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—*Education Forum*

NEW WORLD NEW MIND

MOVING
TOWARD
CONSCIOUS
EVOLUTION

Robert Ornstein
Paul Ehrlich



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I

THE THREAT WITHIN THE TRIUMPH

IT ALL SEEMS to be happening at once. A small group of terrorists murder a few Americans far away—and fear of getting murdered changes the traveling habits of millions. But Americans continue to slaughter more people *each day* with handguns than all the people the terrorists have killed up to the writing of this book. No one does anything about it.

People swamp AIDS testing centers, desperate and anxious to know if they are carrying the virus. If they have it, it will likely kill them. Can society even care for AIDS victims?

Meanwhile populations explode, stockpiles of nuclear weapons grow, budget deficits mount, our education becomes more and more obsolete, and the environment—on which our very existence depends—deteriorates. But most people's attention is fixed upon eye-catching "images," such as the taking of the Iran hostages, horrible murders, airplane crashes, changes in stock prices, and football scores. Cancer terrifies us, yet we keep on smoking. Oliver North testifies that he lied—yet his good looks and smooth talk lead many people to propose that he run for President.

And the President operates the same way. Ronald Reagan, by his own admission, perverted an important U.S. global policy because *his* mind was similarly fixed on another set of hostages. He said, "I let my preoccupation with the hostages intrude into areas where it didn't belong. *The image, the reality of Americans in chains, deprived of their freedom and families so far from home, burdened my thoughts.* And this was a mistake." [italics ours]

Why does the growing budget deficit attract relatively little attention while the comparatively meaningless stock market "crash" makes headlines? Why do many popular writers yearn for a return to an education suitable for Oxford men before World War I, when the world has changed in critical ways to a greater extent since World War II than it changed between the birth of Christ and that war? Why do the numbers of nuclear weapons expand astronomically but largely unheralded, while a small girl trapped in a well commands the front pages? Why do we collectively spend billions on medical care while neglecting the simple preventative actions that, if we took them, would save many times the lives?

We believe it is no accident.

All these things are happening now, and are happening all at once, in part because *the human mental system is failing to comprehend the modern world.* So events will, in our opinion, continue to be out of control until people realize how selectively the environment impresses the human mind and how our comprehension is determined

by the biological and cultural history of humanity. These unnoticed yet fundamental connections to our past, and how we can retrain ourselves for a “new world” of the future, one filled with unprecedented threats, are what this book is about.

We are writing this book in an effort to help decision makers, educators, physicians, businessmen, and concerned citizens to change their “minds”—not in the conventional sense, but rather to change the way they make decisions. We don’t think there is any panacea for all the problems of society; nothing simple that we can do right now is guaranteed to prevent a nuclear war or avoid the next plague. Everything, unfortunately, cannot be solved by one book! But we do think that if people understood the fundamental roots of our many problems, they might begin to change in a direction that could secure the human future.

Today’s situation is unprecedented, but the human situation has often been unprecedented. In part, successfully facing the unprecedented has distinguished human beings from other forms of life. Since they spread out of Africa, people have always created new environments for themselves; they have always had to adapt to new and unexplored territory.

There is a difference now, though. At no previous time have people had the capacity to destroy their civilization in a few hours and to ruin much of the planet’s life-support systems in the process. And never before has a species been engaged, as are we, in the process of destroying those systems wholesale in a “gradual” manner that could complete the job in less than a century.

But fortunately there is still time to change. Scientific evidence developed over the past three decades illuminates many aspects of the nature of both the human mind and the human predicament, and points the way to the changes needed. This evidence is drawn from many disciplines, including evolutionary biology, neuroscience, cognitive science, climatology, and geochemistry.

We believe that the only permanent means of resolving the paradox that our minds are both our curse and our potential salvation is through conscious change. Our biological evolution, including the physical evolution of our brains, is much, much too slow to

help. And the undirected evolution of our culture, in view of the demands being placed on it, is still too sluggish and often inappropriate. Both biological and cultural evolution are inadequate to adapt us to the environments we are creating.

We don't perceive the world as it is, because our nervous system evolved to select only a small extract of reality and to ignore the rest. We never experience *exactly* the same situation twice, so it would be uneconomical to take in every occurrence. Instead of conveying everything about the world, our nervous system is "impressed" only by *dramatic changes*. This internal spotlight makes us sensitive to the beginnings and endings of almost every event more than the changes, whether gigantic or tiny, in the middle.

The perception of dramatic changes begins deep within the nervous system, amid simple sensing such as seeing light. Put a three-way bulb (50-100-150 watts) in a lamp in a dark room. Turn on the lamp: the difference between darkness and the 50-watt illumination is seen as great; but the increase from 50 to 100 and from 100 to 150 seems like almost nothing. Although the change in the physical stimulus is exactly the same, you notice it less and less as each 50 watts are added. Turn off the lamp, even from the 50-watt setting, however, and you feel it immediately! We notice the beginning and the end and overlook the greater changes in the middle.

You might be thinking that this analysis of lamps and sensing light is very far removed from the major dilemmas of our current world. But our point is that many of the predicaments of our society come about from the way people respond to, simplify, and, ultimately, "caricature" reality in their minds. Our caricature emphasizes the dramatic and distinctive features of events, in the same way as a cartoon caricature of a politician might exaggerate Lyndon Johnson's outsize ears, Richard Nixon's ski-jump nose, Mikhail Gorbachev's forehead birthmark.

This simplified focus on the dramatic is now out of date in complex modern life; the same routines of internal analysis that originally developed to signal abrupt physical changes in the old world are now pressed into service to perceive and decide about unprecedented dangers in the new. Scarce and unusual items, be they a

headline news event, a one-day dress sale, or a chance for peace, come into the mind through the same old avenues and are filtered and judged in the same old way.

This mismatched judgment happens in the most basic as well as the most momentous situations. In psychology experiments, a word at the beginning of a list heard once is recalled 70 percent of the time, words in the middle less than 20 percent, and words at the end almost 100 percent. In 1980, presidential candidate Ronald Reagan illustrated these principles. He said: "Politics is just like show business. You need a big opening. Then you coast for a while. Then you need a big finish." Reagan is renowned for his political savvy.

The same sensitivity to sharp changes gets called into play in judging the most important, life-or-death essentials. Consider this: the first atomic bombs were kept secret and then were unveiled suddenly. The mushroom clouds over Hiroshima and Nagasaki, and the sudden vast destruction they caused signaled a sharp change in the world. The new threat was readily noticed and properly feared.

But two responses indicate that humanity did not perceive this important change in the world correctly. First, that atomic explosion on Hiroshima made a *far greater impression* than the much greater destruction and death visited upon Tokyo by conventional incendiary bombs, since burning cities seen from the air (in newsreels) had by then become routine and so were ignored.

And, second, since the first frightening explosions, nuclear weapons have accumulated gradually until they now number in the *tens of thousands*, and most of them are ten to a hundred times more powerful than those that devastated Hiroshima and Nagasaki. Our minds are inhibited in noticing the threat; the continuing accumulation of gigantic arsenals doesn't get the same attention as the first weapons. Only public relations events, new "beginnings" like the nuclear winter announcement, or the showing of the TV film *The Day After*, can reattract old minds—and then only temporarily until habituation sets in again.

The human nervous system, well matched to a world in which small, sharp changes were important but large gradual ones were

not, is inadequate to keep attention focused on this most ominous nuclear trend. Our nervous system and our world are *mismatched* now. The original image of a single nuclear detonation signaled an awesome threat. Graphs and tables describing the sizes of arsenals fail to produce a comparably realistic understanding; occasional news events have only temporary effects on most people. Our response to nuclear armaments has followed the Reagan caricature. The big opening was Hiroshima; now we're coasting; with lots of luck we may avoid the big finish.

A set of hydrogen bombs joined to an intercontinental ballistic missile is one of the ultimate triumphs of biological and cultural evolution. Think of it: humanity, whose own origins were as a few relatively large molecules in a tiny droplet in a primitive sea, has now itself developed the power to annihilate much of life on Earth.

But why? Why have we done it? Why, on a planet that has an exploding population, a deteriorating environment, and massive social problems, has the only genuinely creative species invested so much time, energy, and genius in building arsenals that can only be used to destroy itself?

Why has humanity not redirected its efforts instead into seeking ways for people to live together without conflict and to limiting the size of its population so that everyone can lead a meaningful life? Why hasn't humanity tried vigorously to preserve the earth that people and all living species depend upon?

The answers to these kinds of questions are not simple. The dilemmas will not be "solved" by the next political campaign, government program, educational critique, or international conference. They are to no small degree problems of how we perceive our environment and ourselves.

The problem has much deeper roots than most people envision. To trace its history will take us into the world in which our species evolved, into the world that made us. That world has produced in us certain ways of interpreting our surroundings, ways that once enhanced our survival. But these "old ways" are not necessarily adaptive in a world that is utterly different from the one in which our ancestors lived.

Some scientists recognized our evolutionary mismatch decades ago, but their insight has had as yet little effect. On May 23, 1946, Albert Einstein sent a telegram to President Roosevelt on behalf of the Emergency Committee of Atomic Scientists saying, in reference to nuclear explosions, “The unleashed power of the atom has changed everything save our modes of thinking, and thus we drift towards unparalleled catastrophe.” The power of human destructiveness is far greater forty years after the Hiroshima and Nagasaki explosions that prompted Einstein’s statement, yet human thought processes still remain largely unchanged.

The weapons in the United States and Soviet strategic arsenals now contain enough explosive power that, if packaged as Hiroshima-sized bombs, they could blow up one Hiroshima *each hour* for more than a lifetime (seventy-eight years)!

To recognize how extraordinary human history is, we must reset our idea of time: in evolutionary time, a million years is not very much. Given the time scale of the history of the Earth, which condensed from cosmic gases and dust about 4.6 billion years ago, humanity has evolved and multiplied with unprecedented speed. In only a few million years human beings have spread from the African plains to inhabit every part of the planet. Humanity has grown from scattered groups of a few thousand to a mob of over 5 billion.

Suppose Earth’s history were charted on a single year’s calendar, with midnight January 1 representing the origin of the Earth and midnight December 31 the present. Then each day of Earth’s “year” would represent 12 million years of actual history. On that scale, the first form of life, a simple bacterium, would arise sometime in February. More complex life-forms, however, come much later; the first fishes appear about November 20. The dinosaurs arrive around December 10 and disappear on Christmas Day. The first of our ancestors recognizable as human would not show up until the *afternoon of December 31*. *Homo sapiens*—our species—would emerge at about 11:45 P.M. All that has happened in recorded history would occur in the final *minute* of the year.

It’s been a long evolutionary climb, one taking several billion

years, from our evolutionary origins in the sea to our ability to make and deliver hydrogen bombs.

The mental machinery of human beings developed almost entirely before that fateful final “minute.” And that, we maintain, is what makes it extremely difficult for us to diagnose our major problems, let alone to solve them. It is still possible, however, to change the way we perceive the world, to change the way that humanity thinks, and thus to survive.

Hundreds of thousands or millions of years ago, our ancestors’ survival depended in large part on the ability to respond quickly to threats that were immediate, personal, and palpable: threats like the sudden crack of a branch as it is about to give way or the roar of a flash flood racing down a narrow valley. Threats like the darkening of the entrance to the cavern as a giant cave bear enters. Threats like lightning, threats like a thrown spear.

Those are not threats generated by complex technological devices accumulated over decades by unknown people half a world away. Those are not threats like the slow atmospheric buildup of carbon dioxide from auto exhausts, power plants and deforestation; not threats like the gradual depletion of the ozone layer; not threats like the growing number of AIDS victims.

In this book we’ll say a great deal about threats—the dangers to us, to our civilization, to the very capacity of the earth to support human life—that exist because we have changed the world so completely. We’ll concentrate on the difficulties our minds have in interpreting and even perceiving the new kinds of threats and responding appropriately to them.

In our view, there are several parts to the human quandary:

- The world that made us is now gone, and the world we made is a new world, one that we have developed little capacity to comprehend.

The old world for which our perceptual systems were “designed” was one where the overall environment was a relatively stable, limited one in which threats were signaled by short-term changes and action was usually required immediately. Consider the branch-flood-bear kinds of threats that our human progenitors faced over

millions of years of evolutionary history. Apes, australopithecines (our first upright ancestors), early human hunters and gatherers, and the inhabitants of early civilizations, like other animals, had evolved quick reflexes to deal adequately with such threats.

The benefits of having evolved “quick reflexes” also accrue today; in modern life we also must often react quickly. On hearing a cracking sound from our chair, we are instantaneously apprehensive and ready to act. If a child lurches into the street ahead of our car, we hit the brakes before even thinking about it. If we’re not half-witted, thunderclaps over the golf course tell us to put the clubs away quickly and retreat to the clubhouse for a drink. An unexpected intruder into our home arouses an automatic series of responses that we interpret as fear and a physical necessity to fight or flee. These are all reactions that would serve us well against bear, burglar, breaking branch, or downpour.

- All nonhuman species evolved to fit into their physical habitats, and people originally evolved to do this as well. Human beings, however, have changed the world more in the last ten thousand years than their ancestors did in the preceding 4 million. Much more than any other species, we have turned the tables on the physical environment and made it change to fit *us*. Clothing, fire, dwellings, and agriculture all enabled people to live where none could before. Modern human beings have left their evolutionary home in subtropical Africa to live all over the earth, in the freezing winters of Alaska as well as in the scorching deserts of the Middle East. More importantly, human beings have built entirely *new environments*: farms, villages, towns, crowded cities, ocean liners, even underwater dwellings, and more. Human beings can even live for brief periods away from earth itself.

- The human experience has been one of expanding creations and adaptations. This cyclic pattern spooled us, in an evolutionary instant, from small groups of hunters and gatherers into a complex civilization. Agriculture led to the construction of cities and the population explosion. Cities led to epidemics of the diseases of crowding and to large-scale warfare. Public health measures led to further increases in population and then, by permitting people to

live longer, to an increase in cancer and heart diseases. Cities also led to universities and the uncovering of many secrets of the universe. And uncovering secrets of the universe led to Hiroshima and Chernobyl.

And the pace of change itself becomes even faster. Next month the world population will *increase* by more than the number of human beings that lived on the planet 100,000 years ago, a time when evolution had already produced a human brain almost indistinguishable from today's model. In the next 4 years alone more people will be added to the Earth than made up the entire population living at the time of Christ. It is difficult to comprehend this kind of world, and most people, too many, have been unable to do so. Human inventiveness has created problems because *human judgment and humanity's ability to deal with the consequences of its creations lags behind its ability to create.*

- There is now a mismatch between the human mind and the world people inhabit. The mismatch interferes with the relationships of human beings with each other and with their environments. Our species did not evolve to comprehend the problems associated with gigantic numbers of people—yet 5 *billion* human beings now occupy the Earth.

Human beings, like all other organisms, have to adapt to the environments in which they live. For most of the history of life our ancestors evolved biologically, as do all living things. (Biological evolution consists of changes in the information encoded in our genes. It typically operates over thousands of generations.) Then, for the relatively brief period of human prehistory and history—a few million years—adaptation took place primarily by means of cultural change: the development of language and tools; the invention of agriculture, cities, industry, and high technology.

Cultural evolution can be much more rapid than biological, for it involves alterations of information stored in minds or in books, tools, art, and other artifacts of societies. Cultural evolution can make significant changes in a matter of decades or less. But the rapid changes human beings are making in the world now have made even the pace of most cultural evolution far too slow.

As a result we are losing control of our future. The serious and dangerous mismatch is this: civilization is threatened by changes taking place over years and decades, but changes over a few years or decades are too *slow* for us to perceive readily. That is a time scale too leisurely for a nervous system attuned to bears, branches, burglars, and downpours. At the same time, the changes are much too *rapid* to allow biological or cultural evolutionary processes to adapt people to them. *We are out of joint with the times*, our times.

- The rate of change in the world around us is increasing. Humanity is refashioning the world so quickly now that each *decade's* environment differs dramatically from that of the last. Each triumph of technology contains new kinds of threats. With the advent of television and other modern communications, we can even feel threatened by events, such as terrorist acts, occurring thousands of miles away.

The physiological tendency is to respond to them immediately, as if they were local emergencies, while at the same time we ignore some occurrences such as the gradual increase in homeless people or thinning of the ozone layer, that really are serious threats to us or our neighbors. Thus our old mental system struggles and often fails to distinguish the relevant from the trivial, the local from the distant, just as the ability to make such distinctions is becoming increasingly crucial.

- The human mental “hardware”—our senses and brains—is effectively fixed. That hardware equips us with what we call the old mind. Although we are evolving, our mental machinery will not change biologically in time to help us solve our problems. *The same mental routines that originally signaled abrupt physical changes in the old world are now pressed into service to perceive and decide about unprecedented dangers in the new.*

In saying this we don't mean to downgrade our accomplishments; indeed it is human inventiveness that causes our major dilemma. Our minds now conquer challenges and tasks that appear to have no parallels in our evolutionary past; we read and write, learn more than one spoken language, use word processors, and design and fly aircraft. But none of these tasks represents a break with the standard

animal pattern of planning to reach short-term goals. Many of our highest achievements represent, then, a *refinement* of the old mind, not a new kind of perception. They cause significant changes in our environment decade by decade, but they are generally responses to perceived immediate needs, not to changes happening over decades. We cleverly develop more fuel-efficient cars when gasoline prices suddenly rise. When they drop, we relax fuel-efficiency standards, even though careful analysis indicates that much higher gasoline prices are a near certainty in coming decades.

Like those of other animals, our brains evolved to understand only a small portion of the world, the portion that most affects our capacity to survive and reproduce. Each animal, whether a bee, butterfly, frog, chimp, or human being, lives within its own “small world,” which is a mere caricature of the outside world. This simple caricature of the environment, as we shall see, sufficed for most organisms in most environments, for most people throughout history; and it still works for many people. But it is fatally obsolete in a world where much more explosive power can now be carried in *one* nuclear submarine than has been detonated in all wars so far.

To restrain ourselves requires a radical shift in our normal way of perceiving ourselves and our environment: we have to look at ourselves in the long view and understand an evolutionary history of millions of years rather than the fleeting “history” that is taught. We need to be “literate” in entirely new disciplines, such as probability theory and the structure of thought, rather than just learning more about the sequences of English monarchs.

The time has come to take our own evolution into our hands and create a *new* evolutionary process, a process of conscious evolution. The human predicament requires a different kind of education and training to detect threats that materialize not in instants but in years or decades—we need to develop “slow reflexes” to supplement the quick ones. We need to replace our old minds with new ones.

It will not be nearly as exciting as fighting a bear or running away, not a simple speedy solution that can be summed up in a slogan. The remedy will demand a sustained, persistent, and complex effort. We need to learn to perceive and respond to the slow changes

in the size of human populations, the increasing extinction of other species, and the proliferation of nuclear weapons. These and other such gradual alterations of our world are threats much more dangerous than hostages, mass murderers, lightning bolts, and drunken drivers.