

THE EVOLUTION OF CONSCIOUSNESS

The Origins of the Way We Think

ROBERT ORNSTEIN

LINE ILLUSTRATIONS BY TED DEWAN



MALOR BOOKS
Los Altos, CA



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ISBN: 978-1-949358-97-1

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Library or Congress Cataloging-in-Publication Data for an earlier hardcover edition:

Ornstein, Robert E. (Robert Evan)

The Evolution or Consciousness: The Origins of the Way We Think/Robert Ornstein; illustrations by Ted Dewan.

p cm.

Includes bibliographical references and index.

ISBN 0 -13 -587569-2

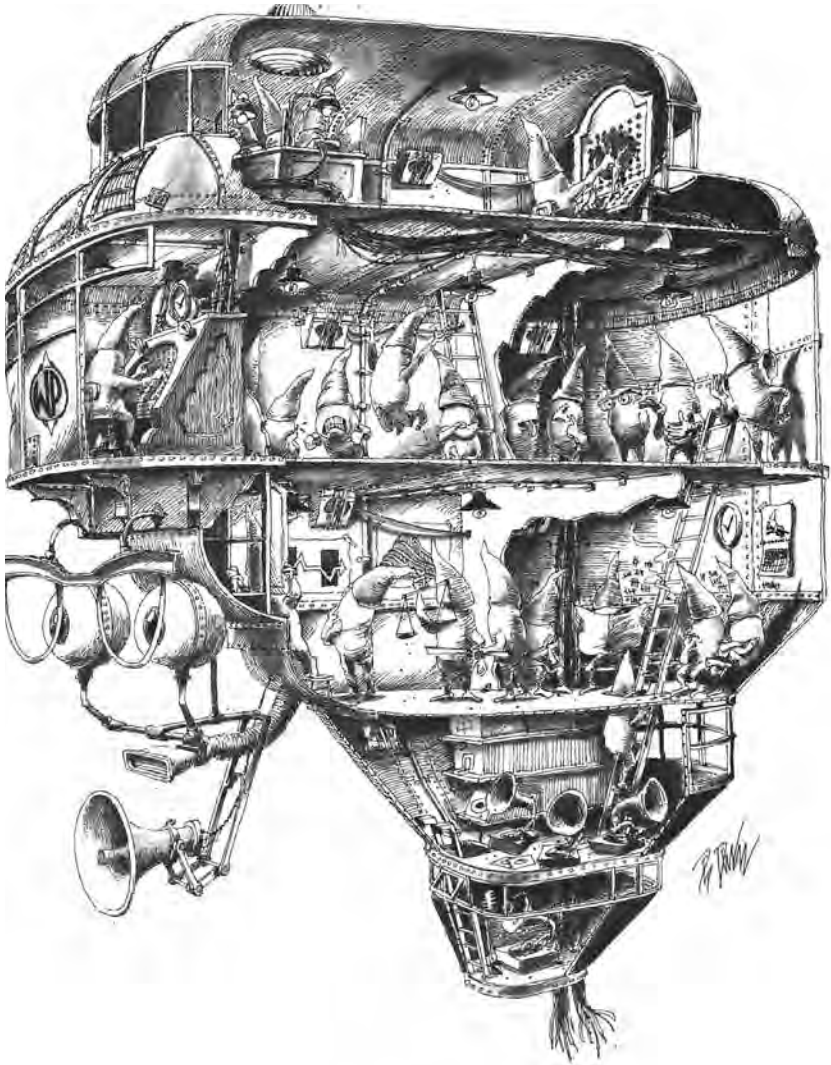
1. Genetic psychology. 2. Neuropsychology. 3. Consciousness.
4. Adaptability (Psychology) I. Title.

BF701.076 1991

155.7—dc20

91-11306

CIP



The world-processing system.

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I

*The Work of
the Mind*



Squadron of simpletons.

1

Aristotle Is a Hamburger

Originally you were clay. From being mineral, you became vegetable. From vegetable, you became animal, and from animal, man. During these periods man did not know where he was going, but he was being taken on a long journey nonetheless. And you have to go through a hundred different worlds yet. There are a thousand forms of mind.

—JALLALUDIN RUMI

The mind is a squadron of simpletons. It is not unified, it is not rational, it is not well designed—or designed at all. It just happened, an accumulation of innovations of the organisms that lived before us. The mind evolved, through countless animals and through countless worlds.



Like the rest of biological evolution, the human mind is a collage of adaptations (the propensity to do the right thing) to different situations. Our thought is a pack of fixed routines—simpletons.

We need them. It is vital to find the right food at the right time, to mate well, to generate children, to avoid marauders, to respond to emergency quickly. Mental routines to do so have evolved over millions of years and developed in different periods in our evolution, as Rumi noted.

We don't think of ourselves as of such humble origins. The triumphs that have occurred in the short time since the Industrial Revolution have completely distorted

our view of ourselves. Hence, the celebrated triumph of humanity is its rationality: the ability to reason through events and act logically, to organize business, to plan for the future, to create science and technology. One influential philosopher, Daniel Dennet, wrote recently: “When a person falls short of perfect rationality ... there is no coherent ... description of the person’s mental states.”

Yet to characterize the mind as *primarily* rational is an injustice; it sells us short, it makes us misunderstand ourselves, it has perverted our understanding of our intelligence, our schooling, our physical and mental health. Holding up rationality, and its remorseless deliberation, as the model of the mind has, more important, set us along the wrong road to our future. Instead of the pinnacle, rationality is just one small ability in a compound of possibilities.

The mind evolved great breadth, but it is shallow, for it performs quick and dirty sketches of the world. This rough-and-ready perception of reality enabled our ancestors to survive better. The mind did not evolve to know the world or to know ourselves. Simply speaking, there has never been, nor will there ever be, enough time to be truly rational.

Rationality is one component of the mind, but it is used rarely, and in a very limited area. Rationality is impossible anyway. There isn’t time for the mind to go through the luxurious exercises of examining alternatives. Consider the standard way of examining evidence, the truth table, a checklist of information about whether propositions are correct or not. To know whether Aristotle is a hamburger, you would look up “Aristotle” or “hamburger” in this table. Now think of the number of issues you immediately know well—what Yugoslavia is, whether skateboards are used at formal dinners, how chicken sandwiches should

taste, what your spouse wore this morning—and you will see that your own truth table, if entered randomly, would have millions of entries just waiting!

How much time would it take to search through all the evidence? Consider a computer about as fast as theoretically possible, so fast that it can look up an entry in the truth table in the time that it takes a light ray to cross the diameter of a proton. Suppose, as a new book, *Minimal Rationality*, has it, “This computer was permitted to run twenty billion years, the estimated time from the ‘big bang’ dawn of the universe to the present. A belief system containing only 138 independent [statements] would overwhelm the time resources of this ‘supermachine.’”

Now, this is a little exaggerated, I grant you. We’d never consider 138 logically independent propositions, nor even a dozen. On the other hand, truth changes constantly. The proposition “Donatello is a turtle” would have had no more meaning than “Aristotle is a hamburger” a few years ago. But that was before the Ninja Turtles landed in pop culture. Even with fixed truths, considering but two logical propositions like this would take 200 million years of this supercomputer’s time, a mite longer than we usually take for life-and-death decisions. Imagine an organism that searched through evidence as a tiger approached. What is this expanse of yellow in my visual field? Is this friendly? Take a look at those ears. Such an organism would not contribute any of its genes to succeeding generations.

Obviously we don’t search out all alternatives in an attempt to gain knowledge; instead, we use a few simple strategies and analyze everything this way. We have a very simple rough justice here in the mind. The mind works in the overwhelmingly large part to do or die, not to reason or to know why. Most of our mental reactions are automatic, not so automatic, perhaps, as removing one’s

hand from a hot stove, but stored in fixed routines, as in a military exercise.

We know only what we need for the rough-and-ready reality and are ignorant of things we see all the time because we don't need to know about them. What are the letters on the telephone under the 7? They are surprisingly difficult to remember because you don't normally need to know the link. You know all the letters and numbers, but you can't easily put them together. This happens all the time. Presumably you know the months of the year, and you know alphabetical order. First say the months in order. Takes about ten seconds or less. Now try them in alphabetical order. How smart are you at this?

We look quickly at the world and compute a rough and likely judgment. How much is $8 \times 7 \times 6 \times 5 \times 4 \times 3 \times 2 \times 1$?

Now, how much is $1 \times 2 \times 3 \times 4 \times 5 \times 6 \times 7 \times 8$? Obviously the products are the same. Still and all, when people are asked to assess one or another, the estimate for the first is 2,250; the second, 512? Why? Because we look at only the first few numbers and rough out the answer. Usually these vague estimates work well.

Our mind did not spring from a designer, nor from a set of ideal and idealized programs. Otherwise, we'd certainly not make the mistakes above. Instead, it evolved on the same adaptive basis as the rest of biological evolution, using the processes of random generation and selection of what is so generated.

The primary billet of the mental system is not self-understanding, self-analysis, or reason, but adaptation to the world, to get nourishment and safety, to reproduce and so pass on descendants. The human mind evolved a fantastic set of adaptations to operate within and to mesh with the small world or local environment in which each

of us finds ourselves. It works to gain a quick fix on reality and guide action.

This mental system has, or had, good justification; it presents priorities for action via consciousness. However, it doesn't show us the action "behind the scenes" of the mind or even tell us which special-purpose analyzer is working at any time. In the normal course of affairs, we would have no need to observe the mind's actions. We only know what is *on* our mind, rarely what is *in* our mind.

The story of the origins of the mind lies in many accidents and many changes of function. It begins long ago, with the nerve circuits of the first living beings. Later evolution carried the same primate brain structure found in the tarsier through the gibbon and, most recently, the chimp, gorilla, and orangutan. Thus, many of the mind's units were well worked out and firmly in place before the first human beings ever saw light. The general plan of our mental operation and action was in place before rationality was a glimmer in the eyes of the first farmers in the Levant, 11,000 years ago.

The finishing touches on our mind were complete tens of thousands of years before the rise of modern science, before the American Revolution in 1776, before the steam engine, before electricity, before Agincourt, before Christ, before Egypt, before the first Ice Age settlements in Jutland, before the cave painters of Lascaux.

In our ancestors evolved a mental system in which many of the mind's standardized short-circuit reactions were organized to simplify choices, to improve adaptation to a stable world, a world where one's grandparents and grandchildren would be facing the same problems with the same tools. Enhancing one's attention and reaction to short-term changes was important in the world in which we were refined.

Human beings have adapted amazingly, to the Himalayas, to the desert, to the forest, to the seashore, to São Paulo, to Prague. This extraordinary diversity is why our mind is so disorganized, so full of conflict, so diverse. And so difficult to analyze simply.

I hope the tour of the mind in this book will contribute to the current evaluations many are making about education and the way our society can adapt to the future. One implication is that we would look at current failures in education, in judgment, in politics not as failures of rationality or of cultural literacy but as *failures of adaptation*.

If we think of ourselves as rational, our ideas for improvement go along mistaken, though well-established, lines. One is knowing many facts. I've opened E. D. Hirsch, Jr.'s, recent *Cultural Literacy* to his famous list of what one needs to know to be culturally literate. First, I want to say this book contains a very good analysis of how we develop our understanding of the world, how we think and act. Yet the prescription for how to improve is weirdly typical of current thought.

I decided to look at *T* by chance. Here is the list for the first page: tabula rasa; tactics/strategy; Taft, William Howard; Taipei; Taj Mahal; take-home pay; take me out to the ball game (song); telltale; Tampa, Florida; tangent; tango; Tantalus; Taoism; taproot. Nothing on this list will help anybody adapt well to the world, understand what we are doing to the planet, or know how to work.

If we think of the mind as adaptive, we realize that during infancy every baby "picks up," with their mother's milk, the basics of life—language, accent, customs, food preferences, ideas of family and behavior, and identification with sex and tribe. The mind does so, without rational intervention, because it evolved to mesh the individual in a safe world.

If we understand that the adaptations of most “tribes” are now out of date in the modern world, yet we still have the same system, then changing our minds may well be much easier than we think. It will be a prescription much different from the cultural-literacy-type prescribed remedy. Humanity needs a new kind of adaptation to a world that is unprecedented.

I don't want to make mincemeat out of Aristotelian thought, but we cannot make the right kinds of changes in ourselves and in our education, our medicine and our society, without knowing where we came from. And knowing what we came from and how we came to be the way we are. We need to know how human beings came to think, feel, believe, and know the way we do, and how so much of it is firmly based on routines that happened to be around.

People can consciously redirect their minds, but, like learning to read or to do math, this ability doesn't come naturally. It has to be nurtured. We have to know who is in there to order around.

The mind isn't any one thing. Like an army, it has its master builders, its accountants, its dullards, its stooges, its wild spirits, its dreamers especially. The mind contains separate systems of thought, emotion, and ideas, and these *transfer* from one situation to another. Sigmund Freud elaborated on an important mental routine in his analysis of transference, but it isn't specific to the therapeutic encounter. Minds come into consciousness and transfer reactions all the time. This swapping of reactions leaves our consciousness unaware of how a new and different “mind in place” is determining our reactions.

This complicated internal system should have forewarned us that the mind isn't designed to be understood

as we might a software routine. It is, basically, just another organ to help a person operate in the world, to stay out of trouble, to eat, sleep, and reproduce. So why should human beings ever have evolved the ability to know what their mental system is doing, any more than we know what our pancreas is doing? And we have not done so. Our natural view of our mental state is deeply distorted.

About This Book

It is time to begin to produce a modern synthesis of Rumi's perspective on the operation of the mental system and the modern information of how the mind evolved over millennia and how the many bytes and pieces of the mind work. If we are to make any real change in the way we do things, we need to understand first where the mind came from and upon what it is based.

This book has several parts. The next one, part 2, begins way back in our biological history, because the same life processes that produced the wing and the eye also produced the cortex in the fish and, finally, the human mind. Understanding how the simple processes of evolution worked over eons will make some of the mind's moves clear, for the mind, like all else on earth, evolved.

We first consider Charles Darwin's displacement of the religious-oriented "designer being" manner of thinking of the nineteenth century—in which organisms were seen to operate the way they do because of a Supreme Being who made them the way they are.

Later in this part we look at whether the human mind is, in part, an accident. Its evolution turns around a central question: Why is our brain so big? Why have a brain capable of not only chess when there was no game, but of building guided missiles when there was no metal or chemistry or writing? For the brain (which is the

most “costly” neural material in the body) ballooned up radically 2 million years ago, and the “usual suspects” for this expansion don’t seem to have primary responsibility. It was not language, it was not tools, it was not bipedalism alone. The brain seems to have increased in size before all the organized societies, cooperation, and language would have had any call for such a development.

This is the central mystery of the mind: It is difficult to see why we are so advanced relative to our nearest ancestors. We aren’t just a slightly better chimp, and it’s difficult, on reflection, to figure out why. This gigantic cortex has given us our adaptability as well as the extra capacity to adapt to the heights of the Himalayas, the Sahara Desert, the wilds of Borneo, even to central London.

I’ve encountered some surprises in doing the work for this book: It seems that some of the physical changes necessary to adapt to the upright position of our ancestors lit a fire within the brain, which ignited the modern mind; and there is evidence that the collage of different “selves” within the brain fight for control and decide what we are going to do on their own.

Part 3, “The Inner Workings of the Mind,” follows the mind as it works in the different worlds in which people live. We’re able to live all over the earth because the mind gets wired up differently in different territories. The human mind contains a phalanx of adaptations to circumstances, many of which we will never encounter. We learn one or at most a few of the languages on earth, eat but one of a style of foods, learn to behave in a way appropriate to our culture. And we lose many of the possible abilities we possess during development. An individual’s evolution moves through several “worlds,” as Rumi put it.

Through the enormous brain growth during evolution, the human baby has been oversupplied with a “thousand

forms of mind"; it babbles all the sounds of the world during development and then loses some as the individual world selects those minds the baby needs to survive. There are separate, independent abilities, few of which become activated in a person. Your ability to speak Tagalog is unused, as is the ability to leap or to live at 10,000 feet above sea level; nevertheless, they are there.

When the nervous system gets organized, it has a lot of potential, a thousand forms of mind. As we get older, a few of the many potential abilities are put into service; most disappear. We see this in a child's ability to dance, to draw, to dazzle in many ways, ways that are often gone by adolescence. This process happens through biological, cultural, linguistic selections early in life. The world in which we find ourselves actually wires up the brain differently because of experience. The world selects what's needed. For example, people develop to digest the food of their region. A fellow graduate student of mine, born in Japan, had to leave the room if Velveeta were even opened, so sick did he become at the smell of rotten milk. (I always wanted to give him blue cheese to see what would happen.) The mind gets customized for each locale.

This part introduces us to how the earliest mental routines, which developed for quick action and survival, later were recruited to make mental judgments. This is why we evaluate war as we do marriage, estimate tiny changes in brightness as we do gigantic changes in government expenses, and why millions shift their travel plans because of one terrorist murder, unaware that more Americans are killed each day with handguns than have been killed in toto by all the terrorists. Same old brain, that SOB.

Part 4 discusses how the brain evolved its specialized centers of action. The large cortex developed into special-

ized cerebral hemispheres, which contain different kinds of thought. And the specialization goes deeper. Different centers of the mind seem to act independently of consciousness, so that something inside us, for instance, decides how and when to move long before our consciousness knows about it. Our consciousness seems largely to have negative options, to stop one of the simpletons from acting.



1-2

Parallels.

The next part (Part 5) concerns our experience and how the mind produces it. We seem to have evolved two kinds of routines for understanding the world: One operation gathers information, the second interprets. This is why memories, dreams, and imagination are all the same process, for the mind uses the same interpretations whether it is dreaming at night, recollecting infancy, or

imagining a new home. What we think of as our memory is an illusion, as are our dreams. And, surprisingly, so is the sight you see now.

Human beings are broad in that we can live anywhere, but shallow, in that we act the same way. And we are so because of the amazing breadth and lack of depth of the mind. This part of the book, and in a sense, the whole book, is about that dream of the world, and the different dreamers within.

Part 6 goes on to consider how the self is a small isolated part of the mind, sometimes called into play by consciousness, most often on the sidelines. And we as readers try, all through, to see if in our history, our biology, our development, there are sights and insights that we can make use of. This part attempts to show how larger routines get recruited in and out of place. The love we seek makes us vulnerable to cults—shifts our mind, sometimes in a helpful way, sometimes in a dangerous way.

I use the concept of “mind in place” to show how we recruit the same routines to handle different situations. A set of minds swings in and out: One system, then another, then a third takes hold of consciousness. Once recruited for a purpose, the mind in place performs as if it had been there forever, then steps aside, to be replaced with another “actor,” one with different memories, priorities, and plans. And “we,” our conscious self, rarely notice what has gone on.

This is one reason why we don't we act the way “we” want ourselves to. Since minds shift, “we” are not the same person from moment to moment, not the same “self” at all. The idea most people have that they are consistent in the diverse situations of their lives is an illusion, one caused by the structure of the brain. The self is, itself, just one of the simpletons, with a small job.

Part 7 deals with the question of how we can redirect the mind, if it evolved to work so well in the world. In a sense, it will be easier than we might believe, since the mind contains many different kinds of adaptations awaiting their wake-up call, by experiences in childhood, in learning, in the information surrounding us.

The mind is the way it is because the world is the way it is. The evolved systems organize the mind to mesh with the world. This ancestral arrangement of adaptations can work when the world is stable. And it is this stability that is so changed in the modern world. The world we adapted to is now gone.

In modern urban life, with modern media, education, and information and the movement of people, our ancestral adaptations conflict with the needs of the modern world. And while we are over-prepared for some conflicts, such as the sexual, we have no basis for understanding a world of billions of people. How could we ever perceive that our acts of cooling, transportation, and waste disposal could cause a hole in the ozone layer of the planet?

The mechanisms that we use to judge such simple events are the same that we use to judge those that are complex. And we are limited by our mental design, which works better in a world that is stable.

Accidents get us excited and move the mind, so that many of our personal and public “policies” are exceedingly sensitive, not to reasoned analysis, but to an overreaction to accidents. An “unforeseen” oil spill in Alaska suddenly focuses the world’s attention on what we’re doing to the environment. But scientists unanimously warned that this exact kind of spill would happen. How long must we await ever more serious accidents before we act? Until there is a nuclear war?

Our predicament now is not a matter of more information, more critical thinking, becoming more like

a logic machine. These are failures of adaptation, not rationality. Our potential to change is great if we look in the right direction, calling up the mind's other adaptations.

Part 8, the last part, proposes that just as humanity has progressed from biological evolution through neural and cultural evolution, we now need to begin a process of conscious evolution. We find unexpected allies in this arena, in modern spirituality and modern science. We need a new kind of ethic, many say; a new kind of religion, others say. This new viewpoint will have to become the province of each person, not just something one learns on Sunday. We are no longer living in tribes with a small horizon; our minds need to encompass a view that has been limited to an elite group: a truly modern reconciliation of the scientific and the spiritual. I believe it can be done, since both spheres, understood best, are about the same animal—us.

We don't want a world of 15 billion people in the next century if 75 percent of them are going to starve. We don't want a world where gangsters have nuclear weapons. We don't want a world where people don't know how their minds work, or know about major new facts of life, their identity, their society, the fate of the earth.

This is an era of reeducation, a time when we will either take our evolution into our own hands or do far worse than we can imagine. There will be no more biological evolution without conscious evolution. It is not a matter of those not knowing history being condemned to repeat the mistakes of our past: Our own history is no longer prologue to our future. Understanding who we are and how we can adapt anew is prologue to our future. And the mind is the focal point of the future.

But now, the past.