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WINNER OF THE TURING AWARD
AND DANA MACKENZIE

THE
BOOK OF
WHY



THE NEW SCIENCE
OF CAUSE AND EFFECT

PREFACE

ALMOST two decades ago, when I wrote the preface to my book *Causality* (2000), I made a rather daring remark that friends advised me to tone down. “Causality has undergone a major transformation,” I wrote, “from a concept shrouded in mystery into a mathematical object with well-defined semantics and well-founded logic. Paradoxes and controversies have been resolved, slippery concepts have been explicated, and practical problems relying on causal information that long were regarded as either metaphysical or unmanageable can now be solved using elementary mathematics. Put simply, causality has been mathematized.”

Reading this passage today, I feel I was somewhat shortsighted. What I described as a “transformation” turned out to be a “revolution” that has changed the thinking in many of the sciences. Many now call it “the Causal Revolution,” and the excitement that it has generated in research circles is spilling over to education and applications. I believe the time is ripe to share it with a broader audience.

This book strives to fulfill a three-pronged mission: first, to lay before you in nonmathematical language the intellectual content of the Causal Revolution and how it is affecting our lives as well as our future; second, to share with you some of the heroic journeys, both successful and failed, that scientists have embarked on when confronted by critical cause-effect questions.

Finally, returning the Causal Revolution to its womb in artificial intelligence, I aim to describe to you how robots can be

constructed that learn to communicate in our mother tongue—the language of cause and effect. This new generation of robots should explain to us why things happened, why they responded the way they did, and why nature operates one way and not another. More ambitiously, they should also teach us about ourselves: why our mind clicks the way it does and what it means to think rationally about cause and effect, credit and regret, intent and responsibility.

When I write equations, I have a very clear idea of who my readers are. Not so when I write for the general public—an entirely new adventure for me. Strange, but this new experience has been one of the most rewarding educational trips of my life. The need to shape ideas in your language, to guess your background, your questions, and your reactions, did more to sharpen my understanding of causality than all the equations I have written prior to writing this book.

For this I will forever be grateful to you. I hope you are as excited as I am to see the results.

Judea Pearl
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