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The Science of Serendipity

In 1973 Anthony Hopkins found 'The Girl From Petrovka' on a bench just as he was making a film based on the book. What are the odds?

By **AMIR ALEXANDER**

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On a sunny Sunday in 1929, American children's-book author Anne Parrish was browsing the used-book stalls along the Seine in Paris when she came upon a familiar title: Helen Wood's " Jack Frost and Other Stories." She bought the book for one franc and hurried to rejoin her husband, who was sipping his wine at a nearby restaurant. It was one of her favorites growing up, she told him, handing him the book to browse. After a few minutes he passed it back to her, open to the flyleaf, where a childish hand had written: "Anne Parrish, 209 North Weber Street, Colorado Springs, Colorado." It was her very own childhood copy.

What are the chances? For most of us this is a rhetorical question, expressing our surprise at such a seemingly magical coincidence. But Joseph Mazur, the author of "Fluke: The Math and Myth of Coincidence," has a more precise answer. The odds that Anne Parrish would stumble upon her book years later in Paris are 3,331 to 1 or, as he puts it, "slightly better than the odds of being dealt a poker hand of four of a kind." Not so magical, then, after all.

If the odds Mr. Mazur gives for such a seemingly unlikely event appear surprisingly promising, that is, in fact, his point. We live in a world of more than seven billion people,

each constantly making decisions that lead to an unimaginably vast number of unexpected outcomes. Many of those outcomes, he argues, appear to us as remarkable coincidences, even if a closer look would reveal more likely chains of causation.

In Anne Parrish's case, he speculates, the book may have come into the possession of her mother's close friend the painter Mary Cassatt, who spent most of her life in Paris. Cassatt died in 1926, and her estate was dispersed; it is quite possible that "Jack Frost and Other Stories" had been waiting at the bookstand for three years before Anne chanced upon it. Mr. Mazur assigns a probability to each link in the chain of events: the likelihood that Anne would visit Paris in 1929 (0.1, or 10%); the likelihood that she would browse the bookstands (0.3); the likelihood that the book would be there (0.01). The chances that all three would take place and that Anne discover her childhood book are therefore 0.1 x 0.3 x 0.01 = 0.0003, or 3,331 to 1.

Anne Parrish's story is one of several unlikely coincidences to which Mr. Mazur assigns numerical odds. What is the probability that the actor Anthony Hopkins, while working on a film, would find a copy of the book on which it is based on a bench in the London Underground, as he did in 1973 with "The Girl From Petrovka"—the very copy, in fact, that belonged to the work's author and was marked in his hand? What are the odds that your taxi driver is the very one who picked you up years before and thousands of miles away? And what are the chances of winning the lottery not once but four times, as did retired mathematics professor Joan Ginther?

Mr. Mazur relies on the insights of Jacob Bernoulli, a founder of probability theory (and much else) who formulated the "weak law of large numbers" more than three centuries ago. According to Bernoulli, if a test is repeated a sufficient number of times, then the results over all its repetitions will converge on the expected value.

Consider tossing a coin over and over again. Since each toss is entirely independent of the previous ones, it is in principle possible that the results will be all heads or all tails, or at least an overwhelming preponderance of one or the other. Indeed, in the short term we are likely to get a sharp imbalance between the number of heads and tails. But according to Bernoulli's theorem, if the coin toss is repeated a large enough number of times, this will not happen: In the long run, the distribution of heads and tails will match the theoretical likelihood that the coin will land on one or the other—and that, of course, is exactly 1 in 2.

Unlike a coin toss, the strange coincidences of human life do not lend themselves to endless repetitions. But Mr. Mazur implies that if we break up these complex events into

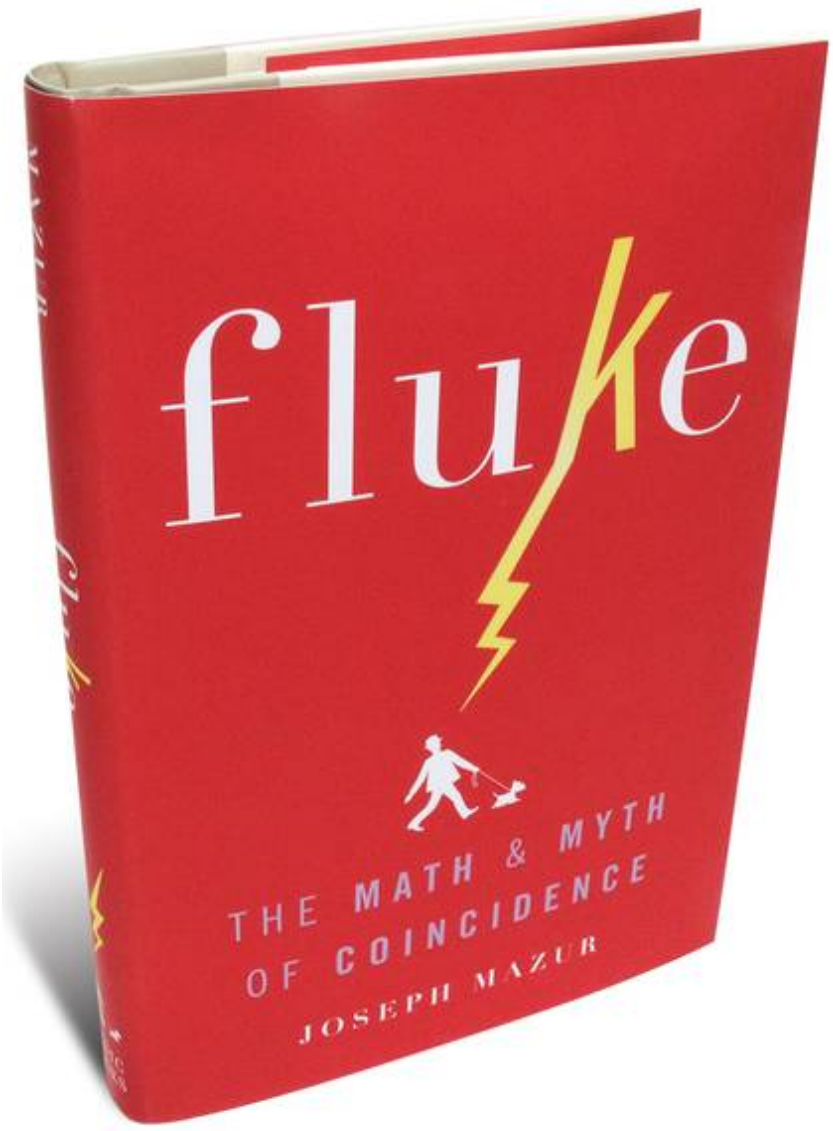

PHOTO: WSJ

FLUKE

By Joseph Mazur
Basic, 273 pages, $26.99

a sequence of simpler ones, then each of the components is, in fact, repeated many times. For example, all members of Anne Parrish's social circle of wealthy Americans were faced with the choice of vacationing in Paris in the summer of 1929. If 10 out of 100 did go to Paris, then we can estimate Anne's chance of doing so at 10%.

For all its intuitive simplicity, as Mr. Mazur points out, the weak law of large numbers is profound. It suggests that the chaos and unpredictability of our lives is an illusion. It is a seductive idea. For Mr. Mazur, a mathematician, even the discovery of a childhood book decades later and oceans away is evidence of the rational order of the universe.

Whether one agrees with Mr. Mazur seems more a matter of philosophy and personal inclination than mathematical proof. Certainly when dealing with coin tosses, poker hands or the roulette wheel at Monte Carlo, he is on solid ground. Each toss, deal or spin is a simple event that is repeated unchanged over and over again. Over time the distribution of the results will surely match the predicted mathematical probability.

But what of the coincidences of everyday life? Are such events really just more elaborate versions of a coin toss? Do they too reveal the workings of the invisible hand of

mathematical probability? That is far from clear. Each of these remarkable instances is a complex event that happens once and only once. Since each event is unique, a sample of one, we will never know whether our calculations are correct or even close. Assigning numerical odds to the vagaries of human life may be a way of affirming one's belief that the world is a mathematically ordered place. Whether such numbers actually add something to our understanding or experience of such events is another question. For the enjoyment of Mr. Mazur's book, this hardly matters, however. Always entertaining and frequently insightful, "Fluke" is never less than thought-provoking.

Mr. Alexander is the author, most recently, of "Infinitesimal: How a Dangerous Mathematical Theory Shaped the Modern World."

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