

Chapter One - Believing in the Palpably Not True

“I know what I believe. I will continue to articulate what I believe and what I believe—I believe what I believe is right.”— George W. Bush

“The most common of all follies is to believe passionately in the palpably not true. It is the chief occupation of mankind.” --H. L. Mencken

Natural Illusions and the Brain at Work

H. L. Mencken did not have a very high opinion of the human species. To write, as Mencken did, that our *chief* occupation is to believe in the palpably untrue may seem to be an obvious exaggeration. We might even say that his pessimistic claim is untrue, but that he passionately believed it anyway. He painted all mankind into the same corner, there to sit with our dunce hats on, raging against the truth. It is no exaggeration, however, to describe *half* of all adults in America as passionately defending the palpably not true. I am referring to the fact that poll after poll finds that about 50% of our adult population does not accept what just about every scientist on the planet accepts: the fact that humans and all other animals have evolved by processes such as natural selection over hundreds of millions of years on a planet that revolves around a star that dwells in a remote corner of one of billions of galaxies. I know that many find this a bleak picture of the universe and blame scientists for taking away the magic of a universe created just for us by an Almighty God. While I consider the story of creation unworthy of our age, I do not consider the people who hold such a view to be any less intelligent or knowledgeable than I am.

Throughout this book I will use harsh language to characterize various ideas, but my acerbic tongue is aimed at ideas and not at the people who adhere to those ideas. Many of the ideas I now consider unworthy of belief are ideas that I once accepted as truths, including the idea that the universe was designed and created just for us. Changes in what I believe have not been driven by changes in my intelligence and I am well aware that many who I disagree with are much more intelligent than I am. I write these things now to avoid being misunderstood later.

It wasn't that long ago that the generally accepted opinion among most people, including most educated people, was that the mind is independent of the brain and the body. Thinking, it was thought, is something the immaterial mind does. When the immaterial mind reflects on its operations, it is reflecting on its own essential properties and functions. Critical thinking, it was thought, is equivalent to examining the nature and limits of the immaterial mind's operations. Little, if any, thought was given to the fact that whatever the mind is it works as well as it does by deceiving us into seeing things that aren't there and believing things that aren't true. Witness the daily passing across the sky of the Sun. Anyone can see that the Sun moves across the sky. It does so every day, whether we see it or not. This is so obvious to our senses that one wonders why it ever occurred to anyone to look at this obvious fact in any other way. Yet, a 15th century Polish monk, Nicolaus Copernicus, asked what things would look like if the Earth was moving and the Sun was standing still. The answer is not so obvious because thinking such a thought is not a simple reflex of sense perception. Yet, the answer is very simple: things would not look any different to us if the Earth moved around the Sun. But, if it were true that the Earth moves around the Sun, the consequences would be monumental. For that would mean that the most obvious daily occurrence is an illusion. We might forgive the deity for creating a universe where straight sticks appear bent in water. Our brain quickly tells us that the stick does not bend; it just

looks like it is bending. But what kind of creator would trick his favorite creatures by making the Sun appear to go around the Earth when it doesn't? Others may explore that line of inquiry.

What I want to explore is the fact that for billions of people this daily illusion is not seen as an illusion. It is seen as true. Yet, the facts are that the Earth is hurtling through space in orbit around the Sun while rotating at a high rate of speed on its axis. Earth's circumference at the equator is 24,901.55 miles (40,075.16 km). If you are standing at the equator then you are moving more than 1,000 mph (1,600 km/h) relative to the center of the planet. The planet is also orbiting the Sun with a velocity of about 67,062 mph (107,300 km/h). The illusion of the Earth's motionlessness is due to the relative motion of planets and stars, something which science has explained.

Other illusions have also been explained by science, though many people refuse to accept the explanations, and some illusions remain controversial. Everyone agrees that a rising full Moon looks bigger on the horizon and appears to shrink as it moves upward in an arc until it is overhead. As it rises, the Moon appears to be following a curved path in the sky, a path that resembles an inverted bowl with a flat bottom. Obviously, the Moon does not shrink and grow as it orbits the Earth. The Moon is the same size when it rises as when it is overhead. Some sort of illusion is going on. How can the same object appear so much larger on the horizon than it does when overhead?

Intuition might tell you that the Moon is closer when on the horizon and farther away when overhead. The brain has evolved over millions of years to trick and deceive us on a regular basis. This is for our own good. Without these deceptions the species might have perished long ago. (I'm going to talk metaphorically for a bit. I really do know that the brain does not have a mind of its own.) Things far away appear smaller than things nearby, but the brain knows the real size

of that tiny looking tiger in the distance. The apparent difference in size of objects that vary in distance from us informs us of approximately how far away we are from those objects. It might have been advantageous to our survival as a species to be able to tell when a predator was 1,000 meters away and when one was 10 meters away. It would have been of no advantage to think that tigers are tiny when far away and grow menacingly large when they get close to having us for breakfast. But there's a problem with our intuitive explanation of the Moon illusion. The difference in distance of the Moon from a point below the Moon or from a point to the Moon on the horizon isn't enough to account for the difference in appearance of the size of the Moon when rising and when overhead.

Given the evolutionary history of our brain and how we perceive the size of objects relative to their distance from us, there are only two possible explanations for the illusion. Either the brain thinks the Moon is closer than it is when on the horizon or the brain thinks the Moon is larger than it is when it rises. Scientists have ruled out the former explanation on two counts. The Moon isn't always closer when on the horizon and the illusion of the bowl-shaped sky tricks the brain into thinking that the sky at the horizon is much farther away than the sky directly overhead. This means that when the Moon is full and on the horizon the brain, the great deceiver, is itself deceived and presents a giant globe because it thinks the Moon is farther away than it really is. Shouldn't that make it appear smaller? You'd think so, but not in this case or in other cases of what is called the Ponzo illusion. I've had one experience of a perceptual illusion where I saw something as much larger than it is because I thought it was much farther away than it really was. I was at Crissy Field in San Francisco looking across the bay at the coastline of Marin County a couple of miles away when suddenly a giant bird flew into view. It looked like what I imagine a giant pterosaur would look like if it were flying a couple of miles away from me.

When my eyes refocused on the jetty about one hundred feet in front of me, instead of on the coastal hills a couple of miles away, I realized it was just an ordinary seagull! I don't think this completely explains the Moon illusion, though, I've experienced large flying things up close and far away, but only a few astronauts have had the pleasure of seeing the Moon up close. (For more on the Moon illusion, see astronomer Phil Plait's explanation at <tinyurl.com/22qk39z>.)

The greatest illusion of all, perhaps, is the illusion that everything has been designed for a purpose. Clearly, the eye was designed for seeing, the ear for hearing, and so on through the entire litany of all things great and small. Before Charles Darwin and Alfred Russel Wallace in the 19th century asked what things would look like if they had evolved by natural processes, it was not apparent that things would look exactly as they do when one assumed a Great Designer in Heaven creating everything for a purpose.

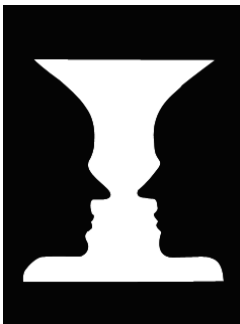


Figure 1

Most people have no trouble understanding that the same arrangement of dots on a piece of paper can be seen either as a vase or as two faces (**figure 1**), but many people don't understand that a purposeless universe would look exactly the same as one where every hair is counted and every event is planned down to the last detail.

Perhaps the greatest illusion is the illusion of having a soul. Could anyone tell the difference between two people, one of whom has a soul and one of whom doesn't? The logician Raymond

Smullyan created an interesting paradox in a short story called “An Unfortunate Dualist.” A depressed fellow wants to commit suicide and discovers a magic elixir that will kill his soul but leave his body functioning exactly as before. Smullyan adds another dimension to the idea that there would be no noticeable difference between a person with a soul and one without a soul. A friend of the depressed man sneaks in while the man is sleeping and injects him with the soul-killing elixir. The man wakes up, not knowing he has no soul, goes to the drugstore and buys the elixir. He takes it but doesn’t notice anything different. “Doesn’t all this suggest,” asks Smullyan, “that perhaps there might be something just a *little* wrong with dualism?”

Today, the generally accepted opinion among most neuroscientists is that the mind is the brain in action and the human brain is the result of millions of years of evolution. Critical thinking is something the evolved human animal does. When we reflect on our thinking, we must take into account how the brain evolved. Usually this involves assuming that the modern brain is the result of tens of thousands of years of adaptations to the environments which our human—and even our pre-human—ancestors found themselves in. To think critically is to be aware of the effects of these adaptations on the way we experience the world as we try to make sense out of our experiences. Nature has driven us to think in ways that benefit our chances of survival and reproduction. These ways of thinking may not lead us to care much about the truth. They may, in fact, drive us to prefer the “palpably not true” to the “truth as science finds it.” It sure seems that way when one takes in the landscape that is belief in America about the origin of species and the known universe. The methods of science alone, the inventions, the discoveries, the unimaginable growth of understanding about the workings of the human body, disease, and health; the almost daily discovery of something wonderful about the stars, planets, earthquakes, birds, oceans—the list is nearly endless—should make even the most otherworldly heart among us swell with pride

and enthusiasm, with joy and exuberance. Yet, as in the darkest of the Dark Ages, we find millions of Americans actively denying the beauty and wonder that science pours out from every pore of its still steaming body born only a few centuries ago. The high priests of religious fundamentalism and literalism would have killed science in its crib and declared that they alone are the protectors of mankind. The dualist tells us that we have souls that live on as immaterial spirits after the body has died and decayed. If the fundamentalist dualist stopped there, we might engage him in some sort of dialogue. But he will not stop there. He must go on to claim that everything science tells us is wrong—unless what science tells us agrees with his interpretation of the Bible.

The religious literalists are not the only barbarians defending the gate who want us to admit that everything science tells us is wrong.. The so-called New Age folks have their own regiment in the Anti-Science Brigade. No scientist anywhere has any evidence of any such law as *the law of attraction*, *the law of similars*, or *the law of infinitesimals*, yet millions of people are absolutely sure of their reality. The so-called law of attraction is a throwback to the magical thinking that characterized the human species in its infancy. We readily excuse our early ancestors for believing that like cures like or that our mental disposition might attract similar external circumstances and events. It is only by selective thinking that one could delude oneself into thinking that if only I think positively then good things will happen to me and my cancer will go away. We might find some comfort in believing that bad things happen to us because we aren't living right. We might even find some science to support our belief. Sometime it is true that bad things happen to us (like lung cancer) because we aren't living right (we shouldn't have smoked cigarettes for all those years). But it is foolishness to think that everything that happens to us happens because of our attitude or frame of mind. Does anyone really believe a baby born

with cancer in the eye is born that way because of her attitude? We are asking for trouble and disappointment if we believe that we can make reality change just by willing it. Of course, it is obviously true that very little good will happen to you if you just sit on your hands and make no plans or don't devise ways to make things happen. That's not the law of attraction. That's a self-evident truth.

While we might excuse the magical thinking of those who devote their lives to such fantasies as the law of attraction, I can think of no excuse for those who risk their health and their lives—and the health and lives of their children—by putting their faith in homeopathic “medicine.” This “medicine” is nothing but water. Using homeopathic water is on par with using water from some holy well: both are just water and have no inherent medicinal properties. You can no more give water the power to heal by shaking it vigorously after diluting something in it until nothing is left but water than you can by waving your hands over a flask and uttering an incantation in Latin or any other tongue. At least the believer in the healing power of holy water from sacred places rests her belief on *faith*, rather than on some fanciful law that has never been observed by anyone. Samuel Hahnemann (1755-1843), the father of homeopathy, came up with his dilution idea prior to our understanding of atoms and molecules. We might excuse him for his ignorance. There is no excuse for anyone today not to know that when you dilute a substance 100 to 1 and do so 30 times there isn't a single molecule left of the original substance. Hahnemann's other unscientific notion—that like cures like—might be excused as another throwback to the early days of human evolution when the brain had little knowledge in its memory banks and functioned mostly by trial and error. But thousands of years of experience have taught those who care to know that there is no scientific basis for the belief that like cures like. There is no law of similars and to believe so is to believe something that is palpably not true.

We know that many people feel better and get better after taking homeopathic remedies despite their lack of scientific merit. We also know why they feel better or get better after visiting the homeopath (or any of a number of other non-scientific healers). We know that homeopathy, prayer, faith, and dozens of other unscientific practices can and do have salutary effects on many people. Many scientific studies have shown that people who get better after a treatment for some ache, pain, or disorder often do so for reasons other than the medicine or active treatment given. Many of us have given credit for our recovery to a medicine when in fact the problem went away because of spontaneous improvement or we mistook a fluctuation of symptoms for the end of our troubles. Most illnesses don't kill us; they resolve themselves in a week or two. Many studies have shown that sometimes when one group of people is given a placebo (an inactive substance like starch or water), they do just as well as another group given medicine. This is true not just for homeopathy, but for science-based medicine as well. Many kinds of pain, especially back pain, come and go. We are likely to seek some sort of alternative treatment when things are at their worst, which is exactly the time that things will start getting better on their own. Scientists call this *regression to the mean*. We often forget or don't give credit to some additional treatment that may have actually been the cause of our relief. Weirdly, scientists have even found that some people out of politeness or a desire to please their homeopath (or whomever) say they are feeling better when they really aren't feeling better. We also know that patient expectation and healer suggestion play a role in how we feel after a treatment. We know that such things as belief, motivation, and expectation can have the same kinds of physical effects as, say, morphine. We call these effects "placebo effects." It is a near certainty that "battlefield acupuncture" in place of morphine for wounded soldiers works this way. Some scientists think that the effectiveness of Prozac and similar drugs for depression is

due almost entirely to placebo effects. Scientists have found that the bodies of dogs, as well as the bodies of humans, can be conditioned to release such chemical substances as endorphins, catecholamines, cortisol, and adrenaline. One reason, therefore, that people report pain relief from both true acupuncture and fake acupuncture may be that both are placebos that stimulate the opioid system. (See [Appendix C](#).)

Some people think that the fact that alternative medicine is placebo medicine means we should be promoting placebo medicine. After all, who cares *why* homeopathy or acupuncture works? What matters is that they *do* work. No, what matters is *why* anything works. If scientists can tease out the various causes of relief that are not due to active medicine or treatments, then maybe they can devise better ways to deliver medicines that we know from scientific studies do work. More important, though, is the fact that we know these alternative treatments are not and cannot be effective for such things as preventing malaria or treating cancer. We also know that placebo opioid effects are not as strong or as long lasting as treatment with a real painkiller such as morphine. While it is true that you are not going to be harmed by homeopathy most of the time, it is not true that the reason you get better from taking a homeopathic medicine is due to some substance having been diluted out of presence and shaken vigorously.

Despite their apparent benefits, another harmful effect of alternative treatments is that patients can be misled by unscientific healers to imagine they are suffering from nonexistent disorders (e.g., allergies and poisoning from “toxins” such as mercury in dental amalgams) and then provided treatments for their imaginary problems. The patients in such cases know they’ve suffered and know they now feel better. It is only natural that they would conclude that their phony healer is the real thing. Our brains have evolved to make such connections. It is not natural to mistrust our brain, so it is understandable why so many of us make erroneous causal

connections. We're hardwired to do so and it takes a lot of reprogramming of our brains to overcome these natural tendencies. This reprogramming is called *education* and *learning*. And the part of education and learning that is most relevant here is called *science*. If thinking scientifically were natural to our species, it would not have taken so long to get where we are and there would not be so many people who are resistant to science.

Yet, even some of those who are not resistant to science have hindered the efforts of scientists to educate the public about the wonders of the world around them. There exists a band of scientists who, while doing science, echo the notion of the religious fundamentalists and New Age gurus that everything science tells us is wrong. Many of these scientists go by the name of *parapsychologist*, an accident of history that has done no favor to the legitimate science of psychology. Many others go by no special name, but they loudly and proudly describe themselves as "alternative." For those who must know more about these characters, Google any of the following: "alternative physics," "alternative history," "alternative archaeology," or "alternative medicine." We can't deny the wildness of the imaginations roaming these alternative fields. Nor can we deny their disdain for logic, their penchant for selective use of evidence, and their admirable ability to get their ideas into digital letters and pictures for consumption by hordes of people craving ever wilder tales that have little scientific merit. These alternative thinkers and their followers seem to consider their rejection of "mainstream" science—i.e., science!—worthy of a badge of courage. They give skepticism a bad name.

The "alternatives" aren't the only ones giving skepticism a bad name. There are two other platoons marching with the Anti-Science Brigade: the *denialists* and the *contrarians*, neither of which should be confused with the lone scientist working away on an idea that conflicts with the consensus of his fellow scientists. For an example of the latter, we need look no further than the

2011 Nobel Prize winner in chemistry, Daniel Shechtman. He claimed to have found a new crystalline chemical structure that seemed to violate the laws of nature. In 1982, Shechtman discovered what are now called “quasicrystals.” Such structures were thought to be impossible, but there they were. Shechtman says when he persisted in the idea he was thrown out of his research group for bringing shame on them. The discovery “fundamentally altered how chemists conceive of solid matter,” the Royal Swedish Academy of Sciences said in awarding Shechtman the \$1.5 million prize.

The denialists and contrarians will never be awarded anything like a Nobel Prize, for reasons that will become obvious. Denialists deny what most scientists think is true. A denialist often gives a long list of twisted facts and brings up things that might be true, while leaving out many facts. For example, denialists have twisted the facts and left out many things to show that cigarette smoking is safe, that evolution is a hoax, that vaccinations are not safe, that 9/11 was a plot by the Bush administration, and that the Apollo Moon landing was a hoax.

Contrarians demand absolute certainty before they will accept something as true. Never mind that hardly anything is absolutely certain, contrarians only worry about this when their personal ox—often this ox is a political animal that looks like an elephant or a donkey—is being gored. A healthy skepticism doesn’t require us to reject claims unless they are absolutely certain. Some claims have been proven beyond a reasonable doubt. Scientific skeptics know that most scientists could be wrong about such things as global warming, cigarette smoking, and vitamins. But when the majority of scientists agree, for example, that the evidence shows that cigarette smoking causes lung cancer or that human behaviors are contributing to global warming with potentially devastating consequences, the scientific skeptic doesn’t reject the claim simply because there is some possibility that some study in the future will show that they’re wrong. Nor does a scientific

skeptic agree with those who consider such things “controversial” because they can find scientists who disagree with the consensus.

Philosophy and Science to the Rescue....sort of

It wasn't that long ago that the philosopher René Descartes (1596-1650) was certain that critical thinking would lead us to absolute certainty about all the things that matter. David Hume and Immanuel Kant burst that bubble in the eighteenth century. Today, we accept it as fact that the best we can hope for in most of the things that matter is some degree of reasonable probability that what we believe is true. When I speak of “we” I mean those of us who are not part of the Anti-Science Brigade. Mathematics and formal logic may prove some things once and for all, but all the other sciences and most of the thinking we do in everyday life must be tentative. The Anti-Science Brigade will have none of it. Their pernicious deeds are many, but the ones that should anger us the most are those that proclaim it is only fair to teach their stories (which they hold as absolute truths) alongside whatever science is being taught. Where we teach evolution, the Anti-Science Brigade says, we should teach creationism. It would be un-American to do otherwise. Nonsense! We will not teach alchemy alongside chemistry, numerology alongside algebra, nor astrology alongside astronomy. Nor should we teach creationism alongside cosmology or evolutionary biology.

Philosophers from the time of Socrates to the present day have been in the forefront of offering incisive criticisms of what most people instinctively believe. It was not that long ago that many philosophy teachers considered themselves the best equipped profession for teaching critical thinking to the next generation. That notion is no longer sustainable. Along with

traditional epistemology, we must recognize that psychology (including social psychology, behavioral economics, and evolutionary psychology) plays a fundamental role in any attempt to guide ourselves or others in critical thinking. Our first guide must be recognition of our biological limitations. Psychologist James Alcock put it this way: “The true critical thinker accepts what few people ever accept—that one cannot routinely trust perceptions and memories.” We might formulate this into a guiding principle: *Trust no one, not even yourself*. Of course, if we stop there and take this principle too literally, we will get nowhere. We can’t live as social creatures without some good measure of trust in our fellow citizens. Nor could we survive if our senses and memory weren’t reliable to a high degree. To think critically, we must examine how we come to believe anything or accept any action as reasonable or right. We must study the pitfalls and hindrances that prevent us from arriving at rationally defensible beliefs and actions. And we must learn to avoid those pitfalls, recognize the hindrances, and find ways to overcome them. This job is painfully difficult and it is made all the more arduous by being surrounded by members of the Anti-Science Brigade.

Overcoming our natural overconfidence in our memories and interpretations of experience goes against the grain. It’s unnatural to challenge ourselves about things that seem obviously true to us. But if we want to know the truth about things, rather than just be certain about them, then we will have to practice some unnatural acts in public. Nothing conflicts with our natural inclinations more than critical thinking. Truth attracts us when it brings comfort or security, releases tension, or arouses some pleasurable feeling. But truth is often indifferent to our well-being and is often not as attractive as a comfortable falsehood.

You and I evolved to deceive ourselves and to deceive others. Caring enough about the truth to pursue it does not come naturally to most people. But even those who commit themselves to a

lifelong pursuit of fair-minded, reflective inquiry will never succeed at becoming a perfect critical thinker. No matter how open-minded one becomes, you cannot know whether you have overlooked something relevant and important. You can never know whether you're deceiving yourself and basing your decisions or conclusions on desires rather than evidence. You do not become a critical thinker by admitting you might be wrong or declaring that you hold your beliefs tentatively rather than absolutely. Even tentative beliefs can be arrived at uncritically, without fair-minded or reflective thought.

A critical thinker examines all the relevant data, but in any given case you never know whether you have all the relevant data. In some cases, such as politics, you know you don't have access to *all* the relevant data.

How many people want to begin studying something that cannot promise them unqualified success and which can almost guarantee frustration? If you do not become frustrated because of the many obstacles that stand in the way of your success as a critical thinker, you will be frustrated by the lack of interest in critical thinking by many of the people around you. Even worse will be the contact you will inevitably have with many who are demonstrably hostile to critical thinking. Many of them will fancy themselves excellent thinkers, rational to the core, brimming with self-confidence, and absolutely certain that they have the truth and you don't. Most of us take our sensory experiences as unqualified reflections of reality. Or worse, we think that having "faith" in some set of claims gives us a special dispensation to avoid defending our beliefs. Most people have little or no skepticism about their perceptions or memories. Skepticism is a skill you must develop. We are not born—nay, we *couldn't* have been born—mistrusting our senses and our memories. Our survival depends on us not being skeptical, critical thinkers. This fact leads many of us to mistakenly think we cannot be deceived about what's right before our

eyes. In the end, many of us will come to identify good thinking with confirming our biases. We will be pleased with ourselves as we find that the more we learn the more we learn we were right all along! Yes, as long as we ignore or demean all the evidence against us, we'll find that the world keeps unfolding along lines that fit nicely with our beliefs and prejudices.

So why would anyone strive to become a critical thinker? You'll be an outcast, perhaps. Few parents will say *I am so proud of you for challenging me!* Those in power aren't likely to encourage you to question their decisions. Most of your teachers won't praise you for what they may see as subverting the status quo and challenging their authority.

You might deduce from what you have just read that I am more cynical and pessimistic than Mencken was. But wait; there's more! I have to confess to what I consider my greatest illusion or delusion, call it what you will. In any case, I have tried for many years to come to terms with the fact that the preponderance of the evidence indicates that there is no such thing as free will. Yet, I can't accept the idea that all our thoughts and actions are determined by causes over which we have no control. I can't accept the idea that nobody is responsible for his thoughts or actions. Our natural inclination and belief is to think we are free and responsible for our actions, except in those obvious cases of brain or neurochemical damage or where we are coerced into doing or saying things. Unfortunately, the world would not be experienced any differently were we not free to choose one path rather than another. The sum total of the evidence from the sciences seems to overwhelmingly support the determinist hypothesis, yet I can't accept it. We've evolved to think of ourselves as free agents, and overall I think this has worked out pretty well for us. In any case, most of us recognize that some people have more constraints than others due to brain damage, psychological trauma, or mental illness. We also recognize that some of us have more constraints than others due to age or mental feebleness. And some have more constraints

due to fewer opportunities. But very few among us can take seriously the idea that we should not hold anyone responsible for anything since there's no free will.

In any case, whether you are free or determined, I'm going to present you with arguments that you will either agree with or not find compelling. Whether either of us is free to do what we do seems beside the point and of no consequence to the issues I'll be covering. Either my words will have a causal effect on your thinking or they won't. If they don't it may be because you already agree with me or it may be because you freely reject my arguments. I don't see any way to tell the difference between being causally moved to agree or disagree and freely choosing to agree or disagree. If we can't see a difference, does it really make any difference which is true? I don't see why it would.

Whether we're free or not, there will be consequences from choosing to pursue a life of critical thinking. You are very likely to end up standing out as one against the many if you devote yourself to the pursuit of reasonable beliefs and actions. You will be in a minority, to be sure, but a minority you can take pride in belonging to.

So, with that optimistic little introduction laid out, here is what is in store for you in the following chapters.

2. Critical Thinking: How To Lose Friends and Alienate Your Neighbors

Critical thinking requires that we be open-minded, skeptical, and tentative in our beliefs. Why be open-minded, skeptical, and tentative when we're surrounded by close-minded sheep who know what they know and know that what they know is right? In this chapter, you'll find out why you will be disliked, perhaps even hated, for critical thinking. While society may benefit from having many critical thinkers, individuals who think critically are often marginalized or

silenced. Finally, as this is a book about critical thinking, it might be of value to define what we mean by that expression. There is probably no need for it, but I will remind you again of why critical thinking is an unnatural act.

3. Believing is Seeing: Trust No One, Not Even Yourself—Especially if You Find Meaning in a Dirty Diaper

This chapter explains why you can't trust anyone, including yourself. If you start seeing Jesus or Mary in a dirty diaper, it is time to re-examine your trust in your senses and how you interpret experience. We're driven by processes we don't understand but which lead us to find meaning and significance in things that have no meaning or significance. Most of us don't know how to evaluate odds properly, so we think things couldn't possibly be coincidental when they are. We see patterns where there are none and then call in the press to spread the good news.

4. Extraordinary Renditions and Graphic Illusions in a Vaguely Familiar Universe

It is hard to believe but it is true that some members of our species use language to manipulate thought and behavior. (Just kidding, of course. This is *not* hard to believe, unfortunately.) These are the doublespeak experts. They try to persuade us that something bad is really good or that we can be unique and special if we buy the same thing they hope everybody else buys.

Advertisements have tried to associate a healthy lifestyle with smoking: light up a Salem after you climb the Alps or a Benson & Hedges after a game of racquetball. The critical thinker must know how to frame the debate so your opponent can't possibly win. The pen really can be mightier than the sword if you know which words to use. If you're clever, you can mislead others with pictures and diagrams just as effectively as with words.

5. Driving an Edsel to the Bay of Pigs

Why is it that groups of highly intelligent people often make bad decisions? In this chapter, we'll discuss the disastrous role of *communal reinforcement* by team players who toe the line. We'll look at what successful companies have in common when it comes to making good group decisions and what groups that make bad decisions have in common. (In case you are wondering about the title of this chapter: Ford Motor Company's decision to produce a metallic monstrosity it named after Edsel Ford and President John F. Kennedy's decision to invade Cuba are often cited as examples of disastrous decisions due to groupthink.)

6. Reliable Sources of Confusion, Collusion, and Spam

Sifting out reliable and useful information from all the sexy garbage thrown our way by the mass media, politicians, scholars, scientists, talk show hosts, bloggers, and so on, is becoming nearly impossible for the average person. How do you tell who's likely to be providing reliable and accurate information? How do we cut through the propaganda, the advertising, the hype and speculation of the mass media, the information and misinformation overloads? Experts on every subject under the Sun seem endless. With so many claims made by so many people, the critical thinker has a problem: Who do you trust? Who can you believe?

7. Seductive Stories and Varieties of Scientific Experience

A good story trumps a dozen scientific studies. Anecdotes can be powerful persuaders but there are several reasons why they are not compelling evidence to a scientist. In this chapter, we'll review the main reasons anecdotes are not good evidence and what we hope to accomplish

by doing scientific tests to determine whether the implications of anecdotal evidence pan out under controlled conditions. We'll see how easy it is to deceive ourselves and make mistakes in causal reasoning. We'll describe how scientists try to minimize self-deception by using randomized, double-blind controlled studies when possible.

8. The Fallacy-Driven Life

This chapter will focus on fallacies in reasoning—those errors others are always making! The two main errors in reasoning, in my view, are the selective use of evidence and giving improper weight to evidence. I'll review the popularity of irrelevant appeals, the commonality of slanted, selective, biased, one-sided, incomplete arguments. There are many “truths” in the arsenal of the fallacy-driven crusader: the straw man, the false dilemma, begging the question, the non sequitur, to name just a few.

9. Are We Doomed to Die with Our Biases On?

Most of us believe many things that are probably not true. Why? Is it advertising? Television? Laziness? The power of the media or our parents and teachers to brainwash us? Do our brains naturally lead us astray? Is there something in the way we go about evaluating our experience and accumulating beliefs that misleads us? What hope is there that we can overcome our natural tendencies and become critical thinkers?

10. 59+ Ways to Develop Your Unnatural Talents in Critical Thinking, Skepticism, and Science

In this chapter, you will learn many ways you can expose yourself to an unnatural life and not be ashamed of it.

Order the eBook from Amazon (ASIN: B006ONRGT0). Visit the Unnatural Acts blog at <http://59ways.blogspot.com/>.