

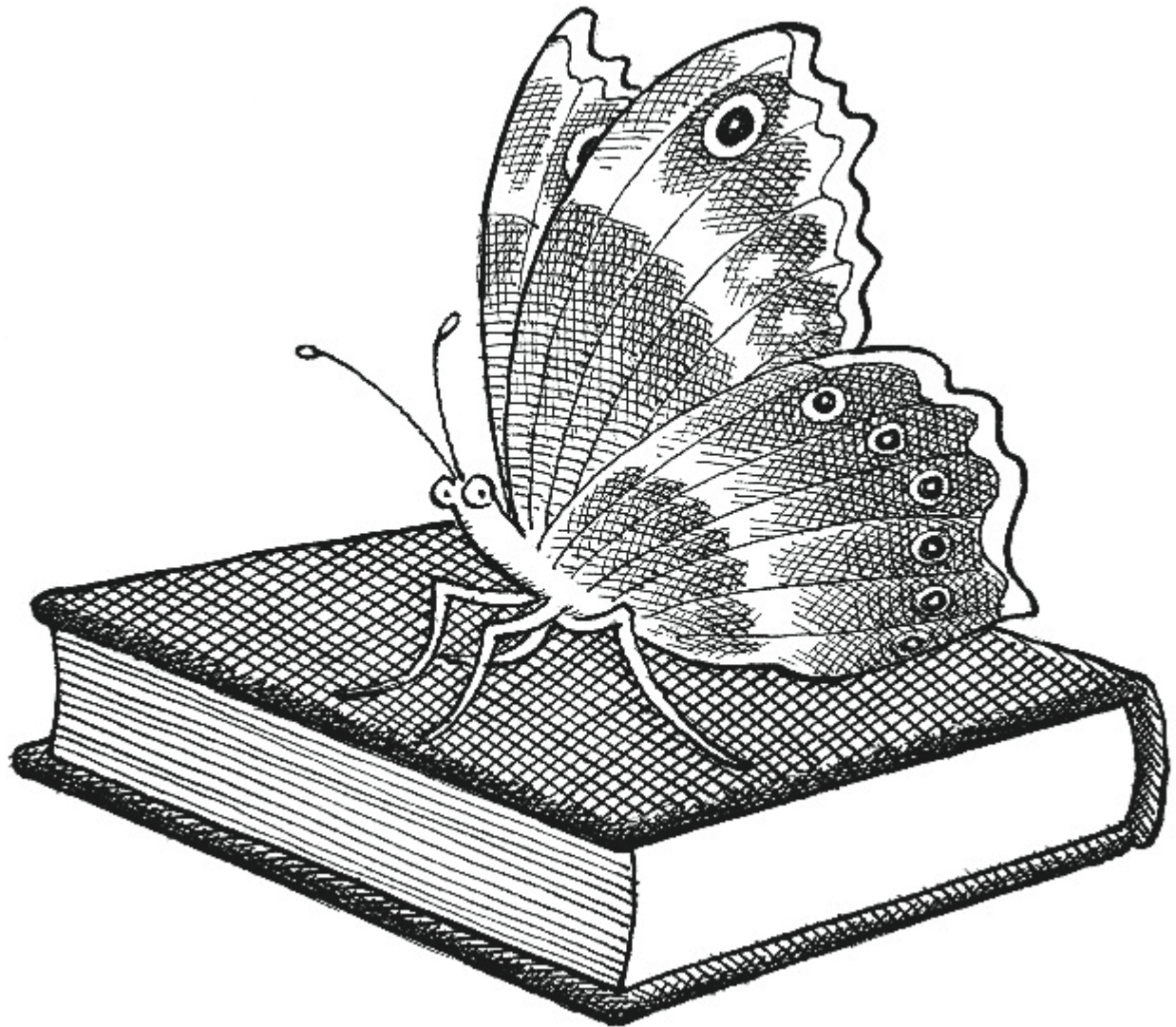
In Brief

September 19, 2018

Judea Pearl and Dana Mackenzie

THE BOOK OF WHY

The new science of cause and effect 432pp. Allen Lane. £25.



# Why

TRISTAN QUINN

*The Book of Why* is a wide-ranging account of the “Causal Revolution” currently taking place in the field of statistics. Judea Pearl and Dana Mackenzie reveal how science sometimes advances not in a straight line but by circumnavigating leading figures who have somehow come to hold up

progress. Even non-statisticians know the mantra “correlation is not causation”. Pearl, a computer scientist, argues that “unfortunately”, for more than a century, statistics “has fetishized this common sense observation”. This “prohibition” on looking for causes created a blind spot. Pearl has developed a mathematical language to compensate for it.

According to Pearl, statistics “inflicted causal blindness on itself” under the influence of the “zealot” Karl Pearson, whose Bio-metrics Lab (established at University College London in 1903) became the “world centre of statistics”. Pearl highlights Pearson’s belief in positivism, which holds that the universe is a product of human thought: “Thus causation, construed as an objective process that happens in the world outside the human brain, could not have any scientific meaning”. Pearson saw correlation – “the degree of cross predictability between . . . two variables” – as precise and universal. The pattern was set for “generations of scientists” when one of Pearson’s students wrote that increased poverty in London was “due to” a welfare programme, but then corrected himself – “Strictly speaking, for ‘due to’ read ‘associated with’”.

Pearl revisits the anguished 1950s debate about whether smoking causes cancer, which was resolved only in 1964 by epidemiologists, not by statisticians who lacked a theory of causation. He recounts the “sad” case of the legendary American statistician R. A. Fisher, who vehemently believed the association between smoking and cancer could be produced by a confounding factor such as a smoking gene. Noting Fisher’s role as a tobacco industry consultant, Pearl remarks: “it is very unlikely that tobacco money corrupted him . . . his own obstinacy was sufficient”.

Pearl’s fundamental insight is that statistics must throw off its “data-centric history”, by interpreting data to establish “why”, not just summarizing it. It is a cautionary message in our Big Data era: “data are profoundly dumb”. Pearl’s approach – causal diagrams expressing what we know and a symbolic language what we want to know – “embraces rather than denies our innate cognitive gift of understanding cause and effect”. Pearl argues persuasively that this could shape the future of artificial intelligence (his real interest), leading to a “moral robot” acting with a “causally sound sense of justice”, quite unlike the AI apocalypse conjured up by some.