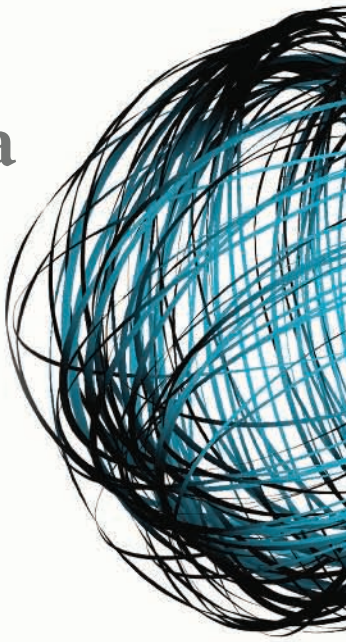
Three Theological Mistakes

How to Correct Enlightenment Assumptions about God, Miracles, and Free Will



Ric S. Machuga

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Preface

This book addresses five big questions.

- Is the existence of God a matter of faith or knowledge?
- Does God sometimes act miraculously or are there physical causes for everything?
- Is morality absolute or relative?
- Are humans truly free or does God's sovereignty determine everything?
- When bad things happen, is God the cause or are they the fault of humans?

Too frequently Christians answer these questions with a Yes to one side and a No to the other side. Thomas Aquinas and Karl Barth answer Yes to both, in all cases. Following their model, I will defend a "third way" which transcends the dichotomies of fideism versus rationalism, supernaturalism versus naturalism, relativism versus absolutism, free will versus predestination, and God's justice versus his mercy.

Our difficulties came to a head in the seventeenth century. Though the Enlightenment was responsible for much that is fine, just, and good, it also promoted three bad ideas: mechanism, universal quantification, and mono-causation. Mechanism is the claim that physical causes always have predictable effects fully determined by the laws of nature. This led to the assumption that the laws of cause and effect are logically clear and mathematically precise. So we must, as Galileo advised, "Measure everything, and that which you cannot, measure it anyway." Finally, since causal relations are always clear and precise they must be exclusive—if something is physically caused, then it was not caused by God, and conversely, if something is caused by God, then it cannot be physically caused. This sort of mono-causation produced a rigid natural/supernatural divide and the search for an "empirically detectable" God.

These three assumptions are demonstrably false, both philosophically and scientifically. In their place I articulate and defend three good ideas:

- Not all causes are mechanistic.
- All quantities are ultimately qualities.
- Full understanding requires dual-causation.

First, while every effect has a cause, many effects are not, and never will be, humanly predictable. Causation, predictability, and determinism are distinct ideas that must never be conflated. Second, while many things can be quantitatively measured, such measurements are ultimately based on qualitative human judgments about *what* something is. Every number is an iteration of the number one. But there is nothing "measurable" that one baseball game, one table, one person, one corporation, one nation-state, one essay, and one poem have in common except a *qualitative* integrity and unity. Third, when God employs humans to achieve his intended goal, the question "Who did that?" cannot be answered on the assumption of mono-causation. Instead, the answer requires dual-causation, or what Thomas Aquinas referred to as primary and secondary causes and Karl Barth the divine accompanying.

Thus, my central theme is that these three "good ideas" answer questions about God, miracles, and evil in a way which is scientifically, philosophically, and theologically satisfying, without resorting to false dichotomies.

Chapter 1 considers the assumption that physical causation and predictability are one and the same. No one cognizant of twentieth-century science believes that this is true. All physical actions have physical causes, but most of these are not even in principle predictable. Chapters 2 and 3 complete the philosophical case for this third category of the "physically caused but not predictable." These chapters do little to build an affirmative case for the alternative position. But until we throw away our old glasses and get a new prescription, we will never realize how much mechanistic philosophy masquerading as science has distorted our vision.

Chapters 4 and 5 will begin to flesh out the alternative to an Enlightenment conception of God. Isaac Newton's theory of universal gravity was the foundation of the mechanistic philosophy that virtually defined the Enlightenment, roughly the period beginning with the publication of his *Mathematical Principles of Natural Philosophy* (1687) to the publication of Immanuel Kant's *Religion within the Limits of Reason Alone* (1793). Newton was neither a materialist nor an atheist. But his conception of God was quite different from the pre-Enlightenment conception of God as the Author of creation. Newton pictured God as one who was "very well skilled

in mechanics and geometry." A century later, William Paley famously compared God to a skilled watchmaker. And today many Christians think in terms of an Intelligent Designer who acts in a scientifically detectable fashion. Instead of a divine Author who *speaks* the universe into existence, creates all things through his *Word* and is the "*author* and finisher of our faith," we now have a supernatural Craftsman who has fashioned an incredibly complex machine, capable of pretty much running on its own, except when God miraculously intervenes to suspend the "laws of nature" or when humans, with their God-given free will, make autonomous choices, independent of all antecedent physical causes.

These two competing conceptions of God assume different ideas about how God acts vis-à-vis his creation. The Craftsman model assumes a theory of mono-causation, while the Authorship model assumes a theory of dual-causation. Mono-causation assumes that everything has *either* a natural cause *or* a supernatural cause. Thus, when we come across things which are either too complex and/or improbable for science to explain in terms of natural causes, the justifiable inference is that they must have a supernatural cause. Dual-causation, on the other hand, assumes that God is the primary cause of *everything*'*s* existence. Nonetheless the created order is informed so that the agency of real secondary causes is also responsible for what happens. Thus, nothing happens without a physical cause. However, as we will explore later, this does *not* justify the inference that God is absent, irrelevant, or uncaring. As the cause of our very being, God is closer, more involved, and more solicitous of our good than anyone else, including ourselves.[1]

The simplest way to understand the difference between mono-causation and dual-causation is to consider two distinct ways people can cooperate to achieve a goal. If a rock is too heavy for any single person to move, then two people might tie a rope to it so that they can both pull on the rope to exert a sufficient force to move the rock. In such a case, each person might contribute 50 percent of the force necessary to move the rock.

But there is a quite different way two people can work together to achieve a goal. Many years ago a friend and colleague said he was going to make an exquisite pasta dish for dinner and asked if I would like to join him. I immediately accepted the offer, though I was very puzzled. You see, my friend is a quadriplegic—how, I wondered, was *he* going to cook for me? When I arrived at his house, it soon became clear how he would do this. After the standard chit-chat, my friend politely began giving me instructions—"get two cloves of garlic from the pantry, three tablespoons of

1. "Because in all things God himself is properly the cause of universal being which is innermost in all things, it follows that in all things God works intimately." Aquinas, *Summa Theologica,* I 105.5; see also *Summa Theologica,* I 8.1.

olive oil, finely chop three leaves of basil . . . ." It continued like this for about thirty minutes, in part, because many of the ingredients and techniques he employed I had never heard of before, and hence, my friend was forced to give extremely detailed (and to his mind, elementary!) instructions. Yet when we finished, the pasta was truly exquisite.

So here's the question: who made the pasta—me or my friend? While in one sense we "cooperated," it would be wrong to describe this as a case where he and I each did 50 percent of the work. No, in the most important sense, my friend did *everything* because I was only the set of hands he used to prepare the pasta. While my hands did the physical work, they would have been utterly useless without his detailed instructions. Nonetheless, there was a real dignity in what I did and the words "well done, good and faithful servant" would have made perfect sense.

Besides thinking in terms of mono-causation, Enlightenment thinkers had a penchant for *universal* laws. Newton's "laws of nature," after all, were applicable to *everything*. So too, when Kant described a religion that functioned "within the limits of reason alone" this meant forming a conception of God under which everyone would be treated equally and fairly. Like the "laws of nature," the "laws of morality" must be universal. A God who failed to meet these criteria, Kant thought, would ipso facto be immoral, and hence, unworthy of our worship.

This made it extremely difficult, perhaps impossible, for Kant to reconcile himself to the irreducibly *particular* claims of Christianity. It was the Jews, not the Egyptians, Assyrians, or Babylonians, to whom God said: "I will make of you a great nation, and I will bless you, and make your name great, so that you will be a blessing" (Gen 12:2); and it was Jesus, not Confucius, Lao-tzu, or Buddha, who died on the cross to reconcile the world unto himself. Such particularity is scandalous if one begins with Enlightenment assumptions. Chapter 6 examines these assumptions and finds them wanting.

Chapter 7 considers a third issue that arises from the Enlightenment penchant for the universal. What makes a house good in Alaska and what makes a house good in Hawaii are quite different. So it would be silly to search for the *universal* laws of constructing good houses. But the Enlightenment credo that *everyone* has a right to life, liberty, and the pursuit of happiness remains at the center of our moral and political philosophies. And this means that much contemporary ethical philosophy is focused on resolving ethical dilemmas, i.e., what should we do when different people's rights conflict? Lying is wrong because everyone has a right to have their questions answered truthfully. But when the Gestapo asks, "Have you seen any Jews?", should we still answer truthfully, even when it means almost

certain death for someone else? Solving puzzles like this has become a central issue for those who begin by assuming that ethics is all about discovering, protecting, and promoting universal rights.

The ethics of Aquinas and Barth take a very different approach. For them the crucial moral question is not *knowing* what to do in difficult cases, but *doing* what one already knows should be done in the most ordinary cases. When St. Paul wrote "For I do not do the good I want, but the evil I do not want is what I do," he had no difficulty knowing what was good; his only problem was finding the power to "just do it."

Aristotle had much to say about the virtues and habits that are developed through good instruction and lots of practice. These provide one source of "power" for doing good. And we will not belittle these. But St. Paul, Aquinas, and Barth all argued that though virtues and habits are real secondary sources of power for doing good, the primary power is the work of the Holy Spirit that proceeds from the Father and the Son. In the end, Christian ethics *is* Christian theology and Christian theology *is* the theology of grace.[2]

In chapter 8 we move from the ethics of grace to the politics of stewardship. We do this to highlight the radical difference between an ethic focused on universal *rights* versus one focused on what we have been *given*. It is John Locke, perhaps the most important Enlightenment political philosopher, who is primarily responsible for this misstep. His influence is clearly visible in our Declaration of Independence and his central argument still convinces many Christians and non-Christians alike.

Locke argued that prior to a social contract that brought governments into existence, the whole of creation was God's and God's alone. In this primitive state, God's bountiful creation supplied more than enough to meet everyone's needs, so the lack of government was not a significant problem. Nonetheless, Locke thought that for people to gather more food than they could use before it rotted and went to waste would be morally wrong and insulting to the Creator. But with the invention of money all this changed. Humans had now invented a way to turn the fruits of their labors into something that would never rot, and hence, would never go to waste. So from here on, when humans freely "mixed" their labor with the land, they acquired an individual *right* to the fruits of their labor which had no limits. No longer were individuals limited in how much they could accumulate and call their own. A couple of generations later, David Hume argued

2. "It is the Christian doctrine of God, or more exactly, the knowledge of the electing grace of God in Jesus Christ, which decides the nature of theological ethics." Barth, *Church Dogmatics,* II.2, 543.

that this right to property was not only unlimited, but that the protection of private property was *the* central purpose of government.[3]

Enlightenment political theory had moved a great distance from the political thought which preceded it. Though a theory of "natural law" had already been formulated and defended by Aquinas, there is only a superficial connection between it and the Enlightenment theory of "natural rights." One indication of the breadth of the divide is Aquinas's clear and adamant insistence that property law is *not* part of the law of nature, but instead, a part of positive law (i.e., man-made law) which is neither universal nor absolute. Thus, he would argue that, "It is not theft, properly speaking, to take secretly and use another's property in a case of extreme need: because that which he takes for the support of his life becomes his own property by reason of that need."[4] We agree with Aquinas. Since God is the primary cause of all we are or have, being good stewards (cooperating, secondary causes) of what we are given precludes any absolute and unlimited *right* to property.

Chapters 4 through 8 all, in one way or the other, invoke the idea of dual-causation. But how can humans truly be free and responsible agents if God is the primary cause of everything? Doesn't free will require that our actions are wholly our own? On the other hand, if God is the Author of *all* of creation, then how can we be anything more than mere characters in a play or drama who do exactly what the script says we will do? In short, how can free will and predestination possibility be reconciled? And isn't this the ultimate either/or choice? Isn't it logically impossible to say Yes to both?

Chapter 9 will address these questions head on. In it I argue that there are two distinct conceptions of freedom. The first, which we will call autonomous freedom, cannot logically be reconciled with a robust understanding of predestination. The second can. When Jesus said to his disciples, "You shall know the truth and the truth shall set you free," he had in mind a very different conception of freedom. Moreover, not only is the sort of freedom that Jesus promised logically compatible with predestination; it *requires* predestination.

A still greater problem remains—the problem of evil. One consequence of the Enlightenment's emphasis on human autonomy that many Christians still find very attractive is that it seems to provide an explanation for pain and suffering. If we, and not God, are ultimately responsible for our free choices, then the pain and suffering caused by humans is *our* fault, not God's. And conversely, if on the assumption of dual-causation we are *only* secondary causes, then doesn't God bear the ultimate responsibility for all

3. MacIntyre, *Whose Justice*, chapter 15.

4. *Summa Theologica,* II-II 66.7.

the pain and suffering caused by humans? So without a robust doctrine of free will understood in terms of human autonomy, it seems that the problem of evil is philosophically insoluble.

While there is no denying the appeal of the "free will defense" to the problem of evil, chapter 10 articulates and defends an alternative approach. In this pre-Enlightenment approach, God's transcendent existence is the ultimate good and evil is the ultimate privation. Evil is the "impossible possibility" that God permits, but does not cause. This is not a philosophical *explanation* of evil. Aquinas and Barth have no philosophical solution to the problem of evil. Instead, they remain content to *describe* evil's effects on God's good creation. Our utterly inexplicable turning away from all that brings joy and happiness toward that which brings only sorrow and destruction cannot be explained. Yet our fallen foolishness also makes fitting the incarnation with the great and glorious salvation found in Christ's death and resurrection.

Nevertheless, no theologically adequate description of demonic evil can ignore the fact that it *deserves* the wrath of God. In the final two chapters, we will explore three distinct ways of understanding God's wrath. Since the time of Augustine, many Christians have thought of it in wholly punitive terms. In this view, God's wrath is the everlasting punishment experienced by those in hell. However, there has always been a second understanding of hell. Though it has clearly been a minority position in the history of the Church, a few Christians have argued that the wrath of God is always restorative and ultimately redemptive. While some people will have to go *through* hell, in this second view, God's wrath ultimately succeeds in bringing *all* humans first to repentance and then to redemption.

The final chapter outlines yet a third view of hell. It follows Barth and says Yes to *both* the punitive and the redemptive aspects of God's wrath. On the cross Jesus suffered the wholly *punitive* wrath of God; for everyone else, God's wrath is ultimately *redemptive*, though it does include a punitive aspect. Yet Barth insists that he is not a universalist. Is he being subtle or simply slippery?

If we assume an Enlightenment conception of freedom in terms of autonomy, then Barth is clearly being slippery. Given this assumption our eternal destiny is wholly in our own hands and the choice for or against God is ultimately our own. No matter how much God *desires* that all will be saved, there is no way that he can *assure* that this will be the case. But if by "freedom" we mean the freedom Jesus promised to his disciples, then Barth's position is subtly defensible. The bottom line is that we must neither affirm nor deny that all will be saved, but we must also unceasingly hope and pray that hell will be emptied. As Edith Stein once said, "Human freedom can be

neither broken nor neutralized by divine freedom, but it may well be, so to speak, outwitted."[5]

Now, a note on heroes and villains. Thomas Aquinas and Karl Barth are clearly the heroes of this book. So who are the villains? That's not nearly as obvious. Rene Descartes, Isaac Newton, David Hume, John Locke, and Immanuel Kant are all frequently mentioned, and rarely in a positive light. But I wouldn't consider them villains. And I would certainly never suggest that there isn't much to be learned by reading them. Nor would I suggest that there isn't much to learn from the Enlightenment to which they all contributed. Of course, given the subtitle of the book, the reader can rightfully expect that the Enlightenment will receive some serious criticism. But my goal is not to find and punish villains.

A Thomist of the previous generation, Etienne Gilson, frequently compared the history of philosophy to the scientist's laboratory. When science is working as it should, no one criticizes individual scientists just because their theory is proven false in the laboratory. Coming up with good scientific ideas and theories is hard work that only great minds can do well. And the fact that a scientist's idea or theory doesn't work in the laboratory does not belittle the scientist. The only scientists who deserve criticism are those whose ideas are too vague or inchoate to permit rigorous testing. So too, Gilson argued, coming up with good ideas and theories in philosophy is hard work which only great minds can do well. And while scientific ideas are frequently tested by expensive tools, philosophical ideas can only be tested by history. Given the interconnection and resonances of philosophical ideas, it takes centuries for all the implications of a great philosopher's ideas to become clear. Descartes, Newton, Hume, Locke, and Kant were all great philosophers. But now, two-and-a-half centuries after they died, even mediocre philosophers are able to put their fingers on mistakes and implications that were invisible at the time they were first proposed.

What's more, the great philosophers we discuss sometimes had vague intuitions of future difficulties that would arise when their ideas were simplistically and perfunctorily applied to ethical, political, or theological problems. A great tool only produces great results in the hands of a skilled craftsman. So great philosophers frequently qualify and nuance their big ideas with numerous fine distinctions.

And while fine distinctions have their place, this book is not one of them. My goal is not a careful exegesis of past philosophers. Instead, I assume with Thomas Aquinas that "the study of philosophy has as its purpose to know not what people have thought, but rather the truth about the way

5. Quoted in Balthasar, *Dare We Hope,* 221.

things are."[6] If historical scholars can point to more nuanced and qualified statements which demonstrate that these great philosophers did not really endorse mechanism, universal quantification, and mono-causation, then so much the better!

Finally, a note on reading this book. The book focuses on big ideas about God, miracles, and free will. But the conclusions I reach are not deductions from alternative "presuppositions." Instead, I try to build a case based on a wide range of issues and specific examples for a decidedly "unmodern" approach to these questions. While my goal is to study the forest, doing this requires much time looking at individual trees. So to make sure the "big picture" is not lost, each chapter begins with a short abstract. These should keep the forest more clearly in focus.

I have also included fairly extensive footnotes, many of which include quotes (some fairly long) from both primary and secondary sources. These can easily be ignored without substantial loss. The primary purpose of the footnotes are twofold. First, to make clear the utter unoriginality of my arguments. Second, to provide interested readers with references to my decidedly unmodern way of thinking.

Of course, I am speaking loosely when I refer to *my* thinking. "Thoughts" are not *owned* like cars or pieces of property. A book like this is the product of countless hours of discussion with friends and colleagues. Here are a few that immediately come to mind and deserve my heartfelt thanks: Dan Barnett, Greg Cootsona, John Wilson, Dave Montoya, Bill Martin, Scot Hoiland, Michael Machuga, Matt Caldwell, Michael Fitzpatrick, Andrew Lavin, Justin Gilley, Jay Gallangher, Robin Parry, David Yeago, James Madden, Gary Deddo, and David Opderbeck. And finally I must acknowledge the computer skills of my wife, Kathy—without her my frustration level with all things technological could have easily prolonged this project beyond the useful life of my neurons.

6. Aquinas, *Commentary on De Caelo [On the Heavens]*, I.22, quoted in Stump, *Aquinas,* 9.

—1—

The Collapse of Mechanistic Philosophy

A small error at the beginning of something," said Thomas Aquinas, "is a great one at the end." One such error is the common failure to distinguish between causation and predictability (i.e., determinism). While every action or event has a cause, most actions and events are not even "in principle" predictable. Our failure to make this distinction permits mechanistic philosophy to masquerade as science.

TIME AND CHANCE HAPPEN TO THEM ALL

Common sense assumes a real difference between things that happen by chance and things that happen in a predictable or mechanical fashion. Things that happen by chance can only be *described* after the fact. Things that happen in a predictable or mechanical fashion can also be *explained* in terms of natural laws.

An ordinary tennis ball illustrates this difference. We can all predict that when we throw or hit a tennis ball across the net, it will soon hit the ground somewhere on the other side. An excellent tennis player can predict with pretty fair accuracy precisely where the tennis ball will land. And if the tennis ball is being shot out of a ball machine, any high school physics student could predict when and where the ball would land just by measuring the force imparted and the angle and direction in which the ball was aimed. Students today can do this because three centuries ago Isaac Newton

discovered the mathematical laws of mechanics and gravity. Since these laws explain what is and isn't relevant to the motion of any given object, they allow us to predict what will happen.

More specifically, Newton's laws tell us that the mass of the ball, the force imparted, and the direction and angle it is aimed fully determine (and hence, predict) where and when the ball will land. Well, not exactly: if this were posed as a problem for college physics majors they might be asked to add factors such as air resistance and wind direction to their predictions. But because of Newton, they would never need to know the color of the ball, the time of day, whether the ball machine was manufactured in the United States or China, or countless other identifiable factors in the immediate proximity. Once we have accurately measured a handful of relevant factors, we have all the information necessary for an accurate prediction of where and when the ball will hit the ground.

Now let us change the situation slightly. Think of the same ball machine shooting the tennis ball down a fairly steep dirt road strewn with rocks, several switchbacks, and drop-offs. Once again, we can predict where the ball would first hit the ground. But where it would come to rest as it rolled and bounced down the road, perhaps careening over the edge of a rocky cliff, is an entirely different matter. This time a college degree in physics would be of little help. Why? It is not because there are gaps in the causal chain or other "supernatural" forces acting on the bouncing ball. No, the causal forces here are no different from those in the first situation.

The critical difference is that in the first example, a small error in the initial measurements will have a small consequence in the final outcome, whereas in the second example, a small error in the initial measurements will have an unpredictably large consequence. The difference between the two is that every rock and switchback in the second example constitutes a threshold or "tipping point."

In the first example, a sudden gust of wind might cause the ball to land slightly to the left of our prediction, but it would not completely invalidate our prediction. However, in the second example, the tiniest of errors at the beginning of our calculations would totally invalidate our prediction. A tennis ball careening down an irregular, rocky dirt road is like a ball in a pinball machine. While there are no magical or mystical elements in either case, in both cases there are cascading chain reactions. If the tennis ball hits a rock or the pinball hits a pin ever so slightly to the right of center, one causal sequence will be initiated. But if it hits ever so slightly to the left of center, another entirely different sequence will emerge. In one case, it may send the tennis ball sharply to the left and then into a smooth culvert running all the way to the bottom of the road. But in another case, it may send the tennis

ball sharply to the right and then over a cliff. And even if the ball only moves slightly to the right or left when it hits the first rock, each and every rock in the road constitutes a threshold or a "tipping point" just as capable of initiating a sequence of events with equally unpredictable results.

Contemporary scientists call these sorts of examples nonlinear systems. The name may be new, but the idea is ancient. If Tom and Harry are being chased by a bear and their only option is to leap twenty feet over a very deep chasm, and if Tom can jump precisely twenty feet, while Harry can jump precisely nineteen feet, eleven inches, this slight difference in jumping abilities will produce radically different results—Tom lives and Harry dies! When tennis balls are careening down mountain roads, the extremely large number of relevant factors (the precise location, size, and shape of every rock) coupled with numerous thresholds (nonlinear events) makes it humanly impossible to predict where the ball will come to rest. Yet, while it would be impossible to predict what happens in such cases, anyone with a good slow-motion camera could easily record, and then describe, every step in the cascading chain of events.

Of course, the unpredictability of a tennis ball bouncing down a rocky dirt road is of little significance. But the havoc caused to human plans by thresholds and tipping points is not always trivial. Here are two examples.

In the 1980 presidential election, Jimmy Carter was challenged by Ronald Reagan. During the campaign, Reagan and many others had repeatedly characterized Carter's foreign policy as being "weak" and criticized him for being too willing to sacrifice our national honor when faced with challenges from abroad. The Iranian revolutionaries' seizure of diplomatic hostages in Tehran became the prime example of Carter's inaction and (apparent) weakness. And for many, it seemed to confirm everything Reagan was saying about Democrats.

However, we now know that Carter had set in motion a rescue mission and was only biding his time. By April of 1980, American intelligence agents posing as European businessmen had infiltrated the ranks of the Revolutionary Guards holding the hostages, and they had detailed information about precisely where in the embassy the hostages were being held and other important information about their daily routines. There were even reports that some members of the Revolutionary Guards had been "flipped" (changed sides) and were ready and willing to assist the Americans in their escape.

On April 24, after all the groundwork had patiently been laid, Carter gave the order to begin the rescue. Though the carefully planned and practiced rescue would only require six helicopters to fly all the captives to safety, eight helicopters took off from an aircraft carrier just in case something

went wrong. But even these precautions were insufficient. Shortly after take-off, one of the eight helicopters developed a rotor problem and was forced to turn back. Halfway through the flight, the helicopters were caught in a haboob, a rare meteorological phenomenon in which winds generated by a thunderstorm create clouds of dense dust many miles away without any warning. This caused the loss of one more helicopter. Still, the mission had the six helicopters needed for a successful rescue, and success here would have made the "wimp" charge look ridiculous; all the negative predictions about Carter's chances of reelection would be out the window. But success was not to be had. The mission was aborted when a hydraulic pump on one of the six remaining helicopters failed—the result of a crack in a ten-cent aluminum nut!

About two millennia earlier, Virgil's description of the founding of Rome rested upon perfectly understandable but equally unpredictable events. Though Virgil was more of a poet than a historian, his story rings true. It begins when Aeneas's son innocently goes hunting and the nostrils of his hounds catch the scent of a stag sacred to the Rutulians. When Aeneas's son lets an arrow fly, it reaches its target, but not in such a way as to kill the stag there and then, but in a way that would allow the fatally injured animal to "creep moaning into his stall . . . all stained with blood." The hardy country folk immediately take up arms to seek vengeance.

But why did the hounds happen to catch the scent of this particular stag and not one of the countless others that inhabited the forest? Why did the arrow fatally wound, but not immediately kill, the sacred stag? Why did the stag have just enough life left to make it back to his stall rather than die during the journey, thereby masking the identity of its assailant? We might agree on a description of how the battle for Rome began. But on the morning of Aeneas's son's hunting trip, no one could have predicted the prodigious consequences that would follow.

And how did it end? Weary of war, the two armies agreed to settle the dispute with one-on-one combat between two champions, Aeneas for the Romans and Turnus for the Rutulians. When both saw level ground, they ran swiftly toward one another, each throwing his spear, but neither managed to down his opponent. Then they clashed in close combat. They were evenly matched in skill and strength, but when their swords met, Turnus's sword shattered "like brittle ice, and now its fragments gleamed back at him from the yellow sand."[1]

But why did Turnus's sword shatter? Virgil says it was because Turnus mistakenly grabbed his charioteer's sword as he ran to meet Aeneas, not his

1. Virgil, *Aeneid* XII.735–65.

father's sword that he had used in all of his previous battles. Of course, the cascading chain of events didn't begin there. Why did he grab the wrong sword? Did his charioteer misplace the proper sword? When he reached for his father's sword, was Turnus distracted by the flight of a bird (i.., an evil omen)? Did the fast and rocky ride of the chariot knock Turnus's sword from its scabbard, forcing him to grab his charioteer's sword instead?

All of these questions define crucial tipping points (thresholds) that, as Virgil said, make it "hard to distinguish chance and prowess in the fight's confusion."[2] The Preacher in Ecclesiastes agrees: "Again I saw that under the sun the race is not to the swift, nor the battle to the strong, nor bread to the wise, nor riches to the intelligent, nor favor to the men of skill; but time and chance happen to them all" (Eccl 9:11).

A common sense understanding of each of these examples—a tennis ball bouncing down a rocky dirt road, the 1980 presidential election and the founding of Rome—would include at least three points. First, some events can be fully *described*, but never *explained*. Second, even though there is a *cause* for everything that happens, in these cases the final outcome was neither *determined* nor *predictable*.[3] Third, each of the outcomes *could have been otherwise*. However, many Enlightenment thinkers challenged all of these commonsense points. The next section will consider their arguments and what we will call "mechanistic philosophy."

LAPLACE'S DEMON

"Time and chance happen to them all," said the Preacher. But, then, the Preacher lived a long time ago, back in the days when people believed that the sun orbited a stationary earth in the center of a two-thousand-year-old universe. Today we know so much more. "Sure," objectors would say, "no one living a thousand years ago imagined that we would be able to predict the paths of comets, much less be able to instantaneously communicate with people halfway around the world or even with space ships passing by Saturn. So before adopting the three points of 'common sense,' think of all that we

2. Ibid.

3. "The theory of natural selection can describe and explain phenomena with considerable precision, but it cannot make reliable predictions, except through such trivial and meaningless circular statements as, for instance: 'The fitter individuals will on the average leave more offspring.' Scriven (1959) has emphasized quite correctly that one of the most important contributions to philosophy made by the evolutionary theory is that it has demonstrated the independence of explanation and prediction." Mayr, *Toward a New Philosophy of Biology,* 31–32.

have learned! We now know that the earth revolves around the sun, which is on the outer edge of a medium-sized galaxy, which is but one of billions of galaxies in a universe that is billions of years old, and in which *everything* is strictly determined by the laws of nature. So while it may still be difficult to precisely predict the outcome of many events, *in principle* these predictions are fully within the capabilities of modern science."

In 1814 Pierre-Simon Laplace, a mathematician and physicist, famously formulated this objection to the three points of common sense:

> We may regard the present state of the universe as the effect of its past and the cause of its future. An intellect which at a certain moment would know all forces that set nature in motion, and all positions of all items of which nature is composed, if this intellect were also vast enough to submit these data to analysis, it would embrace in *a single formula* the movements of the greatest bodies of the universe and those of the tiniest atom; for such an intellect nothing would be uncertain and the future just like the past would be present before its eyes [emphasis added].[4]

According to this view, all of reality is fully determined, and therefore the unpredictability that we commonly attribute to "time and chance" is *in fact* due wholly to our lack of knowledge. While the relevant causal factors determining the winners of elections and wars (or even the precise resting place of a tennis ball bouncing down a rock-strewn mountain) may be too complex for human calculation, in fact, everything is mechanistically determined. According to Laplace, what the Preacher called "chance" is not a permanent part of reality, but only the (temporary) result of our lack of scientific understanding. Since every action is caused, our inability to predict an event's outcome is wholly the result of human ignorance because nothing in reality takes place by chance. Or as philosophers like to say, "chance" names an epistemological category, not an ontological category. If we knew enough, we would understand that given the same initial conditions, nothing could have been otherwise.[5]

Not surprisingly, many people reject Laplace's deterministic vision since it seems to call into question much that we all hold dear, including human freedom. And Christians have their own objections. Without freedom, humans would not have the unique dignity of being created "in the image of God." And some have even worried about the implicit idolatry

4. Laplace, *A Philosophical Essay on Probabilities,* 4.

5. "The word 'chance,' then, expresses only our ignorance of the causes of the phenomena that we observe to occur and to succeed one another in no apparent order." Quoted in Gillispie, *Laplace,* 51.

of transferring the traditional attributes of God—omniscience and omnipotence—to Science (with a capital S). Nonetheless, many Enlightenment thinkers think that the arguments in favor of a mechanistic philosophy are more powerful than these objections.

Their first argument is based on history. Many events which were once attributed to supernatural causes or transcendent human freedom are now explicable in terms of perfectly ordinary and "natural" causes. The Greeks prayed to Neptune for safe passage across the Aegean in their triremes (warships); today we check for storms on images from satellites. In New Testament times the Jews attributed epileptic seizures to demons; today we explain them in terms of brain lesions. Fifty years ago school teachers scolded restless and disruptive children; today we treat them with Ritalin, which is far more effective. Though some people still pray for divine intervention to solve their problems, now scientists using fMRI (functional magnetic resonance imaging) can locate the specific area in the brain that "prays." And while it is not yet possible to explain why some people pray to Jesus and others to Allah, the "spiritual peace" they experience is explained by the dopamine in their brain.

And even the "free will" to choose one's own religion is now coming under scrutiny by brain scientists. Again, using fMRI, scientists are able to predict a person's decision up to seven seconds prior to the subject's consciousness of his or her own "choice."[6] Of course, the decisions being considered are rather trivial (e.g., hitting a flashing button with either the left or right hand), but these experimental studies are still in their infancy. So there is every reason to believe that in the future our so-called "significant" decisions will become explicable in terms of brain functions. And when that happens, scientists will be able to *explain* why some people pray to Jesus, while others pray to Allah, or at least, that's the updated version of Laplace's first argument.

The second argument in favor of mechanism is more philosophical and goes like this: Only uncaused events are in principle unpredictable. But to say that something is uncaused is to say that it came from nothing. Yet by definition "nothingness" doesn't exist. Nothing simply "poofs" into or out of existence. Despite our lack of any definitive medical research, we know that if someone gets cancer there must be a cause, even if scientists have yet to discover what the cause is.

Try to imagine a senator arguing before Congress, "We have spent billions of dollars looking for the cause of cancer. Yet in many cases we are no closer to discovering its cause than we were thirty years ago. Therefore,

6. See Callaway, "Brain Scanner Predicts Your Future Moves."

the only reasonable conclusion is to stop wasting money looking for causes where none exist." The senator's argument is a classic non sequitur. His premises may both be true. But his conclusion—"these cancers have no cause"—does not follow. Instead, what follows from the senator's premises is that "these cancers have causes that are *yet to be discovered*."

Before responding to these arguments for mechanism, a brief digression concerning motives is in order. Francis Bacon famously said that knowledge is power. And he was at least in part correct: the kind of knowledge that allows us to explain and predict also gives us control and power. When and if we discover the biological laws that govern the growth of cancers, those cancers will no longer be under the control of Providence; instead, they will be under *human* control.

But we must not be too hard on the Enlightenment. There is nothing wrong with using our God-given talents to mitigate human pain. In many cases it is meek, right, and proper to seek power and control over nature. The Bible itself enjoins humans to tend, cultivate, and steward God's good creation. And as Thomas Aquinas (the great medieval philosopher and theologian to whom we will refer frequently throughout this book) said: "the dignity of causality is imparted even to creatures."[7] While God is the primary cause of all that exists and happens, humans are real secondary causes who are able to control much of their environment. We will say much more about this in later chapters, but for now we happily acknowledge that we live in a world where we should not only *pray* for those who are ill, but we should also *work* on their behalf building hospitals, educating and training doctors, and supporting research institutions in their search for the causes of cancer. And as we work to bring cancer and other effects of the fall under the control of modern science, we must not begrudge the Enlightenment thinkers rightful praise for their achievements.

Of course, some attempts to obtain mastery over God's creation are acts of rebellion and faithlessness. But this gives Christians no right to impute impure motives to Laplace. Perhaps in part he was seeking to "play the role of God." But, then, this is true of all of us at various points in our lives. And it would be contrary to a major theme of this book to pretend we were able to quantifiably measure, and then compare, Laplace's faulty motivation with our own more godly motivation. Humans will never be in a position to

7. *Summa Theologica* I.22.3. Barth approvingly quotes this same passage from Aquinas in *Church Dogmatics* II.2, 512. Again, God gives independence to creatures "not by a lack of power but by an immensity of goodness; he has wished to communicate to things a resemblance to him in that they would not only exist but be the cause of others." Aquinas, *Summa Contra Gentiles* III.70.7. See also the whole of ibid., III.69.

explain why most things happen, including why Laplace was motivated to defend universal determinism. The only prudent course is to pray that our *own* motives are those of good stewards, not those of faithless rebels.

THE DEMISE OF LAPLACE'S DEMON

In scientific quarters, things have changed since the time of Laplace; science with a small "s" has slain the demon of universal determinism. The mechanical clockwork of Newtonian physics has given way to quantum mechanics. Absolute space and time have given way to general relativity. And Newton's geometrically precise parabolic curves have given way to the chaos of double pendulums. One contemporary scientist puts it like this:

> To summarize, no man can go faster than the speed of light; no man can make simultaneous measurements of two conjugate variables with infinite precision; and no man can compute or measure any continuum variable precisely. In consequence, we can no longer disguise the fact that deterministic Newtonian dynamics has been dealt a lethal blow. Relativity eliminated the Newtonian illusion of absolute space and time; quantum theory eliminated the Newtonian dream of a controllable measurement process; and chaos eliminates the Laplacian fantasy of deterministic predictability.[8]

While it took both genius and persistence to undo the philosophical assumptions that were attached to Newtonian physics, at this point it is not difficult to understand why contemporary physics has returned to the commonsense distinction between describing and explaining, caused and determined/predictable, and acknowledging that many things could have been otherwise.

Quantum mechanics is full of surprises that we will not even begin to consider here. But its fundamental point is no more mysterious than the echolocation of bats or the sonar of submarines. Imagine that you are blind, but also that your hearing is very good. In fact, it is so good that like a bat you can "see" by listening for echoes. (While in college I knew a blind student who by snapping his fingers was able to find his way around campus without ever bumping into walls or closed doors.) Now as long as the physical force of the sound waves sent out are sufficiently small relative to the objects one is "observing," then there is theoretically no limit to what even a blind person can "see."

8. Ford, "What is chaos," 354.

But as the force of sound waves sent out approaches the mass of the objects one is attempting to observe, one's "vision" quickly deteriorates. To make our point less abstract, imagine a person who "saw" by throwing out thousands upon thousands of Ping-Pong balls, waiting for their rebound, and then calculated the shape and location of the objects from which the balls rebound. Certainly "vision" by Ping-Pong balls would be rather crude when compared to "vision" by echolocation," and even more crude when compared to "vision by photons (light). But if we imagine the balls becoming smaller and smaller and we also imagine a steady increase in the rapidity and precision with which the balls are dispensed, then there is no conceptual reason that Ping-Pong-ball vision couldn't rival the echolocation of bats.

However, there is one purely conceptual limit to all kinds of "vision"—whether by Ping-Pong ball, sound, or light. Determining whether a door is open or closed by throwing Ping-Pong balls is not difficult. But imagine trying to determine the location of another object of comparable size, that is, imagine a person using Ping-Pong-ball vision to locate another Ping-Pong ball. If a person could approach absolute precision in the direction and force with which the Ping-Pong balls were thrown, then at least theoretically we could locate another Ping-Pong–ball-sized object with one very big caveat—*our information would always be out-of-date*. The reason is obvious—one Ping-Pong ball bouncing off another Ping-Pong–ball-sized object will significantly alter the location of the object we are trying to "see." By the time our outgoing balls return, the location of our target ball will have changed.

At this point, a stubborn Laplacian may object: "But wait. Since we know the velocity with which the Ping-Pong balls are being thrown ,by timing how long they take to return we can calculate the distance of the rebound. And by measuring where the balls strike our detectors, we can determine whether the struck object will move in a straight line or at an angle. From these two pieces of data, like a good billiards player, it is a simple calculation to determine where the object we hit will be at any specified time in the future. Therefore, our observations need *not* be out-of-date after we make the proper corrections!"

Oh, how hard old assumptions die! The Laplacian argument begs the crucial question by assuming that the observer already knows the shape and mass of the object they are trying to "see." True, if we imagine a highly skilled billiards player shooting at billiard balls he is not in a position to see, by watching for rebounds of the visible cue ball he could calculate where the invisible ball was, both before and after it is struck. But this assumes that he already knows the mass and shape of the object that is causing the rebound. However, if the mass and shape of an invisible object a person is trying to

locate by this "echo" method is *unknown* (and not orders of magnitude bigger than the cue ball), then the rebounding cue ball will tell him nothing about the present location of the unknown object.

In other words, if a billiards player *already knows* the shape and mass of the objects at which he is taking aim, then from the rebound it is possible to calculate the future location of the object hit. However, if the object struck is of an *unknown* shape and mass, then the rebound tells us nothing about the future location of the struck object.

Simply, but in no way disparagingly, put, one of the things quantum mechanics does is apply the commonsense truths concerning Ping-Pong-ball vision to ordinary vision by light. Humans cannot see in the dark. The only time we can see if a door is open or closed is when light is bouncing off the door and into our eyes. This much is obvious. But what we and Newtonian physicists usually forget, and what quantum scientists remember, is the second prerequisite for seeing to be accurate and up-to-date—namely, the object being observed must be orders of magnitude larger than the light with which we make our observations.

Though physicists tell us that in some experimental contexts light behaves like a material object (a photon) and in other experimental contexts it behaves as a wave, we will keep things simple by picturing photons as extremely small Ping-Pong balls. When we try to gather accurate and up-to-date information[9] about an electron "orbiting" the nucleus of an atom, our attempts will always be frustrated by the fact that the very source of our information (photons from the observer's light source bouncing off of electrons) significantly alters the location of what is being observed. Unless physicists discover something significantly smaller than photons, it will always be conceptually incoherent to claim that *everything* is predictable.

The behavior of photons, electrons, and other subatomic particles is unpredictable because we cannot make an observation without altering the data in unforeseen ways. And even if we suppose that scientific progress continues indefinitely into the future so that scientists discover (or make) something a fraction of the size of photons, one class of events will still remain unpredictable—namely, the behavior of these newly discovered and/or humanly constructed miniphotons.

9. Physicists tell us that by properly arranging an experiment it is possible to accurately locate the position of a photon, but in so doing we disturb its momentum. On the other hand, it is possible to rearrange the experiment so that we can accurately determine the momentum of a photon, but then we cannot locate its position. What cannot be done is to set up an experiment where we accurately determine *both* the location and momentum of a photon.

"Seeing" what we use to *see with* is as impossible as a swimmer catching her own waves. As Gilbert Ryle[10] pointed out over a half century ago, the problem with the claim that everything is *in principle* predictable is not merely empirical; it is also conceptual. We do not need to make careful observations of Olympic-class swimmers to figure out that they will never be able to swim so fast as to catch their own waves—the faster they swim, the faster their waves will proceed!

There is little controversy about what has thus far been said about quantum mechanics. But there is significant disagreement about how it should be interpreted. The majority opinion (called the Copenhagen interpretation) argues that events or behaviors are in principle unpredictable *because* they are uncaused.

The minority opinion (we will call it the Realist interpretation) argues that we must never conflate what can be humanly *known* with what *is* the case. Even though we will never be able to know what caused an electron to "jump" from one orbit to the next, we know that nothing comes from nothing. Just as common sense assumes that no one gets cancer without a cause (even though that cause is not and may never be known), so too electrons don't "jump" without a cause (even though, for reasons we'll consider momentarily, we will never know what that cause is).

We'll consider the Copenhagen interpretation first.

Though the Copenhagen interpretation was first formulated by Neils Bohr and other scientists, their arguments are really philosophical and are grounded in their answer to that old conundrum: If a tree falls in the forest and no one hears it, does it make a sound? Copenhagen scientists assume that the answer is No. Following Berkeley, a famous eighteenth-century philosopher and bishop, they assume that "to be is to be perceived."

Suppose a scientist says that he has discovered that on April 15, 2001, the entire universe doubled in size. Not only did we suddenly become twice as tall, but all the measuring instruments by which we measure people became twice as big. And lest anyone try to measure their increase in height by timing how long a beam of light takes to travel from their head to their foot, included in this scientist's discovery is the claim that the speed of light has become twice as fast. Should anyone take such a theory seriously? Since Einstein, the answer has been No.[11] A difference that by stipulation can

10. Ryle, *Concept of Mind*, 197.

11. Prior to Einstein, many scientists and some philosophers believed in what Newton called absolute space and time. We will consider Newton's ideas in more detail in chapters 4 and 5. But for now, it is not controversial to say that Einstein's theories have completely undercut the "scientific" support for an idea of absolute space and time in

never make a difference is not a *real* difference! Or, to put the issue in the affirmative—if it walks like a duck, flies like a duck, smells like a duck, etc., then it's a duck! So too Copenhagen scientists argue that if we agree (as all physicists do) that it is in principle impossible for us to ever *know* the cause of an electron's jump, then it is meaningless to claim that it *has* a cause. In short, to be unknowable is to be nonexistent.

Philosophical realists disagree. There is now good reason to believe that other galaxies contain stars with planets orbiting them just as the earth orbits our sun. There is also good reason to believe that some (if not all!) of these extraterrestrial planets will never be explored by humans. Does that mean that on the back side of these planets (which by supposition humans never observe) nothing exists—no rocks, water, or molecules? If we start with Bishop Berkeley's assumption—that to be is to be perceived—then that's precisely what we are forced to conclude.[12] Philosophical realists are unwilling to grant assumptions that do great violence to common sense. So too, physicists who are philosophical realists are unwilling to conclude that the jump of electrons from one orbit to the next *has* no cause just because we can never *observe* the cause. What *exists* and what can be *known*, they say, must never be conflated.[13]

Yet, it is reasonable to ask: Why cannot the cause of an individual electron's jump be known? Again, Copenhagen physicists answer: Because no cause exists. Realists, on the other hand, answer: Because the universe is so intertwined and interconnected that when we consider things as small as electrons, we would have to know precisely the state of *everything* in the physical universe before we would be able to predict when a particular electron would make its jump. Similar problems arise inside the nucleus of an atom. As Heisenberg argued, an alpha particle will never be emitted without a cause, but we can never predict when it will "jump" because

> the forces in the atomic nucleus that are responsible for the emission of the *a*-particle . . . contain the uncertainty which is brought about by the interaction between the nucleus and the rest of the world. If we wanted to know why the *a*-particle was emitted at that particular time we would have to know the microscopic structure of the whole world including ourselves, and that is impossible.[14]

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comparison to which the rest of the universe could be said to have doubled.

12. Berkeley himself did not draw this conclusion because he argued that God "saw" everything.

13. The physicist/theologian Stanley Jaki is just one example.

14. Heisenberg, *Physics and Philosophy*, 89–90. See also F. S. C. Northrop's introduction to this book, where he distinguishes between determinism and causation—"every