



respecting  
**TRUTH**

willful ignorance in the internet age

LEE MCINTYRE



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## RESPECTING TRUTH

Throughout history, humans have always indulged in certain irrationalities and held some fairly wrong-headed beliefs. But in his newest book, philosopher Lee McIntyre shows how we've now reached a watershed moment for ignorance in the modern era, due to the volume of misinformation, the speed with which it can be digitally disseminated, and the savvy exploitation of our cognitive weaknesses by those who wish to advance their ideological agendas. In *Respecting Truth: Willful Ignorance in the Internet Age*, McIntyre issues a call to fight back against this slide into the witless abyss. In the tradition of Galileo, the author champions the importance of using tested scientific methods for arriving at true beliefs, and shows how our future survival is dependent on a more widespread, reasonable world.

**Lee McIntyre** is a Research Fellow at the Center for Philosophy and History of Science at Boston University and author of *Dark Ages: The Case for a Science of Human Behavior* (2006). He is co-editor (with Alex Rosenberg) of the forthcoming *Routledge Companion to Philosophy of Social Science*. The author can be reached through his website at [www.leemcintyrebooks.com](http://www.leemcintyrebooks.com).

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Praise for this book:

“Lee McIntyre identifies the central problem of truth claims today—from global warming and GMOs to evolution and vaccinations—‘willful ignorance.’ *Respecting Truth* should be read by every member of Congress before voting on legislation, and they should do so based on the facts instead of party line. The problem is group think. The solution is having a ‘designated skeptic’. I nominate Lee McIntyre.”

Michael Shermer, *Skeptic Magazine*, USA

“This is a compellingly-written book that addresses a timely issue. It is well researched, tightly constructed, and insightful. It makes for an engaging, informative and eye-opening read. The prose is light and winning, and it provides an expertly-guided tour of an issue of profound importance to us all.”

Andrew Norman, *Carnegie Mellon University*, USA

“McIntyre is very clear about the overall argumentative structure, and he provides excellent examples for each topic under discussion. Although the ideas being discussed are sometimes rather sophisticated, his exposition is very relaxed and casual.”

Noretta Koertge, *Indiana University*, USA

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# RESPECTING TRUTH

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*Lee McIntyre*

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**For Rich Adelstein  
who taught me to stand up for what I thought was true,  
even when he disagreed with me**

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In times of universal deceit, telling the truth will be a revolutionary act.

George Orwell

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## PREFACE

In a previous book—*Dark Ages: The Case for a Science of Human Behavior* (MIT Press, 2006)—I wrote about how ideology was corrupting the standards for evidence-based belief in the social sciences. While the natural sciences seem firmly established as the arbiter of any serious dispute about how the natural world works, in the study of human behavior many feel it reasonable to substitute wishful thinking and intuition over empirical methods. If only the social sciences could be more like the natural sciences, I lamented, we would be in a better position to understand the true causes of some of the social problems that have continued to bedevil us over the centuries, and finally be in a position to address the source of so much human misery.

But by the time I looked up, the world had changed. Science itself was under attack, even in the study of the natural world, such that some political candidates, religious leaders, media commentators (and many others who should have known better) were now disputing not only specific scientific theories that did not match their ideological prejudices, but also questioning science itself as the basis for forming true beliefs about the world. Those who believed in reason, it seemed, were being dismissed as just another interest group and science as just another ideology.

How could this have happened?

True beliefs are adaptive, right? And science works. The methods of scientific reasoning have provided us with the bounty of modern human life that is too vast to enumerate; over the last thousand years science has lifted us out of the dark ages and brought us to a world in which most of our problems are caused not by ignorance of the natural world but by our stubborn inhumanity to one another. One would think that we would suffer, therefore, if we abandoned the most successful system that the human mind has ever invented for the discovery of truth, not only about the natural world but about ourselves as well.

Yet this is exactly where so much of today's public debate has landed us. Science (and the idea of using reason as the basis for human belief in general) is routinely questioned, resisted, denied, ridiculed, rejected, and outright disrespected at the hands of those who do not wish to believe the sometimes inconvenient conclusions that are forced on us by reason. Surely there is more to truth than that which can be determined by science. Yet today—when we have right-wing candidates for the Presidency of the United States who dismiss the scientific evidence for human-caused global warming as a “hoax” and many on the left who continue to believe that there is a medical conspiracy to deny the link between childhood vaccines and autism (even after that research has been debunked)—it is clear that the standards for human rationality are in trouble. For by making such blanket statements—with no credible evidence and no plausible theory about why the scientific community as a whole could get things so wrong—one understands that it is the soundness of science itself that is being questioned.

Of course, even though many may doubt particular scientific theories, they also understand at some level that we cannot do without science. They may question evolution or global warming when it suits their gut or their politics, but then without irony turn around and use Twitter or their iPhone to spread their medieval opinions. Captured by a benighted ideology, millions may wish to row away from science and reason when it is convenient, but they also want to keep the shoreline in sight.

How can we reach these people?

In this book I will argue that truth matters and that deep down most of us already know this. Of course, we may question inconclusive evidence and yearn for better theories, but that is allowable and even well-suited to science. Any reasonable standard of rationality should be able to handle such questioning, for criticism is at the very basis of rational belief formation. Instead, the biggest threat to truth in the twenty-first century, I maintain, is not skepticism or even outright rejection of specific scientific theories, but disrespect for the standards of truth that lie behind scientific reasoning in the first place. It is not crackpot theories that are doing us in, it is the growing prevalence of a dishonest attitude toward truth which says that one can embrace reason where it suits us and then reject it when the results do not match our preferred ideology.

Ignorance and falsehood are not the enemy. Instead we should be much more concerned about disrespect.

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## ACKNOWLEDGMENTS

It would be customary at this point for me to thank all those with whom I have ever discussed the ideas in this book. But I can't do that. The truth is that I have been thinking about the ideas in this book for virtually my entire working life, so that task would be impossible.

What I would like to do instead is single out a handful of people who have done the most to bring this particular book to fruition: my friend Jon Haber, who has read everything I've ever written and done me the honor of criticizing most of it; my teacher Rich Adelstein, whose influence on me has been so great that I dedicate the book to him; my friends and colleagues Dan Little, Mark Buchanan, Michael Martin, and Alex Rosenberg for at various times discussing with me the ideas contained here; and two anonymous referees for the publisher, who made such helpful comments on an earlier draft of this book.

The folks at Routledge have been a pleasure to work with and I would like to thank my editor Andy Beck in particular for his efforts on my behalf. Others who deserve thanks are Ruth Berry in production, Harriet Connor and Mike King in marketing, James Thomas—my copyeditor—who saved me from a number of mistakes and infelicities, and Laura Briskman for her all-around good cheer and hard work in seeing this project through.

I would also like to thank Alisa Bokulich, the Director of the Center for Philosophy and History of Science, for giving me such a wonderful home at Boston University; and my sister-in-law Pat Starr, who did not live to see the publication of this book, but took a special interest in helping me to see that my ideas could make a difference.

My daughter Louisa read every word of this book, then provided expert philosophical commentary that was uncolored by our relationship; I couldn't be

more proud or more grateful. As I was writing this book, I often found myself thinking of my son James, knowing of his commitment to honest argument and making the world a better place. I hope I did you proud son. But, as always, my greatest thanks go to my wife Josephine, who has always believed in my work—and me—with an unshakable conviction that belies all obstacles and setbacks. They say that philosophers are professional skeptics, but there is one thing I've never doubted:

Doubt thou the stars are fire;  
Doubt the sun doth move;  
Doubt truth to be a liar;  
But never doubt I love.

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# 1

## ATTITUDES TOWARD TRUTH

### Willful Ignorance and the Last Glimpse of Shoreline

All truth passes through three stages. First it is ridiculed. Second, it is violently opposed. Third it is accepted as being self-evident.

Schopenhauer

The human relationship with truth is a complex one. On the one hand, most of us believe strongly in the concept of truth and may even grow upset when we feel that it is being withheld from us: when our government lies to us, when a doctor substitutes happy talk for a genuine diagnosis, when despite overwhelming evidence a child abuser pleads “not guilty” at trial. On the other hand, most of us can also be counted on to resist or even actively disbelieve in some truths that we just do not want to accept: that we cannot balance the federal budget unless we raise taxes *and* cut entitlement programs, that the mole on our back really is cancer, that even the most heinous criminals are entitled to a defense at trial. But what to say, then, about those cases in which—if we are rational beings—such dissonance should be resolved on the spot, *because we have the truth right in front of us ...* yet we resist it anyway? Why is there so much difficulty not only in *finding* the truth, but in *accepting* it once it has been discovered? It is the latter sort of problem that I will be concerned with in this book.

One might think that belief in truth—as opposed to its discovery—would be a fairly trivial matter. For despite our reluctance to hear unwanted truths, it seems plausible that the deep-seated countervailing human desire to *know* the truth would eventually result in acceptance, once things were demonstrated to us. But of course, with humans it is never quite so simple. As the history of science has shown us, the discovery of truth is hard, but the acceptance of truth can be even harder.<sup>1</sup>

But we have always known this. Even when science (and philosophy) were in their infancy, human nature was already going strong. In Plato's dialogue *Euthyphro*, we see the great Socrates admonish a callow young fellow for professing to know something that he is in no position to know: what is "righteousness"?<sup>2</sup> Throughout the dialogue, Socrates demonstrates again and again that Euthyphro has no idea what he is talking about, when he argues that it would be righteous for him to prosecute his own father for murder, given some pretty shoddy evidence and the fact that Euthyphro cannot even define the meaning of righteousness. One might think that Socrates is so adept at this kind of questioning and verbal humiliation—which is his standard method throughout the dialogues—because he himself knows the answers to the questions he is asking. But, when challenged in this way, Socrates always demurs and says that he himself has no wisdom, but is only a kind of "midwife" who can help others to seek it. Even though the goal of philosophy is to find the truth, Socrates customarily professes ignorance.

Why is this important? Here Plato is teaching a central lesson about the philosopher's search for knowledge that will have later ramifications not only for science but also for any subsequent quest for true belief. The real enemy of truth is not ignorance, doubt, or even disbelief. It is false knowledge. When we profess to know something *even in the face of absent or contradicting evidence*, that is when we stop looking for the truth. Which is more likely to stand in the way of truth, Socrates wonders, ignorance or the conviction that we do not need to learn anything new? It is the hubris of the latter point of view that is the real problem. If we are ignorant, perhaps we will be motivated to learn. If we are skeptical, we can continue to search for answers. If we disbelieve, maybe others can convince us. And perhaps even if we are honestly wrong, and put forward a proposition that is open to refutation, we may learn something when our earlier belief is overturned. But when we are willfully ignorant—when we refuse to consider new data because nothing could convince us to abandon what we already believe—that is when truth is most in danger. When we choose to insulate ourselves from any new ideas or evidence *because we think that we already know what is true*, this is when we are most likely to believe a falsehood.

In the search for truth, it is not mere disbelief that explains why truth is so often disrespected. It is one's attitude.

### The Problem of Willful Ignorance

Our problems with truth are many. Not only are we often ignorant of it, or careless in not bothering to use reliable methods to find it, but we also sometimes actively choose not to believe things even when we know full well that they are probably true or have within our reach easily available sources of information that would enable us to find out. In one of the 2008 Republican presidential primary debates, the candidates were asked to raise their hands if they did not believe in evolution; Senator Sam Brownback, Governor Mike Huckabee, and Representative

Tom Tancredo did so. In the 2012 political cycle, Sen. Rick Santorum, Rep. Ron Paul, and Gov. Rick Perry became fond of saying that global warming is a “hoax.” When asked to clarify his views Perry said:

I do believe that the issue of global warming has been politicized. I think there are a substantial number of scientists who have manipulated data so that they will have dollars rolling into their projects. I think we’re seeing it almost weekly or even daily, scientists who are coming forward and questioning the original idea that man-made global warming is what is causing the climate to change.<sup>3</sup>

And while the eventual Republican nominee, Mitt Romney, had this to say in June 2011:

I don’t speak for the scientific community, of course. But I believe the world’s getting warmer. I can’t prove that, but I believe based on what I read that the world is getting warmer. And number two, I believe that humans contribute to that ... so I think it’s important for us to reduce our emissions of pollutants and greenhouse gases that may well be significant contributors to the climate change and the global warming that you’re seeing.<sup>4</sup>

By August 2011, he appeared to have changed his position:

My view is that we don’t know what’s causing climate change on this planet ... and the idea of spending trillions and trillions of dollars to try to reduce CO<sub>2</sub> emissions is not the right course for us.<sup>5</sup>

That same month Jon Huntsman, the only Republican candidate who was willing to stand up for science, tweeted “I believe in evolution and trust scientists on global warming. Call me crazy.” After polling in single digits for a few more months, Huntsman dropped out of the race in January 2012.

As if this sort of “head in the sand” approach to scientific evidence by our elected officials was not appalling enough, it is depressing to learn that the level of scientific illiteracy is perhaps even greater among the general public.

In a nationwide telephone survey conducted by the California Academy of Science in 2009, it was found that:

- 47 percent of American adults did not know how long it takes for the Earth to revolve around the Sun.
- 41 percent believed that the earliest humans lived on Earth at the same time as the dinosaurs.<sup>6</sup>

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#### 4 Attitudes Toward Truth

Add to this the equally depressing results of a 2007 Harris Poll which found that:

- 42 percent of American adults believe in ghosts.
- 32 percent believe in UFOs.
- 23 percent believe in witches.<sup>7</sup>

And, although it is true to say that Americans tend to be more skeptical of some basic scientific truths (like evolution) than residents of any other nation except Turkey,<sup>8</sup> the problem of willful ignorance is far from an American-only problem. In a 2008 British poll it was found that:

- 23 percent of Britons thought that Winston Churchill was a myth, while 58 percent believed that Sherlock Holmes was real.
- 47 percent thought that the twelfth-century English king Richard the Lionheart was a myth.<sup>9</sup>

But what makes us think that such incredible beliefs have anything to do with the problem of *willful* ignorance and are not just the result of plain old ignorance? Some of our fellow citizens and politicians, that is, could just be incredibly stupid when it comes to reasoning about scientific (and historical) matters. What is there beyond the falsehood of the views expressed above that leads us to believe that they not only contradict the truth, but show contempt for it?

Ignorance is the lack of true knowledge. Willful ignorance is something more. It is ignorance coupled with the decision to remain ignorant. In saying this, it is tempting to believe that if one is willfully ignorant then one must *know* that one is ignorant, thereby revealing a bit of savvy whereby, presumably, one knows that there is some truth out there that one wants to be insulated from. A good example of this might be our suspicion that a vast majority of the people who ran for the Republican presidential nomination in 2012 did not actually believe the nonsense that they spouted about global warming, but instead merely pretended to believe it, so that they would appeal to those voters who were actually ignorant.<sup>10</sup> But this is not willful ignorance; this is dishonesty. Instead, to be truly willfully ignorant, one could neither disbelieve in the truth (for, after all, one could simply think that one's mistaken beliefs were correct), nor affect the mere pretense of disbelieving (for that is to look at the truth with one eye and pretend not to see it). Willful ignorance is instead marked by the conviction to shut *both* eyes against any further investigation, because one is so firm in one's belief that any other sources of knowledge are not needed. Here one is not only ignorant but (like Euthyphro) prefers to remain so. One does not in any sense "know" the truth (even with one eye), even though one probably *does* suspect that there are further sources of contravening information out there. Yet these are rejected, because they might conflict with one's favored beliefs; if there are other sources of information, they must be ignored. This is why the false beliefs cited in the polling results show more than just ignorance. For when there are such easily

available sources of accurate information out there, the only excuse for such stunning ignorance is *the desire to remain so*; one has actively chosen not to investigate. More than mere scientific illiteracy, this sort of obstinacy reflects contempt. But why would someone embrace such a hostile attitude toward the truth?

The answer to this question is complicated and will require the remainder of this book to address it fully. But already, we may settle the matter of whether willful ignorance is a reasonable approach to the problem of trying to form true beliefs, for most certainly it is not. To reject possibly refutatory sources of information—only because they might contradict one’s beliefs—is wrong. Worse, it is irrational.<sup>11</sup> It is fundamental to scientific judgment that one could always be wrong. Because scientific judgment (and, one presumes, many other forms of rational judgment) are based on evidence, it is always theoretically possible that some further information will come along that will refute one’s hypothesis. If one’s beliefs are based on evidence in the first place, they should be open to revision or refutation based on further investigation. The problem with willful ignorance is not just that it will likely lead to false beliefs, but that it relies on a standard of reasoning that foregoes the possibility of correcting one’s beliefs in the future. But we should not so easily give up on the search for truth. Instead, we should embrace the methods of critical reasoning that are used by science to make our beliefs better (and truer) over time. Even where we may not be able to find the truth, we can at least approach it.

To reject this method in favor of dogmatism is not just ignorant, nor even dishonest. It is instead to show contempt for the standards by which true beliefs are formed. Truth is not discovered by happenstance, nor merely by having the right theory. It is a result of openness to new data, whereby one is constantly correcting one’s opinion over time, because this is a method that has proven itself in the past to lead to true beliefs. To shut oneself off from new sources of information is to be hostile to the truth. Even if one happened to be right about some matter of opinion (like the proverbial stopped clock that is right twice a day), one’s opinions arguably still would not be “true” if they were arrived at by accident, rather than produced by a procedure that could be justified as reliable.

The problem with willful ignorance, therefore, is not mere ignorance of any particular facts about astronomy or biology, but rather a pervasive hostility to searching out reliable methods of gaining true beliefs, which demonstrates a lack of respect for the concept of truth in the first place. It reflects a willingness to cling to falsehood even when good sources of information are easily within our reach. Beyond being wrong, one’s beliefs will likely end up being irrational. The problem with willful ignorance isn’t mere ignorance of the truth; it is the “willfulness” that is troubling.

## The Human Relationship to Truth

As we have seen, our relationship to truth is complicated. We can actively search for it, accept it when we see it, doubt it, reject it, disbelieve it, spin it, outright lie

about it, keep it a secret, remain indifferent to it, choose to remain ignorant of it, or pretend that it isn't there. The interesting thing to note here is that whether or not we choose to inquire into the truth—or believe it when it is in front of us—our attitude toward truth can fall along either side of an axis marked by “respect” or “hostility” that has only an orthogonal relationship to the classic terms of “belief” and “disbelief.”

Most people think of truth in terms of belief or disbelief, but this is far too simple. Even when we believe something that is true, we can misuse that knowledge in various ways, some of which are hostile to truth. Even true belief, that is, can be manipulated in a way that is not respectful. When we believe that something is true we can use that knowledge honestly, to correct our theories or even to change the world. But we can also use it dishonestly to deceive others, either by outright lying or simply misleading them, so that we may pursue some other attractive purpose. Alternatively, we can decide to suppress the truth, by keeping it a secret or pretending it isn't true. Even when we know the truth, we can fail to respect it.

Disbelief, too, can be complex. In some cases we may disbelieve something based on genuine, though perhaps faulty, judgments over whether it is true. That is fine and, even if we are wrong, this reveals a certain respect for the truth. But in other cases we may display a tendency to disbelieve something despite overwhelming positive evidence, such that it raises suspicions over our integrity.<sup>12</sup> In such cases, we may be in denial or find it attractive to equivocate or remain ignorant long past the point at which it would have been possible to ascertain enough evidence to settle the matter. (The example of the current “debate” over global warming here springs to mind.) In other cases, we may outright refuse to believe something that conflicts with beliefs that we find sacred. Such reactions, too, reveal a lack of respect for the truth.

So we see that, whether we believe in the truth or not, many of our reactions to truth can be hostile. If we believe something but use this knowledge to spin others, we are being hostile to the truth. If we reject the truth because we are afraid to engage in inquiry, we are similarly hostile. Indeed, anything short of the open and active pursuit of true beliefs, with the complete integrity of believing them if and only if we think that they are true, demonstrates some degree of hostility toward the truth.<sup>13</sup>

Of course, the majority of us fall short of this goal sometimes. Yet almost none of us dare express the sentiment that we do not care about the truth. Why is this? I think it is because deep down each of us probably does believe that truth matters, both that it exists and that the possession of it is valuable. Despite the fact that we sometimes treat it brutally, or only give it lip service, it is the rare individual who is prepared to embrace the idea that there is no importance in forming true beliefs. Although many treat it carelessly, few abandon the truth. Why? Because, as it turns out, the concept of truth is useful to the survival of our species and at some level most of us probably recognize that we could not have gotten to this point in our lives—or human civilization—without it.

As complicated as our brains may be in their patterns of denial and resistance, deception and rejection, the human brain is also possibly the single most carefully wired engine for detecting truth that has ever been seen in the history of the universe. And it is a good thing, for surely we would have perished long ago without it.

## Notes

- 1 Giordano Bruno learned this when he was publicly burned in Florence in 1600 for his conviction that there were “other worlds,” as did Galileo later when he was put under house arrest for his belief in the movement of the Earth.
- 2 The actual Greek word at issue in *Euthyphro* is “piety,” which within this context may be loosely translated as “righteousness.”
- 3 Jim O’Sullivan, “Perry tells N.H. audience he’s a global-warming skeptic,” *National Journal*, August 17, 2001, <[www.nationaljournal.com/politics/perry-tells-n-h-audience-he-s-a-global-warming-skeptic-with-video-20110817](http://www.nationaljournal.com/politics/perry-tells-n-h-audience-he-s-a-global-warming-skeptic-with-video-20110817)>.
- 4 Louis Jacobson, “On Mitt Romney and whether humans are causing climate change,” *Politifact.com*, May 15, 2012, <[www.politifact.com/truth-o-meter/statements/2012/may/15/mitt-romney/mitt-romney-and-whether-humans-are-causing-climate/](http://www.politifact.com/truth-o-meter/statements/2012/may/15/mitt-romney/mitt-romney-and-whether-humans-are-causing-climate/)>.
- 5 Brad Johnson, “Romney flips to denial: ‘We don’t know what’s causing climate change,’” *ThinkProgress* [blog], October 28, 2011, <<http://thinkprogress.org/climate/2011/10/28/355736/romney-flips-to-denial-we-dont-know-whats-causing-climate-change/>>.
- 6 “American adults flunk basic science,” *Science Daily*, March 13, 2009, <[www.science-daily.com/releases/2009/03/090312115133.htm](http://www.science-daily.com/releases/2009/03/090312115133.htm)>.
- 7 “Americans’ belief in God, miracles and heaven declines,” *Harris Interactive*, Harris Poll 97, December 16, 2013, <[www.harrisinteractive.com/NewsRoom/HarrisPolls/tabid/447/ctl/ReadCustom%20Default/mid/1508/ArticleId/1353/Default.aspx](http://www.harrisinteractive.com/NewsRoom/HarrisPolls/tabid/447/ctl/ReadCustom%20Default/mid/1508/ArticleId/1353/Default.aspx)>.
- 8 James Owen, “Evolution less accepted in U.S. than other Western countries, study finds,” *National Geographic News*, August 10, 2006, <<http://news.nationalgeographic.com/news/2006/08/060810-evolution.html>>.
- 9 “Nearly quarter of Brits think Churchill a myth: Poll,” *ABC News* (Australia), February 3, 2008, <[www.abc.net.au/news/2008-02-04/nearly-quarter-of-brits-think-churchill-a-myth-poll/1031856](http://www.abc.net.au/news/2008-02-04/nearly-quarter-of-brits-think-churchill-a-myth-poll/1031856)>.
- 10 Commentators sometimes called this “paying the crazy tax.”
- 11 Of course, one may raise the objection here that I am using the standards of reason to critique non-reason, which begs the question. For a stirring discussion of the skeptical and reflexive problems that can arise in such a justification, see Michael Lynch’s excellent book *In Praise of Reason* (Cambridge: MIT Press, 2012). My present goal, however, is not to provide a full-blown critical defense of reason, but rather to presume that even if philosophers have sometimes had a hard time providing a logical defense of it, in historical terms this debate was settled long ago. Science and reason have been at the foundation of Western culture since the Enlightenment. Yet *despite that*, some continue to doubt its results and question its methods, when it suits the purpose of their ideology. It is the latter issue that I am concerned with in this book and I refuse to allow those who reject the standard of rationality embraced by philosophy to somehow hide behind “skepticism” as convenient camouflage for their deeply anti-truth agenda.
- 12 Note that we are here talking about true statements, not false ones, so presumably there is some basis for believing them.
- 13 Truth is about more than the content of our beliefs, that is, but also about the attitude with which we approach the method by which true beliefs are formed.

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# 2

## THE VALUE OF TRUTH

### Should My Genes Care Whether I Can Justify My Belief That a Tiger is Coming Toward Me?

Rather than love, than money, than fame, give me truth.

Henry David Thoreau

What use is the truth? Why should we value having true beliefs? Are true beliefs somehow adaptive or helpful to our species in its struggle for survival? And indeed, if this is so, wouldn't the tendency to look for and value true beliefs somehow be wired into our brains after all of these years of natural selection?

I believe that the answer to these last two questions is, for the most part, yes and that a compelling story can be told about human history that culminates in the development of the human brain's greatest truth-seeking invention: science. Science is the formal codification of the process of forming true beliefs about our world that has been selected for and wired into our brain over hundreds of thousands of years and has contributed to our survival and growth into the dominant species on this planet. Not coincidentally, I believe that science is also the best model of what it means to have a respectful attitude toward truth.

There are many misconceptions about how scientific beliefs are formed and of the standards by which scientific theories are evaluated. In the popular imagination, a scientist gathers evidence, tests a hypothesis, and then discovers "the truth." Any deviation from this fantasy, wherein one is forced to admit that a scientific theory is "not yet proven" or that "not all of the data are in yet," is sometimes taken by naive critics to show that a particular theory is "just a theory," which presumably has not yet gone through the rigorous assessment needed for scientists to show that it is actually "true." Such an ill-informed understanding of the process by which science actually works (or of what scientists mean when they use the word "theory" as opposed to "hypothesis") has probably led to many of the

ignorant statements concerning the alleged lack of evidence for global warming or evolution that politicians love to bellow on the campaign trail.

But, to anyone who has bothered to study it, one understands that science is just not like this. It is not the *particular* theory of evolution or global warming that cannot be proven true but, if we get right down to it, actually *any* of the theories of science. But this is not because science is somehow a flawed process, which cannot lead us to better and truer theories. Instead it is just that science does not work like most people think it does. No scientific theory, no matter how well corroborated by the evidence, can ever be proven absolutely true. Not even gravity.

Although it is correct to say that science is “evidence based,” it turns out that this is both a blessing and a curse ... the source of science’s greatest strength and also its greatest perceived weakness. For being evidence-based means that no matter how well one’s theory may fit with the current evidence, it is always possible that new evidence may come forward that will cause us to revise our current theories. *All* scientific belief, that is, is tentative and open ended. It is changeable and subject to revision because it is based on the possibility that we have not yet sampled all of the world that our theories are supposed to cover.

A scientific theory can no more be proven true than we can hope to make absolute pronouncements about the edge of the universe or what happens to us after death. We just have not been there yet. Part of this is due to the famous “problem of induction” that was put forward two centuries ago by David Hume, which shows that whenever we are generalizing based on a limited sample of data, our assertions must run the risk of being false. Only deductive statements—such as those in logic and mathematics—can be proven absolutely true, but this is because they are self-contained analytical systems whose truth is not based on correlation with the state of the world in the first place.<sup>1</sup>

Is this a weakness in science? Far from it. For in science we see that it is possible to contend with uncertainty in a positive way and learn to embrace the power of skepticism. Even if we are not prepared to believe that a theory is absolutely, provably true, it may remain worthy of our belief because it conforms with the best evidence that we are capable of gathering. This means, of course, that while science aims at truth, it can never technically speaking claim to have reached it. In science, truth is a guiding ideal, not a destination. But, outside logic and mathematics, what were we expecting? Like Socrates, we see that it is not doubt, disbelief, or even ignorance that stands in the way of using our inductive powers to learn more about the truths of nature; it is instead the refusal to consider new evidence because we are already sure that our theories are true in the first place. Yet how can we claim to discover truth about the world outside the examination of empirical evidence?

So we see that even if science cannot claim that every (or any) scientific belief is provably true, it nonetheless leads us *toward* truth and in doing so it is a model of respect for the formulation of true beliefs. Even when scientists refuse to

believe something, they must do so in a respectful way, based on the principled desire to gain more evidence and do more testing. Indeed if they are not prepared to do this—as sometimes happens when scientists fabricate data or refuse to consider new evidence that confounds their favored hypotheses—it is not too strong to say that they have really given up on being scientists and have instead become ideologues, who contend that they somehow have special access to the truth outside hypothesis testing and corroboration by their colleagues. But, as Thomas Kuhn famously argued in his account of how earlier scientific beliefs are later overthrown by those who are willing to embrace new paradigms, there is a real danger in such cases that the “old guard” will get read out of the profession.<sup>2</sup> They become dinosaurs. And this, we may all agree, is not a good evolutionary move.

### Evolutionary Psychology

The field of evolutionary psychology holds that we can understand human behavior only by attempting to explain it within the context in which the genes that govern human action were selected for by the environment. Why do men display so much sexual jealousy? Because those who were cavalier about their mate’s extramarital friendships probably had their genes culled from the gene pool many generations ago. Why are parents so fond of their children, even to the point of sacrificing their own lives to save them? Because such devotion to one’s offspring is an excellent way of getting one’s genes into the third generation.

By the same token, we may conjecture that there is evolutionary value in seeking true beliefs. There must be. Otherwise we would have long ago seen less selective advantage for those who said “Yes, that really is a tiger! Run!” and more for those who said “I don’t believe it. Let me take a closer look.”<sup>3</sup> The ability to gather evidence from nature and formulate true beliefs on that basis is an evolutionary advantage that we see prized in humans and non-humans alike. Yes, that’s a snake. No, don’t eat that. What’s that noise? These are the earliest rumblings of reasoning based on data from our environment that we inherited from our ancestors and so finely tuned into the majesty of science.

As Robert Park argues in his book *Superstition: Belief in the Age of Science*:

Our ability to make sense of the world begins with the marvelous ability of the human brain to pick out patterns in the information collected by our senses. Recognizing familiar patterns in unfamiliar situations is the beginning of reasoning by analogy, and therefore of abstract thought. Our savage ancestors, living as hunter-gatherers in a Pleistocene wilderness, must have been very good at figuring out the behavior patterns of the animals they hunted as food, as well as those that hunted them for food. ... Remarkably, it would turn out that the brain that was good at finding grubs and avoiding saber-toothed tigers could also recognize more abstract patterns in language and mathematics.<sup>4</sup>

Yet, given this, why do we so often refuse to believe something even in the face of evidence that it is true? If humans are wired up for pattern recognition, how did it happen that we have a conflicting tendency sometimes to resist or even to deny the truth? And if such a tendency exists, mustn't it also have been selected for by our environment? But what possible survival advantage might accrue from believing anything other than the truth? If truth-seeking is so valuable within the evolutionary context, then why do we have confirmation bias, cognitive dissonance, the gambler's fallacy, motivated reasoning, stereotype threat, and all of the other foibles of human reasoning that so vex social psychologists, unless those were *also* in some way valuable in the struggle for survival?<sup>5</sup> By the logic of evolutionary psychology, mustn't such truth-avoiding mechanisms *also* have a purpose? If not, why wouldn't evolution have culled them long ago?

Of course, there are some irrationalities that have clear survival value, like the placebo effect, where we find pain relief in a sugar pill merely because we *believe* that it is a powerful medicine. Perhaps there are evolutionary advantages to such mental structures—like pain minimization in the midst of a fight—that have helped us to survive. But wouldn't this mean that we should be prepared to defend *every one* of these mental “glitches” and show why each has specific survival value? Rather than discuss the problem of human irrationality as a whole, shouldn't we be prepared to show that every violation of logic must give its organism an evolutionary advantage? If so, it is hard to imagine the survival advantage of something like overconfidence bias (which is when we think we can do something that we probably can't), which has obvious evolutionary costs.<sup>6</sup>

Indeed, even in what might be thought of as an obvious case for the survival value of truth-avoiding mechanisms within the human brain, the purported benefits seem equivocal. In a study of adult survivors of childhood sexual abuse, researchers Melissa Himelein and JoAnn McElrath found that “well-adjusted” survivors tended to engage in four cognitive strategies: disclosing and discussing the abuse, minimization, positive reframing, and refusing to dwell on the experience.<sup>7</sup> Other research on victimized populations conducted by William Helmreich, who studied Holocaust survivors who had emigrated to the USA, found that many of them also employed mechanisms of psychological “distancing”—such as refusing to talk about their experiences or dwell on the past—that enabled them to cope surprisingly well with their trauma.<sup>8</sup> This sort of strategy—while not amounting to outright denial or resistance to the truth—did (according to Helmreich) enable these Holocaust survivors to do better than a control group of American-born Jews of the same age, as measured by low psychotherapy rate, more stable marriage, and low criminality. Robert Jay Lifton has identified such strategies to seal off part of one's emotions and memories as “psychic numbing,” which Helmreich sees as a positive adaptation to trauma. Yet this is where the controversy arises, for one person's “tenacity” or “resilience” can be seen by another as symptoms of unresolved post-traumatic stress syndrome.<sup>9</sup>

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