

**Religion and Science:  
Trying to Nail My Colors to the Mast**

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Paul Gauguin's haunting masterpiece, "D'ou venons nous? Que sommes nous? Ou allons nous?" painted in the closing years of his life in Tahiti, perfectly encapsules the three questions that I am obsessed with: Where do we—humans, dogs (to whom I feel a special kinship), planets and everything else—come from? Who are we? Where are we going?

I grew up in the warming comfort of a devout catholic family that offered one particular time-honored and reassuring account of life. Over the years, I began to realize that many of these traditional answers are incompatible with the modern worldview. This should not be surprising as the stories and myths that underpin religions formed at a time when very little was known about the size, age and evolution of the universe and the stuff inside it.

This conflict left me with a profound dual personality disorder. I educated my children in the faith of my fathers, we say grace for the food we eat, and we go to church. Yet outside these rituals, I don't give much thought to religious categories of sin, sacrifice, salvation, and the hereafter; instead, I reason about the world, people and their motivation in entirely natural terms. These two frameworks, one sacred and one secular, one for Sunday's and one for the week, don't intersect. One account provides meaning by placing my puny life into the context of the vastness of God's creation and his Son's sacrifice for us and a second one that explains facts about the actual universe I find myself in.

This is obviously not a serious intellectual stance. I harbor two, quite distinct, accounts for the sublunar and the supralunar world (to use an Aristotelian concept), instead of a single, integrated set of non-conflicting beliefs about what is but one universe.

My yearning for a resolution of this conflict is based on the core belief that there is a reality out there, independent of me, and that science is getting better and better at describing it. We are not condemned to wander forever in a Kantian fog, only knowing the surface appearance of things but never their true nature. De- and post-constructivism, the schools of thought that almost any description of the universe is as good, is as valid, as any other one, are not epistemological enterprises worth taking seriously. We can see something; and the longer we gaze, the better we see and understand.

It is only over the last months, as the arc of my life history begins its inevitable decline (I've just passed my 49. birthday), that I've put my views of the fundamental questions that touch upon both religion and science onto paper. For a scientist, let alone somebody who is concerned with the material basis of consciousness, to bare his feelings in this matter is no easy matter. It always comes with a whiff of the exhibitionist.

This essay contains both biographical elements that primarily throw light on my own situation, as well as musing of a more general nature. These should be of relevance to anybody who has ever wondered about things above and beyond the physical universe.

## 1 Tension between Religion and Science

For most people, consciousness can't be explained without talking about the soul and God. I am frequently asked "How can you study consciousness when you are not treating it as part of something much larger, as part of a transcendental reality? I know that you can't prove this with your science, yet it is true none-the-less."

Plato, the patriarch of Western philosophy, is credited with the concept of a person as an immortal soul imprisoned in a mortal body. He also argued that ideas have a real existence, as much as any object, and are eternal. These "platonic" views were subsequently absorbed into the New Testament. They form the basis of the classical Christian doctrine of a soul that will be resurrected at the end of time to live in ever-lasting communion with God. This will only come to pass if you are a righteous person (although a sincere attempt to live a righteous life may be sufficient after some sort of finite sentence in purgatory). If you committed mortal sins without atoning for them, your soul will experience the eternal torment of the absence of God—hell. Many passionately and profoundly believe this.

Indeed, fundamentalism, the uncompromising rejection of a liberal, humanistic and tolerant worldview in favor of a rigid adherence to religious core beliefs, is on the rise. This is as true for Christian fundamentalism in our own country as it is of the much more extreme Islamic variants. And more than ever, young men seem to be willing to kill themselves and others in the name of God. Not quite what Friedrich Nietzsche had in mind when he declared in delirious tones "God is dead!"

Contemporary academic books dealing with consciousness dispense with God and the soul in a mere aside. In a dismissive way, the author points out the obvious incompatibility of science with these antiquated modes of thinking "only diehard traditionalists unable to adapt to modern life need the crutches of a belief in an external agent to deal with their anxieties." What a far cry from the situation a few centuries ago, when books routinely carried the dedication "ad majorem dei gloriam."

The animosity between religion and science was exemplified by Francis Crick. He took it upon himself to rid the world of God, replacing super-natural explanations of life and of consciousness by ones firmly based on natural forces. He succeeded spectacularly in his first goal: he discovered, together with James Watson, the double-helical structure of the molecule of heredity, DNA, thereby ushering in the molecular age; he postulated the central dogma of molecular biology and led the effort to decipher the universal code of life. Only time will tell whether he made any serious inroads toward his second goal.

Francis's opposition to organized religion became legendary when he resigned in the early 1960s from Churchill College at Cambridge, following plans to add a chapel to the College grounds. He was of the opinion that in a modern university dedicated to the truth, religion had no place. When Sir Winston Churchill—in whose name the College had been founded—wrote to him, pointing out

that the money needed for the construction of the chapel was raised by private means and that nobody would be forced to attend chapel, Francis replied by proposing a fund for the construction of a brothel associated with the College: after all, nobody would be forced to take advantage of its services, it would accept men no matter their religious beliefs. With his letter he included a down-payment of 10 guineas. Understandably, this put an end to any further correspondence between the two.

By the time I knew Francis, his strident opposition had become muted. At dinner with his wife Odile in their La Jolla hilltop home, we had, on occasion, discussions about the catholic church, the papacy, their position on evolution, celibacy and so on. He knew that I was raised as a Roman Catholic and continued to sporadically attend mass, although by unspoken consent we never did delve into the basis of my faith. At the time, I would have been hard-pressed to rationally justify my behavior. I think he felt this and wanted to spare me the embarrassment of groping for an explanation, in particular as my faith did not interfere with our quest to understand consciousness within a strictly empirical framework.

In his 1994 book *The Astonishing Hypothesis*, Francis even admitted “Alternatively, some view closer to the religious one may become more plausible.” This startling concession was immediately neutralized by “There is always a third possibility; that the facts support a new, alternative way of looking at the mind-brain problem that is significantly different from the rather crude materialistic view many neuroscientists hold today and also from the religious point of view.” This was not an expression of political correctness; far from it. More than anybody else I know, Francis was open to new, alternative and even radical explanations provided they were consistent with established facts and were superior in some quantifiable manner.

## 2 Some Autobiographical Details

To put the following into context, let me tell you about my background. My father’s catholic faith sustained him throughout his life, including having to serve for 6 years in Hitler’s *Wehrmacht* and 2 years as a “guest” of the French government in a prisoner-of-war camp. When he met my mother more than half a century ago, she had recently converted from Protestantism to Catholicism. My two brothers and I were raised by them in the best liberal-catholic tradition, where science—including evolution by natural selection—was by-and-large accepted as explaining the material world. I was an altar boy, recited the mass in Latin, listened to the sacred music of Gregorian chants and Bach cantatas, and had to sightsee an endless number of baroque and rococo churches. We gazed in admiration at ceilings, stained glass windows, statues, and frescos depicting religious imagery while my mother read aloud, for the benefit of the entire family, the detailed history of each piece. While I found this forced diet of art excruciatingly boring—and can’t quite suppress a shudder even today when I see the three volume art guide in my mother’s bookshelf—I fell in love with the magical intonations of centuries-old roman prayers and the music.

Leaving home at 17 to study physics with a minor in philosophy in Tübingen in South-West Germany, I encountered the fellowship of a band of brothers at a fencing fraternity. If you are not steeped in Teutonic academic traditions, think of the US Marine Corps transposed to a romantic, 500 year old German university to get some idea of what I mean. It is intense. I also indulged in the pleasures and perils of alcohol, women, dancing, the writings of Friedrich Nietzsche and the music of Richard Wagner (roughly in that order). I was young, immature and nerdy and needed to take this voyage of self-discovery through the noisy and glorious confusion of life.

Thirty years later, I remain at university, albeit as a professor at the California Institute of Technology in Southern California, a superb ivory-tower dedicated to educating the best and brightest in the way of science and the pursuit of the truth. I am happily married for more than twenty years to a strong and lovely woman who keeps me grounded. Our son and daughter have grown-up and left. We miss them more than anything else in life. We do enjoy the company of a fluctuating number of big, boisterous and friendly dogs. And I find ecstasy in climbing mountains and walls.

This upbringing has left me with a yearning for the Absolute. And the recognition that the numinous can be found in all things, the smile of a loved one, the howling of a dog, the sight of the star-studded heaven, the contemplation of the periodic system, or in the pain of ice-cold hands during a windy climb.

On occasion, I have encountered a dark side to such musings. As a teenager, lying in bed at night, I would strive to grasp, to comprehend eternity. What does it feel like for time to be going on forever? What does it mean to be dead forever? Not just dead for a century, or a millennium; not just for a long time, or a really long time but forever and ever. A dizzying and terrifying notion. Or, to cite the incomparable Blaise Pascal, the 17-th century French mathematician—he invented probability calculus—physicist and philosopher:

When I consider the short duration of my life, swallowed up in the eternity before and after, the little space which I fill, and even can see, engulfed in the infinite immensity of spaces of which I am ignorant, and which know me not, I am frightened, and am astonished at being here rather than there; for there is no reason why here rather than there, why now rather than then. Who has put me here? By whose order and direction have this place and time been allotted to me? ... The eternal silence of these infinite spaces frightens me.

It is only ten years ago I finally realized, at the gut wrenching level, that death was going to come to me. This insight came to me abruptly: I wasted an entire evening playing an addictive first-person video game, running through eerily empty halls, flooded corridors and plazas under an foreign sun, pursued by hordes of aliens shooting at me. I went to bed and fell easily asleep. But then I suddenly awoke with the knowledge that I was going to die! Not right there and then but some day. I did not have any premonition of accidents about to happen, cancer, or so on—just the sudden realization that my life was going to end, sooner or later.

I pondered the significance of this for the next months, facing down an existentialist abyss of oblivion and meaninglessness within me. Eventually, however, I realized at some unconscious level that all is well! All would end well. There is no other way I can describe it; no mountaintop conversion nor any flash of deep intellectual insight but a sentiment that suffuses my life; I wake up each morning to find myself in a world full of mystery and beauty. And I am profoundly thankful to whatever God may be for the wonder of it all.

Of course, there are plenty of bad things happening. Natural catastrophes bring death and destruction. And all of us, to a smaller or larger extent, engage in evil acts out of thoughtlessness, selfishness, greed, lust, indifference, or fear, and sometimes even with the best of intentions. To the maximal extent possible, we must prevent or, failing that, lessen the impact of the terrible suffering in the world. I am no Dr. Pangloss proclaiming that we live in the best of all possible worlds. The world badly needs improving, but human goodwill and ingenuity is, in principle, up to it.

Here I am, a highly organized pattern of mass and energy, one of about six billion, insignificant in any objective accounting of the world. And in a short while this ‘I’ will dissolve and will cease to exist. What am I to the universe? Practically nothing. Yet this dissolution makes my life more significant. My passion for life, for my family, my love of dogs, running and climbing, books and music, the cobalt blue sky, are meaningful *because* all of these will come to an end one day. And that is as things should be.

I do not know what will come afterward, if there is an afterward in the usual sense of the word, but whatever it is, I know in my bones that everything is for the best. I don’t know why. I can simply state the fact of the matter. How can this intuitively but strongly felt belief in a meaningful universe be reconciled with science?

This sentiment is tied in with my overall sunny and optimistic disposition. It is probably largely determined by genetic factors, amplified by the benign circumstances I grew up in. I can’t take credit for either. Let’s step back and consider the cardinal questions of religion, “does God exist?” and “can he intervene in the universe?” from a less idiosyncratic and more universal perspective.

### 3 Deism or God as the Divine Architect

The greatest of all existentialist puzzles is why there is anything rather than nothing. Surely, the most natural state of being is for there to be nothing. Cosmology has chased this question down to the point of creation itself, the unimaginable fiery Big Bang about 13.5 billion years ago (this is a really long time: more years than there are seconds in the life of a centurian).

But here—despite the best efforts of Stephen Hawkins and other cosmologists—physics is stuck and meets metaphysics. Who or what set the conditions for the initial singularity, when the entire universe was compressed into a single point of infinite density? If *ex nihilo nihil fit* (from nothing

comes nothing<sup>1</sup>), applies to the universe as a whole as much as to anything in it, then it had to be born from something. The same is true of the laws governing the universe, quantum mechanics, electrodynamics, and general relativity. Are these the only laws that can exist? That is, are they necessary, or could they universe have obeyed other laws? Is a universe that does not obey quantum mechanics viable?

One rational explanation is a demiurge, a Supreme Being, who created the laws of physics and who set up the initial Big Bang. These gave rise to a stable universe with sufficiently diverse chemical elements to support life. After this initial act of creation, the divine architect left the cosmos to its own devices, free to evolve by chance and necessity. Eventually creatures arose from the primeval slime who built temples to praise God. This is the *Creator* or *Divine Providence* that the American Declaration of Independence speaks off. Thomas Jefferson and Benjamin Franklin, among others, were deists, as a belief in such a naturalistic God is called.

Science gives a valid description of the way things move about, interact with each other, and change from one form into another. That the physical world of galaxies, stars, planets, cars, billiard balls, atoms and the zoo of subatomic particles act in a regular manner that can be captured by mathematics and that can, therefore, be predicted is nothing short of amazing. Indeed, some physicists and mathematicians—most famously Albert Einstein—believe in a creator precisely because of this “miraculous” state of affairs. After all, it is easy to imagine a universe that is not comprehensible at all or a universe so complex that it can’t be understood by the human mind. But the deist’s God created a universe not only hospitable to life but also so predictable that its regularity can be apprehended by the human mind.

Yet we search in vain for direct empirical evidence, for hard data that can be analyzed in an objective manner that speaks to the existence of an eternal being above and beyond natural forces. God does not leave any residue in our test tubes nor tracks in our bubble chambers.

God can’t be forced to reveal himself through logic either. As the philosopher Immanuel Kant already argued, all proofs (the ontological one, the teleological one, the cosmological one) of the existence of God are flawed. No chain of bullet-proof arguments leads from unassailable propositions about the universe to the conclusion that God must, of necessity, exist (nor the opposite).

This should come as no surprise to any student of Kurt Gödel’s celebrated (first) incompleteness theorem: any mathematical system of sufficient complexity contains statements that are neither provably true nor provably false. Of course, this was formally developed in the context of mathematical yes-no statements. But if it is true for such simple statements, it is even more likely to be relevant to the question of God’s existence.

A new twist to debate was introduced in 1973: the *anthropic principle*, the observation that the universe is very friendly to carbon-based life. If many of the physical constants and parameters

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<sup>1</sup>By nothing, I don’t mean empty space, the vacuum that has proven to be quite fecund in the hands of the physicists. I am referring to the absence of anything: space, time, matter, energy. Nothing, *rien, nada, nichts*.

that govern the cosmos would be slightly different, life couldn't exist (in that sense "anthropic" is a misnomer for the principle does not refer to human life; rather, it should be called the biotropic principle).

Take the force of gravity. In order for life as we know it to form, gravity must be  $10^{40}$  times weaker than electromagnetism. And the number of positively charged particles must equal in charge the numbers negatively charged particles or else electromagnetism will dominate gravity, and stars, galaxies and planets can't form. The numbers of electrons must equal the numbers of protons to better than one part of  $10^{37}$ . If the strong nuclear force would be slightly stronger or weaker than either nothing but hydrogen would exist or no elements heavier than iron. If the universe would have expanded too rapidly then protons and neutrons couldn't have bonded into atomic nuclei. If the expansion would have been ever-so-slightly smaller, everything is too hot for nuclei to have formed. In short, an amazing number of coincidences have to occur to give rise to a universe that is stable for a sufficient long time and diverse enough in elements to support complex, carbon-based life forms.

This itself is not controversial. Indeed, one faction argues that this observation is trivial and tautological. Clearly, for humans to be in a position to ponder the existence of the universe, it had to be friendly to life, since humans wouldn't be around otherwise (selection or observer bias).

A much more interesting interpretation is that the universe is fine-tuned to support life, echoing the argument made two centuries earlier by the Anglican priest William Paley for inferring an intelligent watchmaker upon finding a watch when strolling over the heath. And thus the Supreme Architect reveals his handiwork!

The anthropic principle has triggered a lively debate that shows not signs of settling down.

Ultimately all such arguments for the existence of God are undecidable. What remains is belief. Neither empirical knowledge nor logical certainty. That is the universe we find ourselves in.

Why would the universe be constructed in this manner? Why doesn't God reveal himself by a thundering voice from the sky or by a burning bush? Ah, there's the rub; one of theology's perennial questions. Maybe he can't because nothing escapes the tyranny of physics? Maybe he won't because we live in the best of all worlds compatible with human freedom? Maybe because without any direct material manifestations, a belief in God requires an act of faith, an existentialist commitment not justifiable by facts. "I believe, freely and without due cause, that a benign God exists." A question with many answers.

## 4 Theism or Can God Intervene in the Universe?

So what power does God have? Can the Supreme Being intervene in his creation? After all, people do pray in the expectation that God can and will listen to them—provided that their intentions are pure and their belief sincere—and that he will intervene on their behalf to cure a sick child, steady

a rocky marriage or make them accept with equanimity the loss of a loved one. If God is unable to do any of these things, why bother (except for such practical psychological benefits as relaxation)?

So is science compatible with an activist God who intervenes in the universe (this is called theism)? How would he, she or it (for the entity we think of as God would not be subject to the dictates of any one particular gender with all the attendant characteristic of the XY sex gene; this is simply how people, historically, conceived God to be) influence the course of events in the world?

When something outside the universe, not subject to the normal rules of space, time or causation, does something inside the universe, people speak of a miracle. So the question needs to be rephrased as whether miracles are compatible with science. The unambiguous answer is no.

Take Jesus' first public action, turning water into wine at a wedding in Canaan. What was water suddenly, inexplicably and without further ado, changed into wine. This runs counter to a fundamental scientific principle, the conservation of energy and mass. The aromatic and ether molecules making up the wine had to come from somewhere. Converting some of the H<sub>2</sub>O molecules into carbon and the other atoms is a feat of nuclear synthesis that initially requires and then releases prodigious amounts of energy (for example, the trigger for the conversion of hydrogen fuel into helium that occurs in an hydrogen, fusion bomb is an atomic, fission bomb). But Jesus never dabbled in nuclear engineering and nothing like it was reported in the new testament.

Every time this conservation principle is tested, it is found to be sound; from the infinitesimal small to the unimaginable large. It is therefore extremely unlikely that this miracle took place; the more likely explanation is that the wedding organizers discovered flasks of wine in the basement that had rested there forgotten, that a guest brought the wine as a gift, that the story was made up to cement Jesus' reputation as the true Messiah, or some other such explanation.

Some miracles may admit to a scientific explanation based on psychological or psychosomatic factors. When reading the accounts of the four Evangelists, one feature stands out. That whatever else Jesus was, he must have had an amazing charisma, a powerful ability to influence people around him and what they perceived. So it is possible that his audience "believed" Lazarus to be dead and that Jesus brought him to life again. This is possible. But miracles that violate the natural order of things is not in the cards; not within the framework that has served us so well in describing the material universe around and within us.

The fabric of everyday reality is woven too tight for it to be rendered asunder by extranatural forces.

Maybe God is condemned to be passive, subject to the laws of the universe he brought about, powerless to perturb its course, unable to influence its fate, an absentee cosmic builder.

Of course, God may intervene in a more subtle manner There is a lot of uncertainty, of randomness, in the world. Both at the subatomic level as well in the everyday world of people and toasters. Maybe this is where God's handiwork takes place.

In the microscopic, quantum world, uncertainty is endemic. This is what *Heisenberg's* uncer-

tainty principle is all about. It states that the position and the velocity of an electron or other thing cannot be determined, in principle, at the same time. It is possible to measure the electron's position very accurately but then its speed fluctuates widely or vice versa. We can only know both within a margin of error. This fuzziness is built into the very fabric of the cosmos and can't be eliminated with any instrument.

Probably more important for wet brains at room temperature are fluctuations of the myriad of ceaselessly moving molecules suspended in water that make up all bodies and that is the manifestation of temperature. Except at absolute zero, this thermal motion never stops and makes precise predictions impossible.

Both quantum and thermal uncertainty are amplified by chaos, the modern discovery that the evolution of even simple and fully deterministic systems becomes ever more difficult to track the further into the future one tries to predict their course. The farther one strives to look, the denser the fog becomes. This is what makes predicting the weather beyond a week or so essentially impossible. The dream of the Marquis de Laplace, "that to a sufficient powerful intellect with precise knowledge of the current state of the universe, its future would be an open book" is an impossible one. Nobody can know the *precise* state of affairs. Indeed, the paragon of predictability, the solar system, is chaotic: physicists can't tell with certainty on what side of the solar system, relative to Earth, the planet Pluto will be in a few hundred million years from today!

At the organismal level, uncertainty shows up in unpredictable actions. Biologists and psychologists tame this bothersome, random aspect of reality by dealing with average or "typical" behaviors, determined over the course of hundreds of trials. In a laboratory setting, a rat is likely to turn right in the maze, toward the cheese, or a volunteer is likely to press the left button signaling perception of the stronger image. Yet on some trials, both the rat and the person do the opposite. The mathematics of random processes doesn't predict what will happen on the next trial, only what is likely to happen.

This is where God may interfere with his creation, unbeknown to our prying eyes and measuring devices. Like a financier manipulating the stock market without leaving any trace, placing a small bet here and there, but never in large enough amounts to attract attention. God could adjust synaptic release probabilities here and ionic channel openings over there, enough to affect the actions of the organism, yet without leaving an overt material trace, carrying out the hidden work of the Spirit.<sup>2</sup>

Whether microscopic interventions by something outside the physical universe can be cloaked or camouflaged as quantum indeterminacy or chance may be another Gödelian question that can't be answered in an empirical manner, but depends on *a priori* metaphysical assumptions.

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<sup>2</sup>A closely related proposal is at the heart of the dualist mind-body theory of the neuroscientist John Eccles and the philosopher Karl Popper. The "conscious mind" interacts with the physical brain by manipulating synaptic release probabilities in a manner impervious to the dictates of the iron law that energy cannot be created or destroyed. To say the least, the science community has not looked kindly on their proposal.

## 5 Occam's Razor Doesn't Cut Deeply Enough

Scientists love “Occam's razor”. Named after the 14-th century English friar William of Ockham, this principle states that of equally good explanations for a phenomenon, the best one is the simplest, explanation that accounts for all the facts. It is one of the basic laws of deductive reasoning.

When reconstructing an anomalous event, a murder or an airplane crash, investigators can't determine with absolute certainty what happened. But this principle of parsimony narrows down the options. Occam's razor slashes hither, eliminating the unknown assailant with no apparent motive who left no physical trace but who, so claims the defense attorney, was responsible for the murder. Occam's sharp blade decimates the theory of the secret government conspiracy that brought down the airplane but that necessitates a very convolved and unlikely chain of events and the active participation of large number of people. Occam's razor is an invaluable tool, eliminating superfluous entities from our consideration.

The possibility of a supreme intelligence interfering through minute perturbations with the universe appears so unlikely, so outlandish, that many prefer the seemingly simpler explanation of pure chance, Lady Luck. Yet while Occam's razor is sharp enough to deal with all phenomena under the sun, its blade becomes dull when trying to cut into a reality beyond nature. We simply do not know how to assess the associated *a priori* probabilities. The minimalist approach inherent in Occam's way of reasoning doesn't cut deep enough to reveal the transcendental aspects of reality.

There is no way of knowing whether this principle works at the level of the entire cosmos. Why should the simplest explanation be the most valid one? Who's to say that the true nature of things is simple? As we can observe but one universe, any stance we take can't be justified in an absolute way (for instance, by referring to the “typical” universe).

## 6 Can Revelation and Scripture be Helpful?

Traditionally, the most important source of knowledge of the transcendental is from revelation, from the direct, first-hand experience of God. The encounter of Saul, persecutor of early followers of Jesus of Nazareth, with the living God on the road to Damascus turned him into the apostle Paul, Christianity's greatest missionary. Pascal—I cited him already—likewise experienced God in this manner. A description of this searing experience was found on a parchment sewn into the lining of Pascal's coat. The writing of saints or mystics from all religious traditions is full of personal encounters with the Absolute and the feeling of oneness with the universe.

If I had experienced God in this manner, I would not be writing these lines. I would be burning with the conviction of the direct experience of Him! I wouldn't have to resort to inadequate reason to figure things out.

Since I only have reason to fall back onto, I admit to skepticism when considering the ontological

(but not the psychological) validity of such intense life-changing experiences. As a husband, father, son, brother, friend, colleague, scientist and citizen, I continue to be amazed by the ability of people from all walks of life to fool themselves, to live with illusions. You and me are convinced that our motives are noble, that we are better or more successful than most, that the opposite sex finds us attractive, and that we are righteous. Yet to anybody else who knows us well, these beliefs may be patently false. We have the most intricate psychological defense mechanisms to allow us to retain beliefs dear to us, in spite of contravening facts.

As a youngster I wondered how muggers, rapists, or murderers could live with themselves knowing that they were evil. Reading trial transcripts or the diaries of war criminals makes it clear that most perpetrators have a far more benign view of themselves. Creativity knows few bounds when it comes to rationalizations for their criminal acts: “I had to do it since it was him or me,” “She asked for it,” “It’s their own fault” or “This is justifiable payback for ....”

Nobody is immune from self-delusions. Just listen in to the conversations at any large family gathering and you’ll see what I mean. That’s why the adage of Western philosophy, “Know thyself” requires a life-time of commitment. It ain’t easy brother (and never mind outright lying).

As Freud and his disciplines realized, these suppressive mechanisms are hidden from the conscious mind. The propensity to interpret any event in light of what we want to believe is exactly why double-blind experimental protocols are so essential in science and medicine. To rule out that the experimentalist’s hidden biases contaminate the result.

Given these uncomfortable fact about human nature, I am doubtful that intense religious experience, although no doubt genuinely felt, reveal something about the actual existence of God. Too much is at stake for people to be objective. I do not deny the possibility of such experiences (and their neuronal correlates in the medial temporal lobe are a fascinating topic of ongoing research) but am wary.

My wariness increases when turning to another traditional source of religious thought, scripture. The idea that the experiences and thoughts of men thousands of years ago—before the true age and extent of the cosmos were even remotely imagined, before the evolutionary bonds between humans and animals were understood, before the brain was identified as the seat of the mind—could be relevant to the modern quest for understanding the universe and our place in it strikes me as quaint.

The observation that different societies and cultures have quite different scriptures and traditions that usually conflict with each other does not increase my confidence in these received “truths”. On what basis should I choose one religion over the others? The vast majority of humankind believes what their parents believe. But that is not a truly informed choice.

The Old and New Testament, the Koran, and other foundational texts are poetic, inspirational and insightful about human needs and desires. They provide the ethical foundations that have guided individuals and societies for the past millennia. Yet biblical exegesis and theologians such as Hans Küng emphasize that religious writings must be understood within their particular historical

and socio-economic context. As we learn more, the relevance of these sacred texts to the modern world lessens.

Today, we deal with ethical quandaries not faced by previous generations: there is an urgency to protect the environment from overexploitation and degradation; the brutal living conditions and mechanized holocaust perpetrated each year on literally billions of chicken, turkey, cattle, pigs, lambs and others to feed the tables of the Advanced World must end; medical technology for cloning human beings or for keeping patients alive as zombies, without hope, must be restrained. These are the true challenges for the third millennium. Yet there is no commandment in the Decalogue that we take care of planet Earth or that we do not eat the flesh of sentient beings. What is needed are a new set of Commandments, appropriate for our times, as forcefully advocated by the ethicist Peter Singer.

## **7 Parting Thoughts**

In concluding this essay, I am fully cognizant of the fragmentary and inchoate character of my musings. It is in the nature of things that I can write with force and elan about science but that philosophical and theological speculations admit to no ready resolution this side of death.

Yet I can't help but be obsessed with these questions and return to them throughout my life, and will continue to do so. So there you are.