
HOW ARE WE TO KNOW?

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(Best read on a color display.)

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“In the infinitely difficult act of thinking nothing is more difficult than to separate what is known from what is not known—unless it be to understand that the separation must be made.”

Bernard DeVoto¹

“We may not know very much, but we do know something, and while we must always be prepared to change our minds, we must act as best we can in the light of what we do know.”

W. H. Auden²

“What could be more difficult to know than to know how we know?”

Antonio Damasio³

¹Bernard DeVoto, *The Course of Empire*, pp. 51-52, New York: Houghton Mifflin Company, 1952.

²W. H. Auden, as quoted in “The Double Man,” by Adam Gopnik in *The New Yorker*, p. 91, Sept. 23, 2002. Originally from W. H. Auden, “Effective Democracy,” *Booksellers Quarterly*, 1939, reprinted in *The Complete Works of W.H. Auden: Prose, Volume II, 1939-1948*, E. Mendelson, ed., Princeton University Press, 2002.

³Antonio Damasio, *The Feeling of What Happens: Body and Emotion in the Making of Consciousness*, p. 4, New York: Harcourt, Inc.

Preface

I was provoked into writing this book by hearing people say “there are other ways to know.” Probably they meant that science doesn’t have a monopoly on acquiring knowledge. Because I have long believed that the scientific method offers the best approach for finding out about things, it seemed important to investigate what are these “other ways to know.” If there are such, why doesn’t science use them also?

Maybe we know things through intuition, faith, feelings, revelations and mystical epiphanies. I became curious about how *do* we know. And what is knowledge anyway? Whatever it is, how is it related to “reality” and to “truth?” For that matter, what is reality and what is truth? It may seem imprudent or naïve for a non-philosopher to tackle these perennial questions, but any inquiry into how we know things must do so.

I have some experience in the fields of artificial intelligence and robotics. In order for robots to perform intelligently, they must “know” something about the worlds they inhabit. We researchers ought to know how robots know (if indeed we think they do) because we build them!

Our various engineering artifacts have often served as inspirations for modeling biological phenomena. The heart is a kind of pump, the eye is a kind of lens and camera, arms and legs are like cables pulling on levers, the ear is a kind of microphone, and the brain was once a hydraulic apparatus, then a telephone switchboard, and then a computer. Maybe we can illuminate how *we* know by analogy with how robots do.

In order to pursue this path farther and benefit from the pursuit, I need to make an assumption—one with which not all readers will be comfortable. I assume (and believe) that we humans are a kind of machine—not the usual kind of machine that brings to mind clanking gears

and whirring motors but a very sophisticated electro-chemical machine of almost unimaginable complexity. Still, we *are* machines and thus subject to the same physical limitations that robots are subject to. In short, there is nothing “magical” about us, so there can’t be any magical ways to know. We know in the same way that robots know, namely through our senses and through any knowledge that might be built into us by our genetic heritage.

I decided that the most compelling way to illustrate the analogy between us and robots would be to write about a fictional robot taking part in a conversation about knowledge. I had to let the robot be much more advanced than present day robots are—but not, in my opinion, impossibly so. The robot serves as a participating exhibit as two people explain their ideas about knowledge to a bright, inquisitive college student.

Through various drafts of this book and through the reading I did in writing the drafts, my views about how we know, about science, and about religion have been enlarged. Maybe in reading the book yours will be too, but no matter. My goal has been to explain what *I* have learned—not necessarily to change what *you* think.

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