

An exploration of real, virtual, and possible minds

What are they for—who has them and why?

With ambition and patience, in *The Book of Minds*, British science writer Philip Ball explores the parameters and functions of actual, virtual, and possible minds. The journey begins with humans and our fellow organisms on Earth (including plants and fungi) and ends with machine-based minds (artificial intelligence) and minds beyond our grasp (extraterrestrials and even God).

The *Book of Minds* addresses everything from intelligence and consciousness to agency and free will. In doing so, Ball risks biting off more than we can chew. And yet the book reads swiftly and smoothly. Organized into 10 generous chapters, the book often feels like the educated rambling of a passionate dilettante. Ball's take is wide and balanced, likely to please the demigods of mainstream academe while veiling valiant minority reports in its interstices.

What is a mind? According to Ball, "For an entity to have a mind, there must be something it is like to be that entity." Starting with human brains, he acknowledges the constitutive role of bodies, emotions, and the environment. He discusses socialization, language, and the evolution of intelligence, insisting on "the constructive faculty of mind." Ball then turns to consciousness, mentioning the work of the celebrities in this arena, from philosophers David Chalmers and Daniel Dennett to neuroscientists Antonio Damasio and Stanislas Dehaene, in a comprehensive but predictable chapter.

When it comes to other animals, Ball warns readers against conceiving of them as "dim-witted humans." Jakob von Uexküll's concept of "Umwelt" helps here, he insists; every organism experiences its own meaningful environment. From ravens to great apes, Ball covers forward thinking, theory of mind, behavioral flexibility, the ability to make plans, and complex vocal communications in the animal kingdom. Readers also learn about the hive minds of termites and bees.

Ball draws special attention to cephalopods, whose minds are as different from ours as it gets. Prospecting minds further in the living world, he makes a brief foray into "plant neurobiology" and even entertains James Lovelock's Gaia hypothesis, which posits that our planet is a self-regulating living organism.

Ball also tackles artificial minds, as well as our projections upon them. Does the claim that machines do not or cannot have minds reenact the bias against animals that has taken us so long to correct, he wonders? While it is true that computers do specific tasks better and faster than us, the recurring promise that sentient artificial intelligence is just one line of code away has grown tiresome. Good-enough mimicry does not a mind make.

It is unlikely that all the minds in the Universe are confined to this pale blue dot. How will we know aliens when we meet them? Ball suggests that our encounter with

extraterrestrials is more likely to be technological than biological, that is, through their gadgets rather than themselves.

And what about the mind of God? It certainly defies mapping. Ball does not believe in such a thing, and yet—in contrast to the easy ridiculing of certain vociferous atheists—he respects the subtle work of theologians.

A paradox awaits the reader toward the book's end: Did they make it there by choice? In chapter 9, Ball dares to tackle free will. If it exists (he is inclined to think it does), "minds alter the universe in an astonishing way," he writes. If it does not, do minds matter? Quantum indeterminacy and classical determinism offer chance and necessity, while the words "free" and "will" suggest a mysterious force that defies physical possibility. And yet, the minds that laws permit must ultimately face the laws that minds admit.

In considering all possible minds, *The Book of Minds* suggests that humankind is not at the center, at least spatially. However, the book risks framing other minds as surrogates to explore our own. Pluralism and decentering are desirable, but human imagination bootstraps us above other creatures.

Given the scope and length of the book, it is surprising that the phenomenology of experience, the consciousness-expanding effects of psychedelic substances, and altered states of mind such as lucid dreaming and near-death experiences are only mentioned in passing. On these and other fringe topics, Ball reaches the boundaries of the scientific orthodoxy but never crosses the line.

Ball ends the book with a final plea for why we should concern ourselves with the concept of minds, insisting that such probing "might show us what we can become." The French priest and paleontologist Pierre Teilhard de Chardin would have likely agreed. Humanity has not only evolved, he once argued, it is evolving. It is not really us who know the Universe; the Universe knows itself through us.