Miracle on Probability Street

The Law of Large Numbers guarantees that one-in-a-million miracles happen 295 times a day in America By MICHAEL SHERMER

Because I am often introduced as a "professional skeptic," people feel compelled to challenge me with stories about highly improbable events. The implication is that if I cannot offer a satisfactory natural explanation for that particular event, the general principle of supernaturalism is preserved. A common story is the one about having a dream or thought about the death of a friend or relative and then receiving a phone call five minutes later about the unexpected death of that very person.

I cannot always explain such specific incidents, but a principle of probability called the Law of Large Numbers shows that an event with a low probability of occurrence in a small number of trials has a high probability of occurrence in a large number of trials. Events with million-to-one odds happen 295 times a day in America.

In their delightful book *Debunked!* (Johns Hopkins University Press, 2004), CERN physicist Georges Charpak and University of Nice physicist Henri Broch show how the application of probability theory to such events is enlightening. In the case of death premonitions, suppose that you know of 10 people a year who die and that you think about each of those people once a year. One year contains 105,120 five-minute intervals during which you might think about each of the 10 people, a probability of one out of 10,512—certainly an improbable event. Yet there are 295 million Americans. Assume, for the sake of our calculation, that they think like you. That makes $\frac{1}{10,512} \times 295,000,000 = 28,063$ people a year, or 77 people a day for whom this improbable premonition becomes probable. With the well-known cognitive phenomenon of confirmation bias firmly in force (where we notice the hits and ignore the misses in support of our favorite beliefs), if just a couple of these people recount their miraculous tales in a public forum (next on *Oprah!*), the paranormal seems vindicated. In fact, they are merely demonstrating the laws of probability writ large.

Another form of this principle was suggested by physicist Freeman Dyson of the Institute for Advanced Study in Princeton, N.J. In a review of *Debunked!* (*New York Review of Books,* March 25), he invoked "Littlewood's Law of Miracles" (John Littlewood was a University of Cambridge mathematician): "In the course of any normal person's life, miracles happen at a rate of roughly one per month." Dyson explains that "during the time that we are awake and actively engaged in living our lives, roughly for eight hours each day, we see and hear things happening at a rate of about one per second. So the total number of events that happen to us is about thirty thousand per day, or about a million per month. With few exceptions, these events are not miracles because they are insignificant. The chance of a miracle is about one per million events. Therefore we should expect about one miracle to happen, on the average, every month."

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Despite this cogent explanation, Dyson concludes with a "tenable" hypothesis that "paranormal phenomena may really exist," because, he says, "I am not a reductionist." Further, Dyson attests, "that paranormal phenomena are real but lie outside the limits of science is supported by a great mass of evidence." That evidence is entirely anecdotal, he admits. But because his grandmother was a faith healer and his cousin was a former editor of the *Journal for Psychical Research* and because anecdotes gathered by the Society for Psychical Research and other organizations suggest that under certain conditions (for example, stress) some people sometimes exhibit paranormal powers (unless experimental controls are employed, at which point the powers disappear), Dyson finds it "plausible that a world of mental phenomena should exist, too fluid and evanescent to be grasped with the cumbersome tools of science."

Freeman Dyson is one of the great minds of our time, and I admire him immensely. But even genius of this magnitude cannot override the cognitive biases that favor anecdotal thinking. The only way to find out if anecdotes represent real phenomena is controlled tests. Either people can read other people's minds (or ESP cards), or they can't. Science has unequivocally demonstrated that they can't—QED. And being a holist instead of a reductionist, being related to psychics, or reading about weird things that befall people does not change this fact. SA

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