims here are aesthetic rather than epistemic. Then it might be that our faculties work in accords with the *new* design plan [but not with] the *old* design plan . . . [emphasis added].[8]

So if we are devices created by an intelligent designer, it is possible that our designer, or some other intelligent being, should be able to alter our cognitive faculties so that they acquire *new* functions and *new* design plans. Relative to their *old* design plan, they are *malfunctioning*. Relative to the *new*, they are functioning *properly*.[9]

[8] Plantinga (1993: 26).

[9] Plantinga (1993) applies this point to an example from William Hasker. The example involves Geoffrey lacking vision due to a random genetic mutation, but acquiring the capacity to make his way around his environment via magneticolocation, a capacity only some marine organisms are known to have. Hasker claims that since Geoffrey's new ability is a mutation, it has no design plan. Not so fast, says Plantinga. He says Geoffrey may have acquired a new design plan by God's intervention, or the intervention of an intelligent agent:

> [Perhaps] Geoffrey has been given his new design plan by God or by someone else—some young and inept angel, perhaps—to whom God has delegated this task. True (as Hasker points out), you would not ordinarily expect God to revise Geoffrey's cognitive capacities in the direction of less rather than greater cognitive capacity, but of course that is by no means decisive. Perhaps there is some great good for Geoffrey that God can best achieve by making or permitting this revision. (30)

So just as a refrigerator can acquire a new design plan inconsistent with the old, so, too, we also can acquire a new design plan inconsistent with the old. Perhaps we are redesigned to make us better off or for some greater good. Or perhaps our redesign is for some malicious purpose by an evil being that makes us worse off.

II. PURPOSES AND PLANS FROM SELECTIVE HISTORIES

To get a handle on selection as the source of purpose and plan, a layman's understanding of evolution by natural selection should help.

Take a population of beetles that *vary* in color. Some are green and some are brown. Suppose they live in a leafy green environment where birds prey on them. Against a green background, the brown beetles are easy pickings. The green beetles, on the other hand, are well camouflaged. Having green coloration is clearly more adaptive than being brown. The green beetles are apt to survive longer and have more offspring than the brown beetles. Surface coloration has *consequences* for survival and reproduction. And assuming that coloration is a *heritable* trait, the number of green beetles will increase in the population over time, perhaps to the point where all the beetles are green, and occasional mutations leading to different-colored beetles are weeded out. Selection leads to a trait clearly adapted to the environment.[10]

Natural selection involves at least three factors. The first is *heredity*. Descendants in a population have the trait because their ancestors in the population had the trait. The second is *variation* among the heritable trait. The third factor is *consequences*. The differences in heritable traits must have consequences for how likely it is that organisms possessing the trait will live long enough to reproduce successfully. The variations must either enhance or diminish relative fitness. A trait that contributes to fitness is *adaptive*, and so likely to be passed on. Over time nature weeds out the traits that diminish relative fitness, and preserves the traits that enhance relative fitness. Traits that result are *adaptations*.[11]

Adaptations thus result from a history of selection for particular adaptive effects. The heart was selected for pumping blood but not for making noise.

[10] This example comes from the the UC Berkeley website on understanding and teaching evolution. For more on understanding evolution, take a look.

[11] The beetle example involves *directional* selection, where the frequency of a trait in a population changed over time due to selection pressures. *Stabilizing* or maintenance selection occurs when the frequency of a trait stays reliably constant over time. To continue our example, mutations that alter coloration are all likely to be less fit, and so apt to be selected out. A very dark green or very light green beetle may stand out and not survive long enough to reproduce. A yellow or red one is sure not to last long at all. Though directional selection produces changes in gene frequencies, and stabilizing selection keeps them reliably constant, the mechanism in both cases is the same: variation, heredity, and consequences.

There was selection *of* noise-making hearts but not selection *for* noise-makers.[12]

How is natural selection a source of purposes and plans? The etiological theory of functions provides answers.[13]

Advocates of the etiological theory of functions differ over its correct formulation.[14] Here is a formulation that should do. I'll make one revision later:

A token *t* of type *T* has *F* as an etiological function *iff*:

1. *t* is a reproduction or copy of previous tokens of type *T*.
2. ancestors of *t* (earlier members in the lineage) produced *F*.
3. there was selection for *T* because ancestors produced *F*.

On the etiological theory, the function of a token *t* of type *T* is thus the selected effect of previous tokens of the type.

[12] Being an adaptation is not the same as being adaptive. An adaptive trait is one that currently contributes to fitness. Adaptations evolve, in part, by being adaptive, but also by being better adaptive than their variants. So adaptations must have had variants, but adaptive traits, as such, need not. In addition, an adaptive trait might arise by a random mutation out of the blue, and so an adaptive trait need not even result from a historical process. And though being historically adaptive explains how adaptations evolve by natural selection, an adaptation might not be currently adaptive, for the circumstances may have changed so that the trait no longer contributes to fitness. Sober (1984: 100) and Sober (1993: 83–4).

[13] There is a lively debate among naturalists over the best way to understand nature as a source of function and design. The present debate is thus between Plantinga's view and the view I favor. David Buller (1998, 2002) has proposed a weakening of the etiological account so that selection for the trait is not required but only that the trait contribute to the fitness of the organism or larger containing system as the organism or system undergoes selection. History is still required, but variation on the functional item is not. John Bigelow and Robert Pargetter (1987) have proposed a non-historical account that ascribes functions to traits that have a propensity to be selected for. So variation is still required, but history is dropped. Tim Lewens (2004) has proposed that functions are just adaptive effects, regardless of selection. So Lewens drops both history and selection. Peter McLaughlin (2001) has suggested that functions are not tied to selection and reproduction, but self-maintenance of the individual organism. For Buller a functional item is a trait that is there by virtue of being adaptive in the past. For Bigelow and Pargetter a functional item is a trait that is currently adaptive and undergoing selection. For Lewens a functional trait is a currently adaptive trait that need not be undergoing selection. For McLaughlin functions are not tied to fitness. For discussion of the possible compatibility of historical accounts of functions and present contributions to fitness or maintenance accounts, see Millikan (1993, 2002) and Griffiths (2006).

[14] Advocates of the etiological theory include Peter Godfrey-Smith, Ruth Millikan, and Karen Neander, among others. Larry Wright's 1973 article moved accounts of functions in the explicitly historical direction, but his view was not explicitly historical. For a collection of articles, see Buller (1999).

Take our beetle. Providing camouflage is a selected effect of being green. Camouflage from predators is thus its function; that is what it's for; that is its purpose. It is sufficient on the etiological theory that if you are an adaptation for *F*, producing *F* is among your functions.

But it is not necessary. Whereas "adaptation" is a technical term in biology, the etiological theory covers more territory. Copying or reproducing need not mean biological reproduction—any means of copying or reproducing will do. A lineage of ancestors and descendants need not be biologically related. Any effect that contributes to the differential copying and reproducing of variants of tokens of a type thus leads to functions.

This more general or abstract way of understanding functions means that all sorts of things can have etiological functions. Not just skin-pigmentation patterns, hearts, teeth, eyes, and mating displays, but words, customs, and even artifacts, among other things. In artificial selection we humans are the external selection pressure. But the mechanics of natural selection and artificial selection are the same. And artificial selection need not even be restricted to living organisms. Artifacts, too, get copied and selected for certain of their effects. A belt buckle might get mass produced because it effectively holds pants up at an affordable price. Ruth Millikan's overall philosophical project, in fact, is to use the etiological notion of function to examine different kinds of meanings for words and other linguistic devices, and the origin and content of mental representations and the behaviors they produce.[15]

For items with etiological functions, accidental side effects are then just those effects of the item that played no role in its selection.

Many items with etiological functions have more than one function. The tongue, for instance, has a number of functions; it was selected for a

Does the etiological theory give the meaning of the word "function" in ordinary English, or its meaning in the mouths of professional biologists? No. Though biologists use "function" all the time, especially in more popular writings, "function" is not a technical, theoretical, or explanatory term in evolutionary science. As a result biologists tend to use the word "function" freely in all three of these senses, sometimes for purpose, sometimes for capacity, and sometimes for how a gene or trait operates, or how a trait contributes to fitness. They use the term roughly as it is used in ordinary English. They simply see, when it comes to the first and third uses, another source of purpose and plans: natural selection.

Though some advocates of etiological accounts of function have seen their accounts as giving the meaning of a use of the word "function," the etiological account as I understand it is not an analysis of the meaning of the word or of the concept associated with that use of the word. Rather, the etiological account of function is a theoretical account of one source of purposes and plans.

[15] Millikan (1984).

variety of adaptive effects. The tongue is for talking, tasting, chewing, and swallowing.

For items with etiological functions, what determines normal functioning and what makes conditions normal?

The answer is straightforward. For any item with an etiological function, there is a historical explanation for how the item came to have that function: by having a certain effect while operating in a certain way in circumstances of a certain kind. A muscle in an organism's chest pumps by beating regularly. In turn it is connected in a systematic way with other parts of the organism, embedded in a certain kind of habitat. If pumping blood explains, in part, why the muscle gets reproduced, then it comes to have pumping blood as a function. For any item with an etiological function, there is a historical explanation that explains how the item functions, by working a certain way in certain conditions.[16]

Notice the way the item functioned (operated, worked) when it selected for producing the effect that became its function. That way of functioning is normal functioning. Notice the circumstances in which the item underwent selection. Those conditions and conditions of similar type are normal conditions.[17]

The way the item worked or operated fixes its design plan, for its design plan is just how it is supposed to work or operate; normal functioning is proper functioning.

There is nothing mysterious or objectionably circular in this way of explaining normal conditions and normal functioning. Indeed, it is all rather straightforward. Just look at the history of the item, the effects

[16] "Normal" in this context does not mean "usual" or "average." The way an item normally functions may not be the way that it works on average. Normal conditions are not necessarily the conditions where it usually is. Millikan (1984: 33–4).

[17] There is an interesting difference here between functions from intentional design and functions from selective histories. An item with an etiological function will, *ceteris paribus*, fulfill its function when functioning normally in normal conditions. It's guaranteed that design plans for items with etiological functions are good. But there is no guarantee that design plans for items with intended functions will be good. The designer may have been ignorant of what was required to come up with a good design. The item, once designed, may fail to fulfill its purpose, even when functioning according to the design plan. Just think of the dustbin of failed inventions. For failed inventions, there is no explanatory connection between its function and fulfillment of its function in past circumstances, for it does not have its function because of past success. Or an item with an intentionally designed plan may fulfill its intended purpose, but only do so accidentally. It worked on this occasion, but only by lucky accident. Design plans, consciously assigned purposes, and normal conditions bear no deep explanatory individuative relations to one another. For items consciously designed, these notions are atomistically distinct.

that help explain why it gets replicated, how it worked so as to produce these effects, and where it all happened. The historical explanation spells out how it worked, where it did it, and why it was selected. Functions, normal functioning, and normal conditions all fall out. On the etiological notion, functions, normal functioning, and normal conditions are all explanatorily interrelated. Here is a case of interlocking necessary conditions.[18]

An item with an etiological function can surely fail to fulfill its function when not in normal conditions. None of us can see a thing in total darkness. An item with an etiological function may also fail to function normally. A heart may be malformed for a number of reasons. So just as an item with an intentionally assigned function may "malfunction" for failure to fulfill its function (purpose) or failure to function normally (operate as it should), so, too, may an item with an etiological function.

Etiological functions can be lost. The human appendix no longer has a function, though it once aided in digestion. The eyes of some cave-dwelling creatures are no longer for sight but simply reminders of their evolutionary past. Etiological functions are lost when, over time, the trait ceases to produce the effect for which it was selected. So our definition of function needs to be altered somewhat. If, in recent history (which may only be recent in evolutionary time), the item no longer produces the effect it was selected for, then the item loses producing that effect as a function. The appendix is no longer for assisting digestion, and the eyes of fish in lightless caves are no longer for vision.

Etiological functions can also change. An item once selected for a certain effect can undergo new selection pressures where it is selected for a different effect. The item can thereby lose its old function and acquire a new one. Or it may retain its old function while acquiring a new one. Feathers were originally for temperature regulation, like the way our hair follicles assist in sweating. But feathers also came to assist flight.

Taking these facts to heart, Peter Godfrey-Smith[19] suggests that we add a fourth clause to our definition:

A token *t* of type *T* has *F* as an etiological function *iff*:

[18] This answers Plantinga's objection that naturalist theories are circular. Plantinga (1993) argues that Bigelow and Pargetter's propensity account of functions is circular in helping itself to an account of natural habitat (normal conditions). He then generalizes to all naturalist accounts. Plantinga is on solid grounds when criticizing Bigelow and Pargetter on this score. Neander (1991) and Millikan have made the same point. But Plantinga is wrong to generalize to the etiological theory.

[19] Godfrey-Smith (1994).

1. *t* is a reproduction or copy of previous tokens of type *T*.
2. ancestors of *t* (earlier members in the lineage) produced *F*.
3. there was selection for *T* because ancestors produced *F*.
4. where the selection for *T* because of *F* was in the recent past.

Adding this clause, the appendix, like the eyes of some cave-dwelling creatures, has no function. And feathers have more than one function.[20]

Etiological functions parallel functions from intentional design in allowing for change in function. Just as you can redesign a refrigerator, selection can redesign organs and other traits. A trait or part of an organism can even be redesigned so that it malfunctions according to the old design plan but functions properly according to the new design plan.

Both sources make sense of the function-accident distinction; both make sense of normal conditions and functioning normally; of the distinction between failure to operate normally and failure to fulfill a function; of the plurality of functions; of change in function and even the possibility of conflicting functions. One source comes from an intelligent agent sitting down and designing an item to solve a certain problem or produce a certain effect in a certain environment. Another comes from selection pressure acting on the features of a population over generations. I say two *sources* because of the extensive overlap between the two. I say two *kinds* because of the differences.

III. PLANTINGA'S COUNTER-EXAMPLE

Two kinds or sources of function (purpose) and normal functioning (operating according to a design plan)? Design either with or without a designer? Plantinga will have none of this. For him there is only *one* kind and *one* source: intelligent, intentional design. This source is not only the ancestral home of the use of our teleological vocabulary, it is the *only* source of purpose and plans in the world; there are no purposes or plans from selective histories. And Plantinga has examples to prove it.

His central counter-example involves a Hitler-like madman, his henchman, and their persistent descendants over generations:

> A Hitler-like madman gains control: . . . he orders his scientists to induce a mutation into selected non-Aryan victims. Those born with this mutation can't see at all well (their visual field is a uniform shade of light green with little more than a

[20] Cf. Millikan (1993, 2002); see also Schwartz (2002) for further refinement.

few shadowy shapes projected on it). When they open their eyes and use them, furthermore, the result is constant and severe pain, so severe that it is impossible for them to do anything except barely survive. . . . Their lives are poor, nasty, brutish, and short. [He begins] a systematic and large-scale program of weeding out the non-Aryan nonmutants before they reach reproductive maturity. . . . But then consider some nth generation mutant *m*. He is a member of a reproductively established family and has a certain reproductively established character (the relevant part of which involves his visual system). He has ancestors, and among his ancestors, there was a causal connection between that character and the way their visual systems performed, which accounts for the positive correlation of that character with that way of functioning among his ancestors. . . . [This] way of functioning conferred a survival advantage, [the madman and] his thugs and their successors were selectively eliminating those who do not display it. But wouldn't it be wrong to say that *m*'s visual system is functioning properly? Or that its function is to produce both pain and a visual field that is uniformly green? Or that the resistance medical technicians who desperately try to repair the damage are interfering with the proper function of the visual system? . . . it surely won't be the case that [his] visual system is functioning properly, or that its function is to produce pain and a visual field displaying nothing but a uniform expanse of green.[21]

The conditions for function and normal functioning on the etiological theory seem to be met, but surely the function of *m*'s visual system is *not* to produce a uniform expanse of green or cause severe pain; *m*'s visual system is surely *not* functioning normally. Counter-example!

Considered more abstractly, here is the example:

Step One: Take an organ that is clearly adaptive, such as the human eye or the legs. Eyes are for seeing; legs are for locomotion. In normal conditions when functioning normally, eyes lead to keen vision, and legs help us move easily about our environment. Our eyes help us achieve a vast number of goals. Indeed, nearly half the human brain is devoted to vision. And through vision we find food, fight, flee, and find mates.

Step Two: Take a population of humans. Then mutate one or more of the genes responsible for the organ from Step One in a subset of the population so that the organ ends up unable to perform its function, even in normal conditions. The mutated genes produce deformed, ineffective organs.

Step Three: Select out the members of the population without the mutation. Stipulate as well that later descendants who lack the mutated gene continue to die off before reproduction so that the non-mutated genes fade away in the gene pool.

[21] Plantinga (1993: 203–4 and 206).

Step Four: Stipulate that the members with the mutated genes nevertheless survive long enough to have children, and their children with the inherited gene also continue to reproduce.

Step Five: Note that the conditions for the mutated gene to count as an adaptation to the new selection pressures in the environment have been met. The etiological function of the altered visual system should now be the effect that explains why the organ is adaptive in the changed environment, and the organ should now be operating as it did during the selection process as its criterion for normal functioning.

Step Six: Conclude that the result in Step Five is deeply counter-intuitive. The altered organ, intuitively, is horribly deformed and not functioning normally at all. And intuitively the altered organ has its previous function as its only function, and does not have the new effect that makes it adaptive as a function.

No naturalist can explain the correct application of the terms "function," "purpose," "design plan," and "normal functioning." Naturalism defeated!

Not so fast. First, one should clearly notice how artificial the example is. I don't mean the appeal to science fiction. Genetic engineering exists, and we might be able to write such mutations into our genetic code. And we all know the horrible experiments that Hitler and Hitler-like madmen have carried out on various populations. What makes the example so artificial is the idea that those with the mutation should go on reproducing. As Plantinga puts it, the victims' lives are "poor, nasty, brutish, and short." Many will die well before reproductive age. Many will fail to reproduce if they live to that age. And those that do reproduce are not likely to be in a position to care for their children, who will once again have lives that are "poor, nasty, brutish, and short." Many will choose not even to try to have children. The mutation is so deeply non-adaptive that the subpopulation, given our knowledge of how the world works and the adaptive advantage of normal human vision for human beings, is likely to diminish over time. Extinction of the subpopulation may even occur. And this is why Plantinga's stipulation that they will continue to reproduce and have descendants that inherit the gene is so fishy. Nature, left to its own devices, will reduce or even eliminate the subpopulation over time. Deeply maladaptive mutations don't last. Step Four seems bogus.

And this fishy stipulation is essential to the rhetorical effectiveness of the case. The visual system, so mutated, is clearly not "functioning properly." The more maladaptive the altered trait happens to be, the stronger our intuition that the trait is not fulfilling its function and is not functioning (operating) as it should.

So if maladaptive traits don't last, the altered visual system wouldn't meet the criteria for having an etiological function. Counter-example diffused.[22]

But even waiving the artificiality of the example, Plantinga seems not to have thought through the consequences for his *own* account of purposes and plans.

For consider the following question. Why did the madman and his henchmen mutate the non-Aryans in the first place? What reasons come to mind? Perhaps the pleasure that comes to the sadist through inflecting pain and suffering on others. The Hitler-like madman, his henchmen, and their descendants have altered a population to render their lives poor, nasty, brutish, and short, generation after generation. They have designed a gene to create an organ that causes suffering, and have done so for their own sadistic pleasures; they have redesigned the visual systems of non-Aryans for diabolic ends with a *non-epistemic* purpose and design plan.

But if that is so, the eyes and visual systems of the non-Aryans have acquired *new* designs with *new* purposes from intelligent design. They are designed so that when operating according to the new design a visual expanse of near uniform green will occur when the eyes are opened, accompanied by severe pain. Any non-Aryan with the redesigned visual system that does not operate that way is not operating according to the new plan. The redesigned visual systems are *functioning properly* according to the *new* design plan when causing green visual fields accompanied by severe pain.

So let us assume, for the moment, that the visual systems of the non-Aryans were originally intelligently designed with an epistemic purpose. Then when altered they are no longer capable of operating according to the *original* design plan. They clearly fail to function properly. But this is only so relative to the *old* design plan and purpose. Plantinga's case is simply one

[22] I suppose we could imagine a way out for Plantinga. To keep the mutation in the gene pool over generations, the madman and his henchmen have descendants that keep up the malevolent murder of descendants who lack the altered visual system. How do they keep those with the altered visual system reproducing? I suppose they build camps for the victims to reproduce. They provide food and shelter and medical treatment. If the pain gets too severe for the non-Aryans to remain conscious, they may even provide anesthetics to keep the non-Aryans alive and reproducing. The non-Aryans live lives that are poor, nasty, brutish, and short, but long enough to reproduce, generation after generation, as the Aryans keep the population stable over generations.

In his reply to Michael Levin (1997: 91) on this point, Plantinga (2008: 28–9) imagines the generosity of other Aryans. They keep the mutants safe and alive. They provide shelter. They assist in their reproduction. They even mate with some of the non-Aryans, producing mutated offspring. So maybe the henchmen build concentration camps, or charitable Aryans build nursing homes. Either way, somehow or other the non-Aryans with intuitively deeply maladaptive visual systems keep on trucking.

where *redesign* leads to malfunctioning according to the *old* design, but proper functioning according to the *new* design.

To quote and paraphrase Plantinga, a "thing can obviously acquire a *new* purpose and *new* design plan": I construct a device with a design plan for a purpose. Later I make a modification in the design plan for a different purpose. "It has acquired a new design plan. Relative to its old design plan, it is not functioning properly; relative to the new, it is." Most drastically, I make major modifications for a contrary purpose. Then "when it functions properly according to the new design plan, it works badly according to the old." Applied to the mutated non-Aryans, their visual systems "work in accord with the new design plan [but not with] the old design plan."[23]

Plantinga is not entitled to assert that in *no* sense are the mutated visual systems functioning normally.[24] In constructing the example he guaranteed that the new visual system would have a new purpose and plan either from intelligent design or from artificial selection, or both. On his understanding of the source of purposes and plans, the new visual systems are, in a clear sense, functioning properly.[25] In Plantinga's example the jig is up at Step Two.

That said, can we construct a parallel example that doesn't involve intelligent design? It shouldn't be too hard:

[23] Plantinga (1993: 26). See note 2.

[24] Michael Tooley independently (Plantinga and Tooley 2008: 186) notices this point, but does not pursue it. On the other hand, Tooley does effectively dispatch Plantinga's contention that health and proper functioning are necessarily coextensive, thus showing that intuitions about whether an individual is healthy can't drive an account of whether the individual's systems and organs are functioning properly. Tooley imagines a virus entering John's body that destroys a mechanism in the cells. Then the cells are no longer functioning properly. However, this mechanism was responsible for aging. Perhaps God or Mother Nature designed us to age and die. Or perhaps the change blocks the pain that accompanies terminal illness. Those dying of a terminal illness can thus seem fit as a fiddle. After the infection, John is much healthier than before, but his cells do not operate according to their design plan.

[25] Since intelligent design is doing all the work through genetic engineering, keeping the population reproducing doesn't matter. One scientist engineering one visual system is enough to confer on the visual system a new purpose and design plan. Plantinga included the murderous weeding out of non-mutant Aryans over generations in order to create a counter-example to the selective history account.

Michael Levin argued that the example produced a new purpose and plan through artificial selection. Levin does not discuss the point about genetic engineering. Plantinga's reply (2008: 28–9) to Levin is to note that the mutation can get out of control and spread through the entire population, presumably by virtue of Aryans mating with the mutated non-Aryans, and somehow overcoming all of the murderous Aryans (how is that supposed to happen?). How this virus-like spreading is supposed to answer Levin's argument escapes me. Did the selection not occur? And if not, then Plantinga's case is just a case of mysterious genetic drift, and not a counter-example.

The madman and his henchmen have taken over. They are systematically murdering non-Aryans. A radiation burst alters the DNA of a group of non-Aryans about to reproduce. The DNA they pass onto their children includes a mutated gene that substantially alters the building of their visual systems. Their visual systems are now as Plantinga has described. When the madman's henchmen approach these children, they let them live; they delight in the pain and suffering the children experience. The children are assisted by charitable Aryans or cruel henchmen, and the children start having children soon after reaching reproductive age. Their children acquire the immunity, though non-Aryans without the mutation are still hunted down and murdered. Over generations, the frequency of the gene that leads to the altered visual systems continues to increase in the subpopulation of non-Aryans. Those without the gene are hunted down and exterminated.

Here we have a case of variation, consequences, and heredity. So it looks like the conditions are met for the mutated trait to acquire a purpose and plan. But, intuitively, the altered visual system is not functioning properly. It's not working the way it is supposed to. It's clearly broken. If anything, it is malfunctioning. And it's obviously not fulfilling its purpose. The mutated non-Aryans can't see much of anything at all! Counter-example!

Again, not so fast. Just as items with purposes and plans from intentional design can acquire *new* purposes and plans that conflict with *old* purposes and plans, so, too, items with purposes and plans from selection can acquire new purposes and plans that conflict with the old. So there are two issues to address. First, is there a clear sense on the etiological theory of functions where the mutated visual system is not functioning properly, and not fulfilling its function? Can the etiological theory explain why it's obvious that in the example the mutated visual systems are not doing what they are supposed to do? Second, is it really counter-intuitive to imagine the altered visual system acquiring a new purpose and plan over time? If intelligent designers can assign new purposes and plans, why can't selection acting on variants in a population over time do the same?

To answer the first question, it is worth emphasizing that visual systems are a paradigm case of adaptations in nature. Even hard-core anti-adaptationists agree. On the etiological theory of functions, the human visual system is for accurate and reliable visual representation of various features of our environment. The etiological theory has no more problem explaining why the Aryans have normally functioning visual systems than it does explaining why the hearts of Aryans and non-Aryans alike have normally functioning hearts with pumping blood as a function: none.

So what does the etiological theory imply about the altered visual systems of first-generation non-Aryan children? According to the theory, their visual systems do not develop as they should. The mutated gene interacts with the

other genes that build the visual system and causes the visual system to develop in the wrong way. As they grow and mature their visual systems are deeply malformed. Their visual systems are then not able to operate as they should. They do not function normally, and they don't fulfill their function. (A medical technician who desperately tried to repair their visual systems might get their visual systems to function properly; he might also get them killed.) According to the *old* purpose and plan, they are *malfunctioning*.

And since first-generation mutations have no new functions on the etiological theory, the first non-Aryan mutants, though they are now immune to the murderous intents of the madman and his henchmen, do not have altered visual systems with a new function or with a new standard for normal functioning. They simply have the old purpose and plan, a purpose they cannot fulfill and a plan they cannot follow. They haven't even acquired a new purpose or plan, unlike the one-off acquisition of new purposes and plans from intelligent design.

The etiological theory thus entails that the first-generation altered visual systems are not working properly and are not fulfilling their functions. For the first generation, the counter-example cannot even get off the ground. According to the old purpose and plan, their visual systems are not working properly.

So fast-forward a number of generations. Somehow or other the murderous henchmen have continually reproduced their kind and kept on murdering non-Aryans without altered visual systems; only altered non-Aryans have lived long enough to reproduce. Directional selection has produced evolution in the subpopulation. Given the murderous designs and overall effectiveness of the henchmen, stabilizing selection prevents new mutations that aid non-Aryans in getting around from finding a foothold in the gene pool. A visual system that doesn't cause a lot of pain when your eyes are open gets you killed rather quickly. A visual system that produces a nearly uniform expanse of green and hurts like hell keeps murderous henchmen at bay. Since the latter keeps you living long enough to reproduce, and the former only gets you killed, the altered visual system is not only more adaptive than the former, the genes that lead to the altered visual system have increased in frequency over time through selection. The altered visual system is thus an adaptation for immunity from the murderous designs of the henchmen. It keeps them away, and that explains why the altered system persists in the population. Selection has produced a new purpose and plan.

Given enough generations, the visual system of non-Aryans changes its purpose and plan. When the alteration first occurs, it is simply malfunctioning and does not fulfill its function. But over time it acquires a new purpose

and plan. Relative to the old purpose and plan, it is malfunctioning. Relative to the new purpose and plan, it functions properly. Redesign by natural selection has changed the purpose from keen vision to immunity from murderous henchmen.

Despite the artificiality of even this example, there are analogues in nature. First, there are cases where an organ loses its function due to a change in the environment. Cave-dwelling fish still have eyes, but don't use them for vision at all, and if exposed to light, they wouldn't be able to see a thing. The eyes are still there, but no longer have vision as a purpose. So just as the visual systems of some fish can lose vision as a function, so, too, the visual systems of some humans could lose vision as a function.

Second, there are cases of change in function and body plan that are at least accompanied by pain, even if the pain isn't instrumental to the selected effect. For example, walking on two limbs instead of four notoriously produces lower back pain. Adaptations result from a trade-off of costs and benefits. The benefits outweigh the costs, even where the costs involve a good deal of possible or actual pain. Pain itself is often functional; it leads us to avoid the cause of the pain.

Third, there are even cases of genes that produce immunities to diseases that are accompanied by other costs. For example, malaria can be quite a problem in various parts of the world, especially Africa. Many Africans have developed immunity to malaria. The gene that codes for the blood type is thus adaptive in their home environment. However, the gene also leads to sickle-cell anemia when a child inherits both recessive alleles from her parents. The gene doesn't cause the immunity by causing anemia; anemia is a side effect of the immunity. Causing anemia isn't what the genes are for. But even so, immunities often have a price to pay. Our made-up immunity to the henchmen is no different.

So in our new version of Plantinga's case without intentional design we have a parallel result to Plantinga's case with intentional design: an old purpose and plan is replaced by a conflicting purpose and plan. Relative to the old, the trait is not functioning normally or fulfilling its function. Relative to the new, it fulfills its purposes and functions properly. The counterexample is diffused.

IV. ON DESIGN AND DESIGNERS

Plantinga's confidence in his example is driven, I think, by his confidence that the terms "purpose," "plan," and "proper functioning" analytically entail intelligent, rational, intentional design. If there were no powerful

intelligent designer and creator of living things, they would have no purposes, no plans, and nothing would count as proper functioning:

> [I]f naturalism were true [and there were no God] . . . neither human beings nor their component systems would function properly (or, for that matter, improperly). Fundamentally, that is because the notion of proper function really only applies to things that have been designed by conscious, purposeful intelligent agents.[26]

So if the systems and organs of humans have purposes and plans, they must have been designed by an intelligent, purposeful being:

> It looks initially as if the notion of proper function entails that of design, so that necessarily, anything that functions properly has a design plan. And it also looks as if necessarily, if a thing has a design plan, then either that thing or some ancestor of it was designed by a rational being.[27]
>
> Proper function requires design; but the only plausible designers for us human beings and our systems and organs would be God . . . [or] a high-ranking angel.[28]

We are now on very familiar ground. Plantinga's argument reduces to the old saw that things in nature are well designed; analytically the only way they could be designed is if a powerful intentional designer exists; so God exists as the intelligent designer and creator of all things.

If we give Plantinga the second premise, naturalists will balk at the first. Things may *seem* well designed, but that does not mean that they *are* (intentionally) designed; they may *seem* designed without *being* designed. Selective histories produce traits that *seem* well designed, that *seem* to have a designer, with a *seeming* purpose and *seeming* design plan, but in fact they are *not* designed, do *not* have a purpose or a design plan. It just looks *as if* they do. If Plantinga's second premise about the analytic connections between certain terms holds true, then his first premise is false. This point is all too familiar.

I prefer to reject the second premise and accept the first. I agree that the words "function," "purpose," and "design" are all ordinary English words with ordinary meanings. But I do not agree that it is analytic in ordinary English that an item has a function or purpose if and only if intentionally designed, or that an item can function properly if and only if it has a blueprint written up in advance by an intelligent designer. And for the very same reason I do not think it is analytic in ordinary English that an item has a purpose and plan if and only if selected for a certain effect over generations (see note 14). I see both intelligent design and selective history as

[26] Plantinga (2008: 20).
[27] Plantinga (1993: 198).
[28] Plantinga (2008: 20).

sources of purpose and plans, and not competing analyses of the meaning of teleological vocabulary in ordinary English.

These terms have thin senses readily grasped by competent speakers of English, correctly applied to items intelligently designed or selected for a certain effect. Just as ordinary folks use teleological vocabulary when talking about their kitchen appliances, so, too, evolutionary biologists use the same teleological terms when talking about the traits of living organisms. Neither misuse those terms; neither utter obvious analytic absurdities.

What Plantinga sees as analytic is really just a folk theory of how many items with functions come to have those functions. Intelligent designing is a source of purpose and plan with which we are all familiar, having designed devices to solve various problems ourselves. Absent an alternative theory for how an item can acquire a purpose and plan, it is only natural that we would apply our folk theory to any item we ran across that seems to have a purpose and plan. It was Charles Darwin's genius to uncover another source. The etiological theory of functions is thus a theoretical account of how items may acquire purposes and plans other than by intentional design. That it is not on the tip of ordinary English speakers' tongues when they use teleological vocabulary only shows that the theory is not widely understood. It doesn't show that it is false by virtue of the meaning of the words "function," "purpose," and "plan."

Two other objections from Plantinga are now easy to dismiss. He thinks our systems and organs could have purposes and plans that have nothing to do with survival and reproduction. To quote and paraphrase Plantinga, "it is possible that a thing have a function (and function properly) even if that way of function confers no [survival enhancing propensity] upon its owner."[29] He also thinks that an item needn't have ancestors either to have a purpose or plan. The "first telephone . . . could have had a proper function and could have been capable of proper functioning even if it had no ancestors at all."[30] If there are two sources of purpose and plan, then of course both of these things are possible. God could assign functions to items that have no survival-enhancing propensity or items that lack ancestors. But for the very same reason selection could assign functions that have nothing to do with the intentions of some divine being. You don't need selection to assign functions if an intelligent being can do it; but you don't need an intelligent designer either when selection can do the work.

A compromise might be had between the first and second naturalist replies to the design argument: regiment teleological vocabulary when

[29] Plantinga (1993: 209).
[30] Ibid. (203).

describing the sources. When selection over generations does the work, use the terms "function," "normal functioning," and "normal conditions." When intentional designing is the source, use the terms "intended purpose," "design plan," "proper functioning," and "intended circumstances."

The design argument could then be reformulated: the systems and organs of humans and other living organisms have intentional designs and design plans; so they must be created by a powerful intelligent designer, God. Naturalists would clearly reject this argument. The seemingly unobjectionable first premise is not so unobjectionable after all.

A thorough understanding of the two sources of purpose and plan diffuses Plantinga's counter-example and thereby undermines his version of the well-known design argument for the existence of God.[31]

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