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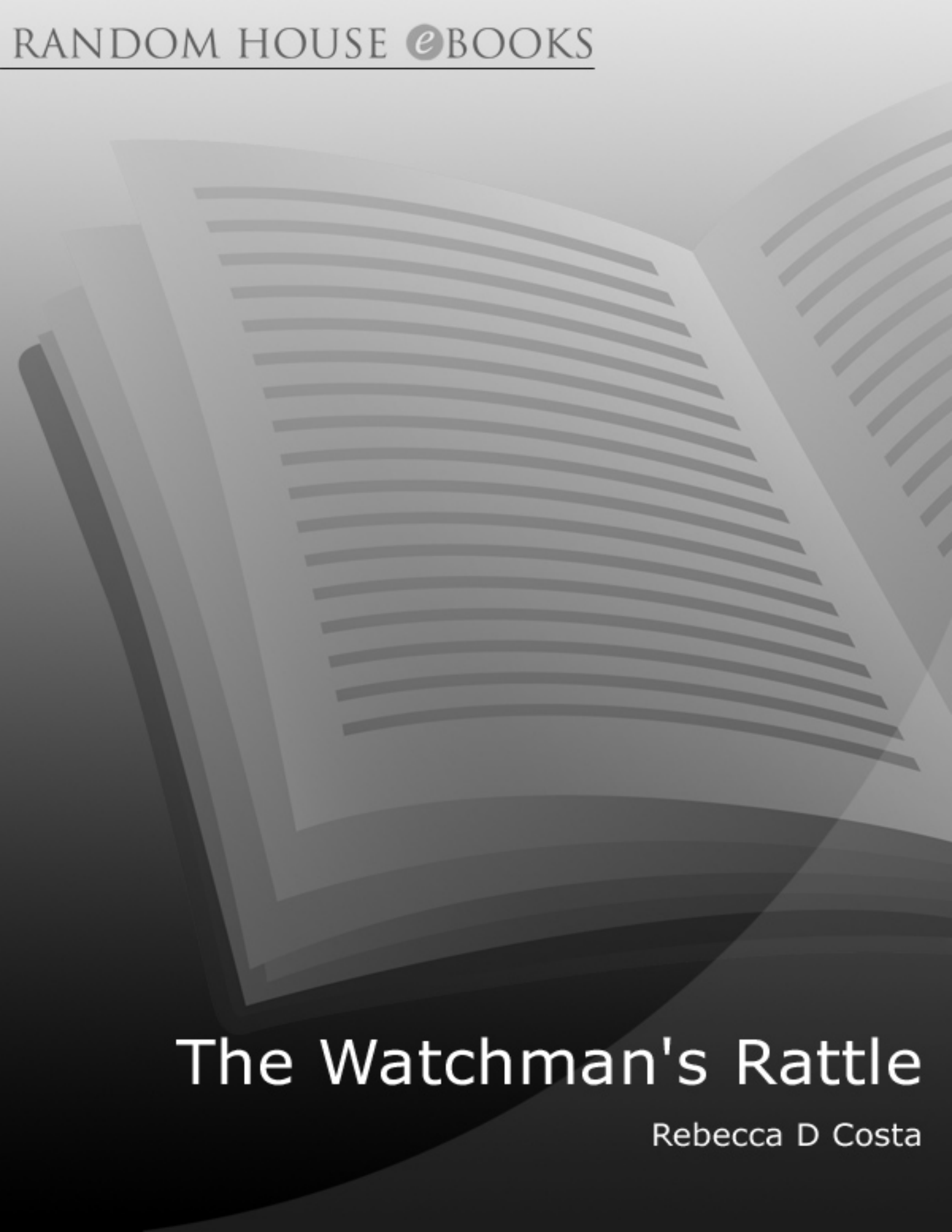

The Watchman's Rattle

Rebecca D Costa

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About the Book

Why does it feel as if our most challenging problems today – the worldwide recession, global warming, fast-spreading viruses, terrorism and poverty – aren't getting solved? What if our brain has limits that prevent it from solving such complex problems? If ancient civilisations collapsed because they, too, hit a cognitive limitation, are we headed for a similar collapse, and if so, can it be prevented?

Using historical and modern-day examples, *The Watchman's Rattle* describes the cognitive gridlock that sets in when complexity races ahead of the brain's ability to manage it. Beginning with the Mayans, Khmer and Roman Empires, Costa shows how the tendency to find a quick fix to problems by focusing on symptoms instead of searching for permanent solutions, leads to frightening long-term consequences: Society's ability to solve its most challenging, intractable problems becomes gridlocked, progress slows and collapse ensues. But, as Costa reveals, there is a growing body of scientific evidence that the human brain can be retrained to comprehend, analyse and resolve massively complex problems. A process of intuitive thinking, which Neuroscientists refer to as 'insight'.

Part history, part social science, part biology, *The Watchman's Rattle* is sure to provoke, engage and incite change.

About the Author

REBECCA D. COSTA is a sociobiologist whose unique expertise is to spot and explain emerging trends in relationship to human evolution, global markets, and new technologies. Costa joins distinguished business leaders, Nobel Laureates, scientists, innovators, and Pulitzer prize–winning authors from around the world in addressing growing concerns over dangerous threats such as global warming, pandemic viruses, terrorism, nuclear proliferation, and failing public education. A frequent speaker at prestigious technology and green conferences, as well as major universities, Costa is the former CEO of Silicon Valley start-up Dazai Advertising, Inc., which was sold to J. Walter Thompson in 1997. Costa's clients included technology giants such as Apple Computer, Hewlett-Packard, Oracle Corporation, 3M, Amdahl, Seibel Systems, and General Electric. Raised in

Tokyo, Japan, Costa lived during the Vietnam conflict in Vientiane, Laos, where her father worked in covert CIA operations. She attributes her natural ability to spot global patterns to her cross-cultural education and upbringing. Rebecca Costa graduated from the University of California with a BA in Social Sciences. She lives on the central coast of California.

THE WATCHMAN'S RATTLE

Thinking Our Way Out of Extinction

Rebecca Costa

For Bailey, Ben, and Camden

Preface

by Sir Richard Branson

SINCE BECOMING A VORACIOUS READER OF books about science, the environment and history over the last twenty years, I have always wondered why sophisticated societies collapse. It has been a fascinating riddle that historians have never explained well. The Marxists always saw it in revolutionary terms and the environmentalists have always seen it in climate terms, while the Malthusian biologists/historians have always seen it in population terms. Together they've explained the collapse of sophisticated cultures as a function of social pressures, population explosion and an adverse environmental kicker pushing a culture over the edge.

That view has always worried me and something sneaking in the back of my mind has often wondered, "Why did clever people who could build pyramids and massive cities in different parts of the world manage to allow that to be destroyed over a few generations?" If great ideas had built civilisations that advanced well beyond the flowering Tudor England of the 17th century, what other factor was involved?

With her book, *The Watchman's Rattle*, Rebecca Costa has made an extremely brave, spirited and well-informed attempt to answer this question in the context of the seemingly insoluble problems facing a global civilisation of 2011, with its 6.5 billion human participants who are

currently having enough babies to guarantee that it will be a 9 billion person problem by 2040.

It is one of those rare books that one picks up and knows within the first few pages that it is extremely important, but more than that it is also a fascinating read that challenges our very beliefs about how we solve the problems we face in a resource-constrained world with a rapidly growing population.

Even in my own experience of modern business, the most frustrating thing is people telling you why things can't be done based upon beliefs rather than data, reaction to the past rather than analysis and a simple view that it is easier to file things in the "too difficult cupboard" rather than trying to manage the risk of achieving them. I remember when we were trying to get Virgin Trains off the ground in the UK with a new technology tilting train that could go much faster round the bends of the old UK rail network. All the experts said it couldn't be done and the civil servants hated the risk. One almost got the impression that people thought it would be better to do nothing and pass the problem on to the next government. How was it that the country that had invented the railway and the first high-speed trains could have such entrenched attitudes?

I've always believed that we will not get to where we need to be with short-term fixes that pass one issue after another on to the next generation, with each successive one left with less room for manoeuvre. Energy and its clean production is the key to a continuously developing civilization and Thorium fission reaction, clean fusion power, artificial photosynthesis or indeed solar power from space are all potentially viable solutions.

And if you want to know why none of them are being pursued with anything like the investment, vigour or attitude to risk needed, then this book will help you answer the question. It will also help you reason with the fact that at the same time as the above solutions are largely ignored,

such enormous investment is poured into marginal and expensive hydrocarbon extraction despite the fact we now know we only have enough left to last 40 years tops!

Rebecca Costa has successfully challenged the prevailing view that our historic, scientific and economic progress since the dawn of capitalism will always be there to rescue the boat and she has done it by introducing our recent breakthroughs in our knowledge of neurological science to convincingly argue that we literally need to change and adapt the way we think about increasingly complex problems that the human ape has to solve in the next century.

I have taken what Rebecca has said very seriously and whether it be in space, in the air or on the ground, I for one will look for solutions in future rather than falling back on simple truisms that may not be true. Let’s not leave it to future generations to blame us for a civilisation collapse we now have the tools to prevent, even if our ape-like brains don’t want to admit it!

Foreword

by Edward O. Wilson

In *The Watchman's Rattle*, Rebecca Costa presents a view of the parlous human condition with which I completely agree. The clash of religions, and civilizations, she argues, is not the cause of our difficulties but a consequence of them. The same is true of the global water shortage, climate change, the decline of carbon-based energy, our cheerful destruction of the remaining natural environment, and all the other calamities close to or upon us. The primary cause of all threatening trends is the complexity of civilization itself, which cannot be understood and managed by the cognitive tools we have thus far chosen to use.

We have come to this point, Ms. Costa tells us, because humanity lacks an adequate sense of its own history. We have not faced honestly the central questions of philosophy and religion, which are scrawled in simplest terms on the canvas of Paul Gauguin's Tahitian masterpiece: Where did we come from? Who are we? Where are we going? By *history*, Ms. Costa correctly means not just of this country or that, but of the rise and fall of past civilizations and, beyond, the six million years of biological evolution of the human line, played out in intricate relationship with the rest of the biosphere.

From the long haul of biological evolution came genetic human nature. This period, during which we acquired our emotions and cognitive capacities, shrinks to an eyeblink

the human history begun with the Neolithic revolution ten thousand years ago. The past three millennia have seen the exponentiation of everything gained by cultural evolution: population spread; the efficiency of work, knowledge, technology; and, unfortunately, the depletion of natural resources; the destruction of the remaining natural environment; and an increase in the war powers of more and more groups and nations.

Professional optimists like to say that doomsday predictions are as old as the written word and never come to pass. They believe that the genius and spirit of humanity have always found a way around its problems, and will again, and yet again. In short, not to worry. But to think this way is to ignore the reality of exponential change. If you have a doubling time of any entity or process of, say, twenty years, for a great many such periods the world as a whole will remain unsaturated and manageable. But at some point in any exponential growth, the next doubling time produces an absolute increase that overshoots all the space and resources left. At that point, the options for accommodation also shrink drastically.

There is great truth in the oft-quoted riddle of the lily pads. A pond (a lake, an ocean, all apply) starts with a single lily pad. Each pad doubles per day; the pond will be full in thirty days. When is the pond only half full? On the twenty-ninth day. After the next day, the thirtieth, further growth is so fast it will, if somehow continued, overwhelm the pond and everything in it in a matter of hours.

I am on the side of Rebecca Costa and others—let us accept the title of realists-in-search-of-a-solution, not doomsayers—who say that because of exponentiation, humanity doesn’t have a lot of time to figure things out. We have to solve our problems not by continuing to use emotions and responses that suited our primitive ancestors but now put us all in imminent danger. Instead, we need to use knowledge and reason and take an honest look at

ourselves as a species. We need to grasp the increasing complexity of our social and political arrangements, and reach solutions. In *The Watchman's Rattle*, Ms. Costa urges us to do so by employing the better instruments of our genetic nature.

Introduction

ONE COLD AND RAINY SPRING DAY, I was sitting in E. O. Wilson's office in the back of the Natural History Museum at Harvard when he turned and said, "*It's dangerous to state the obvious*."[1]

It was a chilling warning from the most acclaimed naturalist in the world and the only scientist to be physically attacked on U.S. soil for his views.

Wilson was foreshadowing what lay ahead: the scrutiny, criticism, irrational opposition, and attempts to disparage me for using terms such as "evolution" and "biological obstacles" to explain why governments, leaders, and experts have become gridlocked.

But everyone knows we can't fix our problems anymore. The world we're handing off to our children is in much worse shape than the one we inherited. Something dangerous is happening, but we haven't been able to put our finger on exactly what it is.

So in his charming southern way, Wilson was simply confirming what I suspected all along: Once we discovered the reason for gridlock, it would likely look and feel *obvious*. The truth always does.

That said, it would have been impossible to write *The Watchman's Rattle* until 2006. Six pieces had to fall into place and they were 150 years in the making.

The first piece of the puzzle arrived in 1859[2] with the publication of Charles Darwin's *On the Origin of Species*. Darwin uncovered the slow, continuous pace at which all life-forms, including humans, respond to their environment to increase their opportunities for survival. To this day, his discovery remains the most important scientific principle governing life on earth.

Then in 1953 came the discovery by James Watson and Francis Crick[3] of the double helix in DNA. Together they unlocked the mechanics of *how* Darwin's theories worked, and for the first time it became possible to trace the biological genesis of all living organisms. Overnight, evolution graduated from a widely embraced principle to a provable fact.

By the time E. O. Wilson's controversial book *Sociobiology[4]: The New Synthesis* came along in 1975, I was already a junior at the University of California. According to Wilson, genetic inheritance plays a big role in how we behave as individuals and in groups. Human beings are not born "blank slates." We are born with hardwired predispositions and instincts aimed at assuring our species' survival. Natural selection has a big hand in explaining modern aggression, altruism, hoarding, competition, even mate selection.

Then one year later, Richard Dawkins released his book *The Selfish Gene*[5], which took a harsher dog-eat-dog approach. According to Dawkins, individual gene pools, not the species, are fighting to survive. Genes *selfishly* want and need to perpetuate. To this end, they manipulate human behavior to assure continuity, even to the point of being destructive to the group.

The revelations of Wilson and Dawkins turned my college education upside down. Torn between my love for biology and a desire to find a humanitarian career, I spent months arguing with the university about changing my degree from sociology to sociobiology. But the university

fought back, saying, “Two books, no matter how historic, don’t justify a new degree.” So in 1977 I, along with a handful of students, reluctantly accepted the first bachelor of science degree offered in “combined social sciences.”

Following this hollow victory, I made my way home, where the fifth piece of the puzzle was unknowingly taking shape: *the accelerating complexity of the human condition*.

In the 1970s my family was living in Northern California, an area populated by apricot and plum orchards, unspoiled creeks, and hills covered with dry grasses and century-old oaks. No one suspected this rural landscape would soon become ground zero for a new era of technology. But by the time I arrived in Santa Clara in 1977, “Silicon Valley” was already under way.

The first company to offer me a job[6] was a group of scientists who believed they could convince draftsmen and engineers to stop drawing by hand. Calma Corporation called its technology computer-aided design (CAD). CAD offered a way to design cheaper, safer, more efficient products by using computer workstations to create three-dimensional models instead of relying on error-prone, manual drawings.

My task was to translate confusing technical data into language the person on the street could understand. I spent many late nights with scientists from Stanford, Berkeley, and MIT trying to summarize their research into a few crisp bullet points. For me this was a dream job: Sociobiology had unwittingly equipped me to act as a bridge between science and society. After all, technology had to be married to real human needs before it would be embraced.

Computer-aided design took off as quickly as semiconductors and personal computers infiltrated Main Street. Within five years, companies around the world, from seat belt manufacturers to those building nuclear power plants, were designing products on computers. It was a

radical, historic, and abrupt transformation and no one even batted an eye.

Then in a twist of fate, General Electric purchased Calma. Suddenly, Calma found itself holding the key to corporate icon Jack Welch's vision of "the factory of the future." Our new mission was to help GE successfully transition from a tired manufacturing giant to a high-tech leader in the twentieth century. I was overjoyed to report to Welch's senior staff, commonly called the *Gang of Five*, who taught me to think strategically and systemically—to look for patterns amid seemingly disparate trends.

By this time it was the eighties and Silicon Valley was booming. Computer hardware and software were changing by the nanosecond, and the Internet and cellular communications were looming on the horizon. Venture capitalists were fanning the flames of progress, and new start-ups were popping up everywhere. Before long, I succumbed to the constant, irresistible calls of recruiters on the hunt for experienced executives. I was lured from GE to a small company that introduced the world's first optical storage device; later I joined a venture that pioneered computer networking. By the time I launched my own company and began working with Apple Computer, Hewlett-Packard, Oracle, 3M, Amdahl, and Seibel Systems, novelty and complexity had become an accepted way of life. New technology was being adopted faster and faster, and no one stopped to question whether this explosive rate of change was sustainable. We all just assumed that it was.

The final piece of the puzzle arrived years later in 2006 when neuroscientists Drs. Michael Merzenich, John Kounios, and Mark Jung-Beeman independently published landmark research on how the human brain tackles complex problems. Their investigation into the conditions that lead to higher cognitive functioning were pivotal in understanding how we adapt to accelerating change and complexity.

It took all these discoveries—evolution, genetics, sociobiology, memetics, neuroscience, and my work in the vortex of Silicon Valley—to bring me to the biological reasons for the ascension and decline of civilizations.

Today, the issues that threaten human existence are clear: a global recession, powerful pandemic viruses, terrorism, rising crime, climate change, rapid depletion of the earth's resources, nuclear proliferation, and failing education. Though at first glance this list appears daunting, it is also true that we have never been in a better position to circumvent a repetitive pattern of decline.

Which brings me to the writing of *The Watchman's Rattle*.

In earlier times, ordinary citizens volunteered as watchmen to protect the welfare of their communities. They patrolled neighborhoods, lighthouses, and important institutions, watching for early signs of danger. Surprisingly, these early watchmen never carried weapons. They carried wooden rattles that made a loud, harsh, clacking noise designed to summon help. The sound of the watchman's rattle was an alarm—a call for citizens to wake from their sleep and quickly join forces against danger.

This book is the sound of the watchman's rattle in the dead of night. A summons for help. A plea to change the course of humankind by calling on the greatest weapon of mass instruction ever known: *the human brain*.

Rebecca D. Costa
Big Sur, California
April 11, 2010

I have never heard a sound beating the air,

so fraught with the spirit of trouble and need of assistance,

as the sharp crack of the watchman's rattle

reverberating in the street at the dead hour of night.

— EDWARD H. SAVAGE, 1865

1

A Pattern of Complexity and Collapse

Why Civilizations Spiral

ON THE MORNING of August 29, 2004, I had an important insight. I remember the date because I was driving to the birth of my nephew Ben.

As I was rushing to the hospital, I was typing the address on my GPS screen, plugging my Blackberry into the cigarette lighter, getting my iPod into the docking station, plugging my laptop into a second outlet, putting my telephone headset and seatbelt on, and trying to drink my coffee. All the while keeping a two-ton vehicle moving at sixty miles an hour on the road.

That's when it hit me.

Life has become really complicated.

There was a time not long ago when all I had was a simple checking and savings account. But today, in addition to these, I find myself trying to keep up with CDs, bonds, mutual funds, REITs, ETFs, Spyders, IRAs, pensions, social security, and commodities such as oil, which seems to affect the value of every other thing. I have four different credit cards, each earning mystery points, airline miles, free rental cars, extra nights at hotels, and global discounts I can no longer keep track of. What's more, my credit card companies have now become banks and travel agencies

want me to order movie tickets, make dinner reservations, and write checks through them.

And then there's the big picture.

According to the U.S. Department of State, there are forty-five active terrorist groups in the Middle East who want to kill me. On a good day I'm able to name three. And as long as I'm on a roll, let me be the first to admit that I can't figure out whether a national health care program is a good thing for me or my country because I don't have the time to study it. In fact, I don't feel qualified to vote on most of the initiatives on a ballot anymore. Although I worry about the effect that global warming and mounting government debt will have on my children's future, I no longer know what to do about them.

The world is starting to look a lot like the inside of my car.

But consider this: From an evolutionary perspective, social progress moves fast It takes only weeks to develop the next iteration of a cell phone, law, or mortgage. And major discoveries in science, from the human genome to new fuel cells and galaxies in outer space, are also occurring at a remarkable pace. But our brains–the apparatus that must process all this new information–evolve over millions of years. So while the world is changing in picoseconds, my brain is struggling to keep up.

But what happens if it can't? Can complexity race ahead of the brain's biological capabilities?

In his book *Making Things Work*,[1] Yaneer Bar-Yam, president of the New England Complex Systems Institute and professor at Harvard University, explains the reason complexity poses a threat: "The rule of thumb is that the complexity of the organism has to match the complexity of the environment at all scales in order to increase the likelihood of survival." He then explains why the odds feel stacked against us: "What is a complex environment? A complex environment is one that demands picking the right

choice in order to succeed. If there are many possibilities that are wrong, and only a few that are right, we have to be able to choose the right ones in order to succeed."

Many more wrong possibilities than right ones? Coming from a soft-spoken physicist at Harvard, that sounds ominous.

But here's the million-dollar question: Is escalating complexity just a modern-day phenomenon? Or did people living in advanced Mayan, Roman, Khmer, and other civilizations develop the same contentious relationship with progress?

And even if they did, so what? That doesn't mean it had anything to do with their collapse.

Or does it?

A Thriving 3,000-year Civilization

Between 2600 BC and 900 AD, the highly advanced Mayan civilization[2] spanned what are now Mexico, Guatemala, Honduras, El Salvador, and Belize. Archaeologists speculate that the empire grew to over fifteen million citizens, with population densities equal to Chicago today.

Imagine a massive, thriving society—located in the middle of one of the most hostile environments known to humankind—without any of the technology or modern conveniences we depend on today: no electricity or trucks, no telephones or police. How was order maintained for millions of people over such a vast geography? Food distributed? Garbage, sewage, and education managed?

Many people know that the Mayans were master potters, weavers, architects, and farmers, but even by modern standards the prodigious reach of the Mayan civilization represented an unfathomable leap in human achievement. Despite colossal environmental challenges, the Mayans invented a sophisticated cylindrical

calendaring system, celestial charts to track weather patterns, the most advanced written language developed at that time for expressing complex ideas, and mathematics that included the revolutionary concept of “zero.” They also engineered elaborate hydraulic projects that included a complex maze of public reservoirs, canals, dams, and levees. On virtually all fronts, the Mayans progressed rapidly, achieving quantum breakthroughs in technological, organizational, and artistic innovation.

Then, about a thousand years ago, sometime between 750 AD and 850 AD, the majority of the Mayan people suddenly disappeared. *In a single generation, the society collapsed*.

Why?

The prevailing theory is that the Mayan civilization met a “sudden death” because of severe drought.

Professor Gerald Haug is the best-known proponent[3] of this view. Core samples from the Caraico Basin show that three long droughts correspond to the same time frame when Mayans abandoned their cities. “These data suggest that a century-scale decline in rainfall put a general strain on resources in the region, which was then exacerbated by the abrupt drought events.”

But other scientists argue that, as malnutrition and water-born diseases became rampant, drought conditions simply worsened existing tensions between the ruling royalty and working classes. The Mayan people revolted against their rulers and began an exodus out of the cities.

Still other scholars cite the spread of a single virus as the primary cause of collapse, whereas other experts insist that food shortages merely exacerbated a history of civil war between antagonistic Mayan factions.

According to Michael D. Lemonick,[4] an expert on Mayan culture: “Uncontrolled warfare was probably one of the main causes for the Maya’s eventual downfall. In the centuries after 250—the start of what is called the Classic

Period of Maya civilization—the skirmishes that were common among competing city-states escalated into full-fledged, vicious wars that turned the proud cities into ghost towns."

Renowned Yale archaeologist Michael Coe agrees with Lemonick: "The Maya were obsessed with war."[5]

But according to Jared Diamond,[6] author of *Collapse: How Societies Choose to Fail or Succeed* and professor of physiology and geography at UCLA, the rise and fall of civilizations can be traced to a dramatic change in environmental conditions. Diamond explains the early success of the Mayan civilization in terms of favorable water, food, temperatures, minerals, and other conditions conducive for a small society. Conversely, as the population grew and one or more of these conditions changed, progress stopped, conditions deteriorated, and citizens disbanded. In the case of the Mayans, deforestation may have started a disastrous chain of events.

From my standpoint, I agree with Diamond, Haug, Lemonick, Coe, and, for that matter, *all* theories regarding the events that led to the Mayan collapse.

How's that possible?

Simple. I am not particularly interested in *what* happened. I'm curious about *why* it happened—and whether it really happened overnight.

What occurred *before* the final event(s) responsible for the collapse of the Mayans, the Romans, the Egyptians, and the Khmer, Ming, and Byzantine empires? Did these societies adopt any behaviors—any ways of thinking—that made them *vulnerable to failure?* And if they did, are we repeating that pattern today?

Dusting Off Evolution

Today, scholars and scientists who study ancient civilizations cite environmental factors, overpopulation, wars, disease, politics, and energy and food shortages as the reasons for collapse. And although these explanations are factual, they also leave out the single most important principle of life on earth: *Evolution. The process and rate at which biological change occurs between one generation and the next*.

The principles governing the speed at which the human organism can biologically adapt offer us the single greatest insight into why civilizations succeed and fail as well as the most reliable preview of our own destiny.

Biological capabilities—the genetic features of each human organism—represent the only common denominator in every civilization and, therefore, must necessarily play a role in every civilization's outcome.

Yet, despite knowing this, when it comes to explaining how and why civilizations decline, we continue to account for every factor *except* evolution. We treat the discoveries of Charles Darwin in 1859 as if they relate only to our cave-dwelling ancestors or animals crawling around the Galápagos Islands. Evolution has become marginalized—imprisoned in the backrooms of zoology departments, treated as the precursor to microbiology, and relegated to what we see in our rearview mirrors rather than what lies ahead of us through the windshield.

Why has evolution been left out of the conversation?

Because for more than 150 years, scientists have failed to show how the principles governing evolution explain the rapid progress of human societies for a brief period, followed by their paralysis and cataclysmic failure. Somewhere along the line, biologists handed the task of understanding the relationship between evolution and modern man to psychologists and sociologists, who quickly formed theories of their own. So the ramifications of evolution on day-to-day life, public policy, and persistent,

irresolvable problems were never solidified. As a result, aside from a few enthusiasts in the ecology movement and their naturalists brethren, evolutionary principles have managed to become irrelevant.

Think about it. We never hear about the effect that evolution has on solving global problems discussed on Capitol Hill, or in corporate boardrooms or in the economics, engineering, or physics departments of universities. No one mentions evolution during national elections, on television talk shows, or in a court of law unless it is in the narrow context of stirring up the tired old debate between creationism and science. We act as if evolution is something that happened in the past or to other species and, therefore, plays no role in the follies of humankind today. In short, evolution has become a *has-been*—a pair of shoes that no longer fit, an aunt who moved to another neighborhood, an old dog asleep on the back porch.

Yet, to solve the highly complex, dangerous global problems we face today, we must first recognize the crucial relationship between evolutionary change and the modern human condition. To finally answer the question scholars have wrestled with for centuries—why do human beings compulsively follow the same pattern of collapse again and again and again—we must come to terms with how we are wired to behave, irrespective of nationality, race, intelligence, wealth, or political convenience. We must look to the physiological capabilities, as well as the limitations, of the *human organism* itself.

After all, modern man has vastly different abilities than our prehistoric ancestors of just five million years ago. And given another five million years, humans will develop talents that will make our way of life today seem equally primitive. Humankind is a “work in progress,” so at any point in time our biological apparatus can take us only so far.

But how far?

History makes it clear that we hit some obstacle that causes progress to slow long before the specific event(s) blamed for the collapse of a civilization—some recurring obstruction that is both natural and predictable: *The uneven rate of change between the slow evolution of human biology and the rapid rate at which societies advance eventually causes progress to come to a standstill*.

In the case of the Mayans, they became unable to "think" their way out of large, highly complex problems because they advanced to a point where traditional left- and right-brain problem-solving methods—which the human organism developed over many millions of years—were no longer sufficient to address their most dangerous threats.

Put another way, the intricacy and magnitude of the issues that the Mayans faced during their final hours—climate change, civil unrest, food shortages, fast-spreading viruses, and a population explosion—exceeded their ability to obtain facts, analyze them, innovate, plan, and act to stop them. Their problems simply became too complex.

The point at which a society can no longer "think" its way out of its problems is called *the cognitive threshold*.

And once a society reaches this cognitive threshold, it begins passing unresolved issues from one generation to the next until, finally, one or more of these problems push the civilization over the edge.

This is the real reason for collapse.

A Recurring Evolutionary Obstacle

Think of *the cognitive threshold* in this way: The rate at which the human brain can evolve new faculties is millions of years slower than the rate at which humans generate change and produce new information. So, from a strictly

biological standpoint, the human brain can't help but fall behind. There is simply no way an organ that requires millions of years to adapt can keep up with change that now occurs in picoseconds.

John Stanton, CBS, ABC, and CNN commentator[7] in Washington, D.C., and author of *Evolutionary Cognitive Neuroscience* summarizes the predicament this way:

> The world that seems so familiar to you and me—a world with roads, schools, grocery stores, factories, farms and nation states—has lasted for only an eye blink of time when compared to our entire evolutionary history. The computer age is only a little older than the typical college student and the industrial revolution is a mere 200 years old. Agriculture first appeared on earth only 10,000 years ago, and it wasn't until about 5,000 years ago that as many as half the human population engaged in farming rather than hunting and gathering.

Stanton then compares this rate of change to the pace of evolution: "Natural Selection is a slow process and there haven't been enough generations for it to design circuits that are well-adapted to our post-industrial life."

It's curious that we are willing to accept physical limitations in every other area *but* the human brain. We accept the fact that a human can't lift five thousand pounds, run a mile in thirty seconds, or stay under water for more than a few minutes. We also accept archaeological evidence that shows the human brain has been quickly evolving for the past twenty-five million years. We have museums filled with skeletal proof that our early ancestors didn't enjoy near the cognitive abilities we do today. What's more, most of us agree that the brain will continue to evolve[8] in the future; it will adapt and mutate in response

to rapidly changing environmental conditions, though no one can predict precisely how.

So, doesn't it also logically follow that we have cognitive limits today?

It seems irrational to *assume* that the left- and right-brain problem-solving methods we have evolved to this point have equipped us to address highly complex problems such as climate change, terrorism, pandemic viruses, and nuclear proliferation, especially since all these problems share one obvious characteristic: They are multilayered, chaotic issues involving many, many variables acting in dynamic ways. In fact, our problems have become so large and so complex that experts rarely agree on what the problem is anymore. As a result leaders have become completely dependent on sophisticated computer-based models—the kind used to make predictions in quantum physics—to run thousands of possible catastrophic scenarios: *What if* a dirty bomb makes it through our borders? *What if* a pandemic virus annihilates a major metropolitan area? *What if* water or food is contaminated by biological weaponry? *What if* both polar caps melt? No more simple cause and effect. No more quick diagnosis and remedy. And no more simple left- and right-brain problem-solving.

The bottom line is this: When it comes to the evolution of the human organism, it doesn't matter if we are talking about the capabilities of the brain, how fast we can run a mile, or whether we have a sufficient number of appendages to drive, talk on our cell phones, and drink a cup of coffee at the same time. Our biological capabilities determine how fast and how far we can go.

Consequently, the difference between an advanced culture that survives and one that does not may simply boil down to whether a society develops new ways to triumph over a naturally reoccurring cognitive threshold. How well do we understand our physiological limitations, our