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Part 1

Mind

Chapter 1

The intention behind the event

Questions of the spirit world are usually considered to be scientifically unapproachable. We humans are somehow, for reasons unknown, aware of ourselves and of the world around us. We perceive soul and consciousness and awareness in each other. Ghosts, spirits, protecting angels, gods—most people claim to have sensed at one time or another the presence or warmth or intent of these disembodied minds. Science is now widely accepted to be a useful tool for studying the physical domain, but the spiritual domain is almost universally assumed to be outside the limits of physicality, of science, of any mechanistic understanding.

Of all branches of science, neuroscience is the only one that has seriously challenged the dualistic view that the universe is divisible into matter and spirit. For at least a century neuroscientists have suspected that the machinery of the brain is somehow physically

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responsible for consciousness—for the soul itself. To understand how the brain results in the mind would rank among the great achievements of science. Darwin's theory of natural selection answered the question of how we got here. Einstein's special and general theories of relativity described the structure of space and time. Would it be possible to uncover the biological basis of the spirit world?

It is my belief that neuroscience has already effectively answered this question, and has done so mainly in the last twenty years with the advent of what is called social neuroscience. Not all neuroscientists are entirely aware of the tiger whose tail they have grabbed. There are still many conflicting views of the brain basis of consciousness and, as of yet, little work on the brain basis of spiritual beliefs. Yet in synthesizing the literature, one can see a relatively simple theory that has already emerged from the work of many people. Special-purpose machinery in the human brain, that evolved over millions of years to make us socially intelligent animals, results in our perception of other people's minds, in our perception of our own consciousness, and in the perceptual illusion that disembodied minds fill up the spaces around us. The general structure of the theory is in place, it is conceptually sound, it seems increasingly likely to be correct, but the neuroscientific details are far from known. The purpose of my book is to describe to the public my own understanding of this remarkable, burgeoning

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scientific advance—nothing less than the mechanistic understanding of the spirit world.

Before I go any further I need to address a particular point. I know that in writing this book I will be accused by some people of trying to kill the spiritual world. People who are suspicious of science or openly hostile to it commonly argue that it kills mystery and reduces beauty to gears and numbers. But science does exactly the opposite. Good science doesn't "explain away" in the sense of dismissing. To come to some deeper understanding of the natural world is a type of homage and makes the universe immeasurably more interesting, compelling, and yes, even quite beautiful to contemplate. My goal here is not to denigrate the human experience of gods and spirits. Quite the opposite. Most science, unable to make head or tail of human spirituality, has ignored or dismissed it. I propose to pay it the ultimate respect of a scientist: taking this crucial piece of human nature seriously and examining it scientifically.

A second point that I would like to make at the outset concerns the audience for this book. The book is not a scientific report. It is not meant to propose a theory in full technical detail to my colleagues. It is written for the most general, nonscientific audience. The examples that I give throughout are not the contrived or complicated examples of experimental protocol. They are anecdotes from everyday life. In the first half of the book I lay out fundamental principles

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of perception, illusion, awareness, and consciousness. The second half of the book focuses more on the underlying brain science, and the writing necessarily becomes more technical and detailed but hopefully still clear to a nonscientific audience.

If you are a neuroscientist or psychologist who wants to get right to the heart of the story, I urge you to read Chapter 4 (Explaining consciousness) and Chapter 7 (The machinery for the perception of mind). Together they present the essential concepts. If you would like to have the concepts placed in a larger perspective, then I urge you to read the entire book. It is, after all, short. I told the story as succinctly as I could.

My interest in human consciousness comes from two directions. I am a neuroscientist and also a novelist. The novelist in me believes it is possible to give the general public a complete account of human consciousness, as far as it can be understood at the moment, without unduly complicated terminology, medical lists of brain nuclei, or equations. It should be possible to get right to business in plain English.

Two modes of perception

In fifth grade some friends of mine played a joke on me.

Just as I sat down at my school desk, the drawer slid open an inch. The explanation was obviously gravity acting on a loose slider mechanism. I pushed it closed and turned to my assignment, but a moment later the drawer pulled open again. That was odd. It was clearly

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broken. I would need to ask the teacher to look at it. Then I noticed a quivering blur in the corner of my eye. Glancing down, I saw a pale, cadaverous human hand emerging from the corner of the drawer.

A decidedly impolite word escaped my lips, and the entire class turned to stare at me. The teacher was shocked. I began to realize the truth only when I heard suppressed giggles behind me. Two of my ever-helpful friends, it turned out, were playing with a length of fishing line and a rubber hand left over from Halloween.

The experience is indelibly impressed in my memory. In the span of ten seconds my mind went through several distinct phases. First I perceived the movement to be a result of physical, mechanical forces. Nothing threatening. Then I had the sudden, spine-tingling perception that the movement was the result of intentionality. Zombie intentionality (if that is not an oxymoron). Finally I realized the true source of the intentionality, which turned out to be much more malevolent than any zombie.

I out myself as a nerd—but even at that time, in fifth grade, and despite the casual cruelty of classroom humor, I was mostly astounded by a sudden scientific realization. The brain evidently came equipped with two totally different, complementary modes for explaining events in the world. The first mode was to find the physical cause of an event. Gravity, vibration, loose bolts, whatever. The second mode was to attribute intention to the event. Here were two fundamentally

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different styles of explanation. What struck me was the suddenness of the change from one to the other, as if a switch in my brain had turned to a new setting, from “that thing is inanimate” to “that thing is moving by choice.” A different circuit seemed to have turned on. I think everybody has had a similar if not quite so dramatic experience—the sudden, spine-tingling realization that something you thought was inanimate is actually alive, sentient, and acting under its own volition.

That realization about a special mode of perception turns out to be essentially correct. The brain does contain special-purpose machinery whose job is to attribute volition, intentions, agendas, goals, emotions, and other mentalistic events.

The ability to construct models of other minds is probably present in many species of animal, and probably varies with social complexity. Primates of all kinds have enormously complex social structures and therefore well-developed circuits for understanding other brains. Marine mammals have complex social interactions. Cat and dog species also depend on social interaction, although arguably the social structure in a lion pride is less rich and less gigantically complex than the social structure in monkey or human society. Even rats, mice, and many species of birds have social structures that may require some limited degree of perception of each other’s minds. The perception of intentionality need not be limited to within-species interactions. An

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antelope must look at a lion and perceive at a glance whether the cat is hunting or just passing by.

Humans are particular experts. Our circuitry for social perception is so well developed that we find it second nature to guess at the inner goals and emotions of others. The skill is so natural that some readers may wonder why I am bothering to point out the obvious. Of course we intuit each other's mental experiences.

The importance of these brain circuits comes into rather horrible focus in cases when the circuits fail. In at least some cases of autism, the social circuits do not function correctly. Autistic people and people with Asperger's syndrome, a less severe form of autism, have a notoriously difficult time intuiting the mental states of other people. They can try to figure out what someone is thinking and feeling by using propositional logic and sheer cleverness—and many autistic people are extremely intelligent. But the specialized hardware that is tuned to social perception is weakened in these people's brains, and therefore they lack the immediate intuition into other minds that comes so easily to the rest of us. Cases like these help to make the point that our talent for reading other people's minds is not a function of general intelligence, but instead depends on highly specialized hardware in our brains that we normally take for granted.

This book explores three basic propositions. First, when we perceive intentions, emotions, mind, *soul*, in

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another person, it is the specialized social hardware in the brain that is responsible for constructing those perceptions. Second, when we sense presences and spirits, ghosts and gods, it is the same hardware again, creating perceptions of mind and intent to explain the events around us. Third, when we perceive the same things in ourselves—our own consciousness, our own soul—again, it is the same specialized social hardware constructing those perceptions. This last proposition is perhaps the most difficult to nail down. How can awareness itself be explained as the processing of information in the brain? It turns out, however, that even this long-sought philosophical—one might say alchemical—understanding of mind falls into place rather neatly when considering the brain hardware that is tuned to social perception.

The goal of any branch of science is to explain a large range of phenomena in terms of a simple, unifying mechanism. The central thesis of this book is that the experience of self, soul, consciousness, spirit, ghost, god, everything that populates the spiritual world, is a *perception of mind* and is created by the social machinery of the brain.