

What's wrong with the evolutionary argument against naturalism?

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Abstract Alvin Plantinga has argued that evolutionary naturalism (the idea that God does not tinker with evolution) undermines its own rationality. Natural selection is concerned with survival and reproduction, and false beliefs conjoined with complementary motivational drives could serve the same aims as true beliefs. Thus, argues Plantinga, if we believe we evolved naturally, we should not think our beliefs are, on average, likely to be true, including our beliefs in evolution and naturalism. I argue herein that our cognitive faculties are less reliable than we often take them to be, that it is theism which has difficulty explaining the nature of our cognition, that much of our knowledge is not passed through biological evolution but learned and transferred through culture, and that the unreliability of our cognition helps explain the usefulness of science.

Keywords Evolution · Naturalism · Evolutionary argument against naturalism · Plantinga · Cognition · Bias

The convictions of a monkey's mind

Charles Darwin understood exactly what his theory implied when he asked “*Would anyone trust in the convictions of a monkey's mind. . . ?*” How could a species of domesticated primates¹ with nervous systems cobbled together by unintelligent evolutionary processes like natural selection, possibly hope to discern the truth about abstract scientific and philosophical questions? Why think this ‘monkey-mind,’ adapted for

¹ To the best of my knowledge, Robert Anton Wilson coined the simultaneously scientific and satirical term “domesticated primates.”

survival and reproduction, would lead anyone to accurate theoretical knowledge about the world?

That Darwinian insight lies at the core of the riddle Alvin Plantinga uses to ensnare the naturalist in his essay “Is Naturalism Irrational?”² If human evolution is indeed innocent of divine tinkering, Plantinga argues, then we have no reason to believe that our cognitive faculties would be reliable. Once we realize that natural selection gives us no reason to trust our belief-forming mechanisms, we must concede that *any* belief we form is suspect, including of course, the belief in evolution itself. Evolutionary naturalism is thus *self-defeating*. Plantinga offers *theism* as an alternative world view that does not suffer from this irreparable defect.

Critics of this evolutionary argument against naturalism have objected that natural selection might actually favor the development of reliable belief-forming mechanisms (e.g. Levin 1997; Fales 2002; Dennett 2009). While these objections do raise reasonable doubts about one aspect of Plantinga’s argument, their approach misses the point of naturalism.³ The interesting question for the naturalist is not whether *unintelligent* design could engineer creatures with reliable minds, but whether it could engineer creatures *like us*. Many of us like to consider ourselves “rational animals” but 50 years worth of research in experimental psychology converges compellingly on the conclusion that human cognition falls well short of optimal reliability. These humbling empirical results about bias and irrationality will seem most disturbing to the theist because they are just what we would expect if Darwin were right. This research also sheds light on why we find scientific methods so useful.

Plantinga’s paradox

Evolutionary theorists sometimes say that natural selection *satisfices*: it does not engineer perfection, it merely builds organisms good enough to pass their genes to the next generation. How much *true belief*, at minimum, does it require to mate early and often, while avoiding walking into trees and becoming dinner for a large jungle cat? In Plantinga’s estimation, *less than you might think*.

Natural selection applies pressure to behavior, but several combinations of beliefs and desires can lead to the same behavioral outcome. If Paul the prehistoric hominid needs to display “tiger-avoidance behavior,” he might believe tigers are dangerous and run away. On the other hand, Plantinga points out,

² Plantinga uses the term ‘naturalism’ to mean *atheistic materialism*, the idea that there is no supernatural. ‘Naturalism’ can also denote an epistemic orientation toward seeking non-supernatural explanations of phenomena and allowing empirical evidence to revise one’s beliefs and definitions. This orientation does not logically preclude the *existence* of God, only the use of God as an explanation of natural phenomena. This essay defends the atheistic variety of naturalism against the charge of logical incoherence while promoting the epistemic orientation as useful.

³ Naturalist PZ Myers did not miss the point. As a draft of the present paper was gathering feedback, Myers published a succinct blog entry criticizing Plantinga’s argument on the grounds that human cognitive faculties are not actually reliable and suggesting that this is why we need science, two of the theses of this paper (Myers 2009).

Perhaps Paul very much *likes* the idea of being eaten, but whenever he sees a tiger, always runs off looking for a better prospect, because he thinks it unlikely that the tiger he sees will eat him. . . Or perhaps he thinks the tiger is a large, friendly, cuddly pussycat and wants to pet it; but he also believes that the best way to pet it is to run away from it. Or perhaps he thinks he is about to take part in a sixteen-hundred-meter race, wants to win, and believes the appearance of the tiger is the starting signal. . . (1993, p. 225)

While it's not obvious that Paul's peculiar beliefs would prove *consistently* adaptive, let alone *as* adaptive as another hominid who had more sensible epistemic inclinations (Levin 1997), Plantinga can reinforce his point by using less fanciful examples. Paul might believe in animism; the idea that everything is alive. He could believe that everything is conscious, or that all the plants and animals around him are witches. These misguided, but not obviously maladaptive beliefs would most likely not damage a hominid's odds in the gene pool (Plantinga 1994, naturalism defeated, unpublished manuscript). In all likelihood, certain false beliefs would *enhance* fitness; for example, the belief that one can stay forever young by having as many children as possible.

If truthful beliefs are not actually needed for survival and reproduction, reasons Plantinga, anyone who believes their cognitive faculties are a product of unguided evolution has a reason to doubt *any* belief they form. The naturalist, once he has drawn the conclusion that his nervous system is unreliable with respect to forming true beliefs, will naturally realize that he can no longer justify *any* belief he holds.⁴ Even if natural selection does push for some degree of basic cognitive reliability, say, with respect to representing simple perceptual knowledge, that reliability would not extend up to fancier types of cognition, like our ability to postulate or evaluate complex theoretical or scientific claims, such as the theory of evolution. Evolutionary naturalism thus undermines its own rationality, according to Plantinga. On the other hand, if we believe an intelligent designer has created us, or at least has guided our evolution to guarantee the development of nervous systems suited for finding the truth, then we need not fear this dizzying spiral down to skepticism.

Buggy squishware

Plantinga has correctly identified a few illuminating implications of the theory of evolution by natural selection, but his theistic assumption of man's cognitive reliability finds itself on the wrong side of a mountain of data. Plantinga does note a few of the ways in which our minds fall short of optimal rationality, then promptly sweeps these

⁴ In Plantinga's preferred terminology, naturalism gives its adherents a 'defeater' for any belief they form. He considers it irrational to believe any idea for which there is an "undefeated defeater." However, nothing about naturalism per se commits the naturalist to accepting this epistemic framework. One might even have good naturalistic reasons for rejecting it; for example, because it encourages black and white thinking, or because its structure has no apparent functional mapping to the categories of our best theories of cognition. For the naturalist who does not buy into the defeater game, Plantinga's challenge remains: how do we get from the purported *facts* of biological evolution to a *reasonable belief* in biological evolution. I aim to defend the coherence of naturalism by giving such an account.

observations under the rug, drawing our attention to the regularity with which we trust our convictions and the wide agreement among us about basic facts of observation, for example, that automobiles exist (1993, p. 217). The naturalist, forever unsatisfied by commonsense intuitions, wonders what other devils might lurk in the details of how our nervous systems actually work. No one who genuinely wondered about the integrity of our belief-forming mechanisms would consult intuition, discover that having an unreliable mind would lead to a paradox, and consider the matter settled.

The human nervous system's ability to perceive and represent the environment functions well enough for *most* of us, *most* of the time, but we tend to draw incorrect inferences from our perceptions more often than we might like. Any decent stage magician can make us 'see' things that we 'know' are impossible. The magician exploits our cognitive blind spots, counting on our propensity to draw faulty perceptual inferences and unconsciously *fill-in* information that was not available to observe. We assume that we chose a card *freely*, that we saw a *normal* coin, or that the magician had *nothing* in his hand because we did not notice anything in it; and then we treat this assumption as if it were an observation. This all happens while we remain at our most attentive, eager to discover how the magician could possibly fool us, but if our web of learned prototypes does not contain card forces, trick coins and palming techniques, we go with the best ideas we *do* have.

What we conceptualize as the 'observable' fluctuates as theories evolve and replace one another because those theories provide the structural grid through which we interpret our experience. People in the Middle Ages would have viewed a man who was catatonic and babbling incoherently as observably possessed by a demon, but today a mental health professional would view the same man as observably schizophrenic (Churchland 1985). The theories and expectations we use to navigate and understand the world guide our process of separating signal from noise, selecting what information gets tuned-in and what gets filtered-out, but this process often flies below the radar of conscious awareness. Since our web of beliefs constitutes what *makes sense* to us, we have a bias toward confirming rather than refuting our beliefs. Seeing the flaws in one's own reasoning is a bit like trying to taste one's own tongue. We generally soak up support for our opinions without question while failing to notice any evidence that might call them into doubt. Psychologists call this human disposition *confirmation bias* and epistemologists refer to its abstracted logical essence as the *theory-ladenness of perception*.

If we sampled a group of opinionated thinkers with *reliable* minds and asked them to evaluate a series of research papers, equally supporting and opposing a controversial claim, we might expect those thinkers to adjust their beliefs to the evidence and converge on a middle-ground agnosticism about the claim in question. Domesticated primates tend to use a different procedure for belief-adjustment. Subjects in one study were asked to examine research papers on the effectiveness of capital punishment as a deterrent. Both proponents and opponents of the death penalty accepted at face-value, any information that confirmed their opinion, while critically scrutinizing only the data that opposed their prior conviction. Perhaps most troubling, rather than having their beliefs tempered by disconfirming information, the two camps grew *more* polarized the more evidence they saw for and against their prior opinion (Lord et al. 1979).

In another study, American Republicans who believed Saddam Hussein was responsible for the terrorist attacks of September 11th refused to update their beliefs in response to data from sources that they considered trustworthy. Subjects were shown a newspaper article stating that the bipartisan 9/11 Commission had concluded that Hussein had no role in the attacks, and another that quoted President Bush as saying “This administration never said that the 9/11 attacks were orchestrated between Saddam and Al Qaeda (Prasad et al. 2009).” Of the 49 interviewees in this study, 48 failed to revise their beliefs in light of the conflicting information. The authors note that they would expect the same sort of “motivated reasoning” had they questioned Democrats about President Clinton’s behavior during the Monica Lewinski scandal. Arguing someone out of their deeply held convictions often proves an insurmountable task, regardless of what evidence you might present.

We fall easily into the seductive trap of considering our memories as analogous to audio and video recordings of events. On closer observation, our memories take heavy artistic license. After watching a video of a car crash, subjects remembered what they saw differently depending on how a question was phrased. Those who were asked “About how fast were the cars going when they *smashed into each other?*” gave higher speed estimates than others who were asked how fast the cars were going when they *contacted, hit, bumped, or collided*. A week later when the researchers inquired whether the subjects had seen any broken glass, those who were asked about cars that ‘smashed’ were more than twice as likely to remember having seen broken glass (Loftus and Palmer 1974). The video showed no broken glass but their memories happily confabulated some. The researchers accomplished this feat of memory magic by changing one word in a question. With more advanced reprogramming techniques like hypnotic regression, therapists have tragically ruined families by causing patients to ‘remember’ fictitious episodes of childhood abuse and elaborate Satanic rituals that never took place (Loftus 2006).

One might think that a reliable mind would understand its own motivations and limitations, and hedge its epistemic bets accordingly, but evolution has not required this. We take placebos and attribute healing properties to inert compounds. We get drunk off non-alcoholic beer if we assume it contains alcohol. We think we prefer Coke, but in blind tests we’re just as likely to choose Pepsi (McClure et al. 2004). We attribute our cleaning behavior to a whim or to a personality trait when in fact it was prompted by a whiff of a lemon-scented cleaning product that went unnoticed by conscious awareness (Holland et al. 2005). We tell ourselves that we don’t have certain socially unacceptable biases about race and gender, and we genuinely believe our own stories but we cannot predict how we will perform on a test that measures these biases indirectly (Banaji 2006). Since so many of the causal factors guiding our behavior operate outside the lamplight of consciousness, our understanding of our own motivations inevitably requires a “rational reconstruction.” We creatively cobble together a selective body of “facts” about ourselves from the already edited information available to introspection, and if we do not suffer from depression, we tend to do so in a way that reflects favorably on us. No wonder 76% of us see ourselves as safer-than-average drivers (Svenson 1981).

Now that I have constructed a case against human rationality by the time honored philosophical method of cherry-picking examples that support my conclusion, I owe

the reader a reason not to dismiss this argument as a misadventure in confirmation bias.⁵ The reader might have noted that I did not mention how masterfully we add 2 digit numbers together, that we have constructed pyramids, or that we have sent men to the moon. Maybe the question of our rationality does not admit of a simplistic true/false answer for the same reasons that we wouldn't give binary answers to questions like "Are humans beautiful?" or "Are rocks heavy?" Still, the requisite attachment of so many caveats to the claim that our cognitive abilities are reliable begins to sound like the man who insists that his wife is faithful, except when she goes home with strangers she meets at bars, football games, and roller derbies. If we cannot trust our nervous systems to perceive correctly what happens before our eyes and remember it, to distinguish observation from inference, to moderate our opinions in response to conflicting data, or to understand the causes of our own behavior, then I can't help but wonder in what sense our *belief-formation* or *belief-adjustment* processes qualify as 'reliable.'⁶

Theistic anomalies

Thomas Aquinas believed he knew in what sense our intellect was reliable. He reasoned,

Since human beings are said to be in the image of God in virtue of their having a nature that includes an intellect, such a nature is most in the image of God in virtue of being most able to imitate God (quoted in [Plantinga 1993](#))

The atheist will surely be forgiven for wondering whether this means that God also reasons with a plethora of unconscious biases, but data suggesting that we tend to estimate our own mental acuity generously should not surprise her. Plantinga however, ought to be astonished, as he endorses and develops St. Thomas' argument:

The traditional theist, on the other hand, has no corresponding reason for doubting that it is a purpose of our cognitive systems to produce true beliefs, nor any reason for thinking the probability of a belief's being true, given that it is a product of her cognitive faculties, is low or inscrutable. . .she believes that God is the premier knower and has created us human beings in his image, an important part of which involves his giving them what is needed to have knowledge, just as he does ([Plantinga n.d.](#)).

⁵ I have only drawn the reader's attention to a few such cognitive caveats from a very wide literature with a strong consensus. For more information on the 'bugs' that infest the human nervous system see [Tversky and Kahneman 1974](#); [Banaji 2006](#); [Kelemen and Rosset 2009](#), and [Gilbert 2007](#).

⁶ Plantinga suggests that our cognitive faculties are reliable if "they produce mostly true beliefs in the sorts of environments that are normal for them (1993, p. 220)." This stipulation faces two seemingly insoluble difficulties. Firstly, we have no way to count beliefs and no infallible answer key to check them against, so we do not know whether most of ours are true ([Fitelson and Sober 1997](#)). Secondly, the degree to which our nervous systems are innately reliable has limited bearing on the actual web of beliefs one ends up spinning, as I will argue in the next section.

As we have seen, the theist has numerous reasons for doubting the products of her cognitive systems—those reasons just don't stem from theism *itself*. They arise out of independently verifiable observations. Plantinga does, however, get one thing exactly right:

...even if we thought it likely, on balance, that evolution would select for reliable cognitive faculties, this would be so only for cognitive mechanisms producing beliefs relevant to survival and reproduction. It would not hold, for example, for the mechanisms producing the beliefs involved in a logic or mathematics or set theory course (Plantinga 1993, p. 233).

Only when we approach cognition from an evolutionary perspective does it make sense why nearly all of us find it easy enough to survive and reproduce if we so choose, yet mastering mathematics and advanced logic takes a tremendous amount of effort, with countless missteps along the way (a point not lost on naturalists Fitelson and Sober 1997, pp. 3–4). Many of us lack either the capacity or the interest to develop such refined cognitive processes, but humans of appropriate age who fail to take an interest in sex or in their own continued survival are few and far between. Theism would lead us to expect exactly the opposite.

The embarrassing extent of our fallibility creates particularly pernicious problems for those theists who view this life as a test that will ultimately consign our souls to an eternity of bliss or an eternity of torture. On this popular view, it seems deeply perplexing, even cruel, that our ability to find religious truth fares so much more poorly than our ability represent the basic perceptions required to survive and spawn. In the view of certain theists, it matters little *when* you die, since your soul will exist forever regardless, but you must come to hold correct religious beliefs before your inevitable passage to the afterlife. Why then does the average person have a brain that absorbs the religious views of the immediate family and the local culture with remarkable reliability rather than one that simply tunes-in the correct religion? Even for Christians who belong to the most populous religious tradition on the planet, claiming about 1/3 of humanity (assuming that one need not find the correct denomination), God could have done 25% better at designing our religious faculties and *still* failed the engineering exam. The theist has thus been handed a Hefty bag of anomalies to explain away and the atheist has a license to wonder whether theistic belief is one of those false, yet adaptive cognitive dispositions which, as Plantinga notes, would tend to thrive under natural selection.⁷

Knowledge evolves

The naturalist has his own bramble bush of questions to untangle. If our brains are not reliable truth-detectors, how can we trust our own convictions? Are we not drinking from a poisoned well whenever we settle on a conclusion? Doesn't the knowledge that

⁷ As Jonathan Haidt points out, "surveys have long shown that religious believers in the United States are happier, healthier, longer-lived, and more generous to charity and to each other than are secular people (Haidt 2007)."

we have unreliable minds undermine our trust in *any* belief we form? The atheist it seems, has acquired a Cartesian Demon and has no Convenient Deity to banish the damned thing.

Lacking in Plantinga's argument is any serious account of how beliefs get inherited. The literature on the evolutionary argument against naturalism is sullied with speculation over the likelihood that evolved creatures might have false beliefs that lead to adaptive behavior, when combined with complimentary motivational drives. But if our genes do not code for the beliefs in question, then those beliefs do not get transferred to our progeny biologically, and this entire debate rests on a category mistake. One might suppose that the 'faculties' which give rise to the beliefs get inherited, but this relationship proves more complex than it might at first appear. While *representational capacities* like intelligence, and *emotional-behavioral dispositions* like happiness and neuroticism do seem to have some basis in genetics; contemporary evolutionary thought does not hold that particular *theoretical constructs* like plate tectonics, or calculus, or the theory of evolution itself can get passed through our genes. Fortunately, that which can be learned from the environment does not *need* to be hard-wired into the brain. The ability to discover knowledge not written into our genetic code means that a brain will arrive at a set of beliefs particular to its learning environment.⁸

For a human brain, the local culture constitutes an *enhanced* learning environment. The great naturalist David Hume once said that "Without the influence of custom, we should be entirely ignorant of every matter of fact beyond what is immediately present to the memory and senses (Hume 1977)." Hume shows an uncharacteristic optimism in this statement. One without the influence of custom would actually miss much of what *is* available to the senses, because such a person does not have a rich conceptual framework to fit their observations into. They will not know that they are observing a microwave oven, a book, or perhaps even a poisonous plant, unless they have already *learned* these concepts. If the environment we are born into happens to be Pleistocene Africa, we learn social and environmental survival skills. Raised in the richer learning environment of Aristotle's Athens, our nervous systems assimilate a world in which there are scores of gods, but only five elements (earth, air, fire, water, aether). In Enlightenment era England, a primate with comparable representational capacities learns Copernican astronomy, Newtonian mechanics, and perhaps Christianity or deism. Put that ape in the modern United States and he does not need to reinvent the AC motor, the theory of relativity, or the Schrödinger equation; we have streamlined the cultural learning process so that he only needs to show up to class. Newton may have been fortunate to see far, standing on the shoulders of giants, but

⁸ We can now model this learning process in fairly robust detail using artificial neural networks. We can also see some reasons why neural network based cognition might evolve more easily than other computational architectures. The parallel architecture of neural networks offers a speed advantage because it performs multiple computations simultaneously. Neural networks also degrade well in response to partial damage since their representations are distributed over populations of simple 'nodes,' often sustaining modest performance, which beats none at all. These features, among others, help offset the various disadvantages of being made out of meat. For an illuminating exploration of the evolutionary and epistemic significance of parallel distributed processing, see Churchland 1995.

anyone in the twenty-first century who can afford a university education has a deeper pool of knowledge to drink from than Newton could have ever imagined.

As our knowledge advances, so do our methods of acquiring knowledge. Nobody comes into this world with the idea of the double-blind experiment, but nearly anyone can *learn* it. Technological innovations lead to progress in the sophistication of our empirical-theoretical models, which leads to further technological growth. This advancement of knowledge stems not from having reliable cognitive faculties, but from being good at imitation and learning by trial and error. As our species learns more, more becomes learnable. Because genetics and innate brain physiology alone fail to determine our beliefs, we cannot answer questions about the reliability of our *individual* cognitive faculties without taking into account the quality of our *collective* cultural knowledge.⁹

While our nervous systems may function *somewhat* reliably for *some* tasks, *some* of the time, evolution did not ‘design’ them to intuit abstract theoretical truths about structure and function, or for that matter metaphysics, straight out of the box. The alarming frequency at which even our most brilliant thinkers have been led astray speaks to the difficulty of understanding a world that we were designed primarily to *survive* and *breed* in. *Homo sapiens* inhabited this planet for around 200,000 years before anyone arrived at a remotely serviceable theory of evolution by natural selection, but what ultimately got us there was not a change in gene frequencies; it was a change in our socio-epistemic practices toward an increasingly naturalistic orientation.

Damage control

Epistemology asks the question: “*How do we know that we know what we know?*” An answer to this riddle comes with its own starting point, jargon, game rules, and standards of what constitutes a meaningful answer. For the naturalist, the short answer is: *trial and error learning*. We gain knowledge through a fallible and somewhat haphazard, but increasingly sophisticated process of tinkering and revision.

Plantinga has seen more clearly than *some* atheists that the evolutionary story of the genesis of our nervous systems has skeptical implications for a naturalistic epistemology. Since our brains were not designed to formulate accurate philosophical or scientific theories, our intuitive convictions are often wildly mistaken. Plantinga believes that if our cognitive faculties are unreliable, we should not trust them, or any belief that they generate. He seems to imply that if we accept a secular account of evolution, we should doubt all of our beliefs *equally* and *absolutely*. Such cartoonish skepticism arises only as a byproduct of forcing ourselves to think in artificially rigid black and white categories, while ignoring our best current naturalistic models of the biological and social evolution of cognition. Simple answers to the question “are our cognitive faculties reliable?” can only be maintained by sweeping data under the rug.

⁹ The narrow definitions of *knowledge* favored by some philosophers do not lend themselves well to discussing cultural evolution. Therefore I use the term *knowledge* in a broad socio-epistemic sense that encompasses our cultural garden of useful theories, facts, skills, know-how, and acquaintance, much of which does not qualify as ‘true’ nor ‘justified.’

From a naturalistic perspective, epistemic honesty requires not only that we proportion our skepticism to the reliability of our own nervous systems, but also that we take into account the cultural processes leading to our convictions. Naturalists find the methods of science so valuable not because they are ‘reliable’—a casual stroll through the history of science shows that the vast bulk of theories turn out to be inadequate or flatly mistaken—the value of scientific methods lies in the ways we can use them to enhance our learning environment and get more specific *feedback* from nature. One cannot determine the effectiveness of Prozac as a treatment for depression a priori, nor by simply giving it to a depressed person and observing what happens. Any change (or lack thereof) in symptoms might have resulted from a change in diet, exercise habits, the subject’s romantic life, or from adopting a puppy. In such a ‘noisy’ environment, proper generalizations cannot be learned, and bias reigns supreme. We need controlled experiments to isolate and measure variables, blind research protocols to circumvent confirmation bias, reproducibility and peer review to check incompetence and fraud. To the epistemic naturalist, *we know what we know* by taking observation seriously, seeking feedback from nature and other thinkers, rewarding discovery, and keeping theories open to revision and improvement.¹⁰ Even in the rigorously controlled learning environments constructed by modern science we have no guarantee of finding truth, but through this naturalistic epistemic orientation, scientific methods encourage the extinction, at least in the long run, of *testable* bad ideas.

Religious beliefs, on the other hand, often cannot be called into question by any empirical observation. Without any workable method for weeding-out error, misguided religious doctrines persist for millennia and religious intellectuals find creative ways to repudiate the conflicting discoveries of naturalistic research programs. A theistic orientation once compelled thinkers like Newton to make brilliant discoveries in the service of understanding God’s creation, but theism has since lapsed into a reactionary ad hoc explanatory posture. For those theists who don’t find massive scientific conspiracies plausible, the discoveries of researchers working within naturalistic evolutionary paradigms get reinterpreted as consistent with theism by weakening the core creationist doctrine into *intelligent design*, in which God guides the evolutionary process; or diluting it further into *theistic evolution*, which postulates that God starts the process and then lets it progress naturally. The theistic approach thus shows the hallmarks of what Imre Lakatos called a “degenerating research programme.” Lakatos spoke of *scientific* research programs progressing and degenerating, but when we apply these concepts to epistemic paradigms generally, we find that the ones that lead to new discoveries and predict novel observations are usually the research traditions that employ a naturalistic orientation and build-in ways of correcting the errors that domesticated primates, with their less-than-reliable nervous systems, will inevitably make.

None of this means that we, as individuals, should not interpret the broader implications of the information available to us or speculate beyond the data. Understanding requires connecting the dots and interpretation fuels learning and research. It does,

¹⁰ Even if Plantinga had a knock-down argument against the current neo-Darwinian synthesis, the possibility would remain that future biologists might discover other *natural* processes operating alongside natural selection that also enhance fitness, cognitive and otherwise. Some would say we already have some candidates, however controversial, for example, see [Corliss 1994](#), pp. 187–192.

however, mean that we have to admit that our theories may require revision as new information becomes available. Whether the conceptual grid we superimpose over the data is naturalistic, Christian, Buddhist, or Scientologist; an adequately motivated nervous system will organize our experience into a reality-tunnel that appears coherent *from the inside*.¹¹ Naturalists have traditionally sought guidance from the sorts of research programs that hold us accountable to empirical data because naturalists understand that we cannot simply *trust* the convictions of a monkey's mind.

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¹¹ The term “reality-tunnel” was coined by Timothy Leary. No other metaphor so vividly captures the cognitive tunnel-vision that results from conviction in a particular belief system.

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