
LIFESTYLE

Odds & Ends | Sometimes science can be aided and abetted by a wager or two

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Back in the 1970s, Stephen Hawking, the renowned English physicist who occupies the same professorial chair at Cambridge once held by Isaac Newton, declared that black holes consumed anything that fell into them.

Hawking's declaration became a sort of dogma, especially among science-fiction writers enamored of the idea of a place in space so immensely powerful that even light cannot escape its gravitational clutches.

But some physicists were skeptical that black holes were really capable of absolutely absorbing all matter and releasing nothing, until eventually they evaporate into nothingness. If true, such a thing would defy physical laws that say matter cannot be destroyed, only changed. So some skeptics did what scientists have been doing for at least the last 400 years: They bet Hawking he was wrong.

Last month, Hawking admitted as much. Using revised calculations, Hawking acknowledged that black holes could, in theory, permit some information (in the form of radiation) to seep out. His turnabout made headlines around the world, partly because it reaffirmed the basic laws of physics, partly because Hawking is the world's most famous physicist, and partly because the great English theorist would now have to pay off a long-standing wager with John Preskill, an astrophysicist at the California Institute of Technology.

Which he did, awarding Preskill with a baseball encyclopedia that he had flown into a physics conference in Ireland. The joke was that the encyclopedia, unlike black holes, would readily give up its information.

It's not the first bet Hawking has lost, and may not be the last. But the physicist is hardly alone in his wagering. Making bets is as much a part of science as telescopes, beakers and hypotheses. The prizes tend to be modest -- a nominal sum of money or more often a bottle of wine or some sort of concessionary speech. For researchers, it's the bet that counts, not the winnings.

Historically, scientific wagers have been used to help researchers better focus on an idea, said James Peebles, a Princeton University cosmologist who says he's still waiting for a bottle of scotch won in a bet over when galaxy clusters formed.

"Betting is a part of science. It's a way to challenge colleagues about their ideas and have your ideas challenged as well," Peebles said. "Laying a wager is really a way to organize your thinking. If you're going to bet, you've got to figure out how to set it up, what exactly you're betting on and which side you want to be on. It's a way to carry on the scientific conversation.

"Not to mention, it's often quite amusing."

Wagers over the ages

The first known wager in science occurred in 1600 when astronomer Johannes Kepler bet his bitter rival Christian Longomontanus that he could calculate Mars' orbit around the sun in just eight days. The stakes of the bet have been lost to history.

Kepler succeeded in fixing Mars' solar orbit, but it took him five years. He lost the bet, but his labors paid off handsomely nonetheless, leading to the development of his three seminal laws of planetary motion, which describe why planets orbit elliptically and at certain speeds.

In 1684, the English mathematician and astronomer Christopher Wren announced that he would give a book worth 40 shillings to anyone who could, within a couple of months, deduce Kepler's laws from the inverse-square law that says the sun's gravity decreases with the square of the planet's distance from the sun.

A 42-year-old mathematician from Trinity College in Cambridge heard about the challenge and found the answer. But Isaac Newton didn't declare his proof until 1687 when he published his classic mathematical treatise, "Principia."

Like Kepler, he failed to cash in but won enduring fame for work at least partly inspired by Wren's challenge.

Sometimes, it doesn't pay to win. In 1879, the British naturalist Alfred Russel Wallace, co-discoverer of evolutionary theory with Charles Darwin, bet John Hampden, a vociferous flat-earther, that he could prove the planet was spherical by measuring a stretch of the Old Bedford Canal, north of London.

Using telescopes and markers, Wallace revealed the Earth's curvature. Hampden paid off the wager -- 500 British pounds -- but then launched a nasty, retaliatory campaign against Wallace and his family. In 1871, he wrote to Wallace's wife: "If your infernal thief of a husband is brought home some day with every bone in his head smashed to a pulp, you will know the reason."

Wallace repeatedly sued Hampden for libel, and won every time. But Hampden declared himself bankrupt. Wallace ended up using all of his wager winnings to cover court costs while Hampden and the flat-Earth movement enjoyed a boon of publicity.

Testing their metals

Between Kepler's bet in 1600 and the end of the 19th century, wagers occasionally took place. But intellectual gambling really took off in the 20th century, in some places even becoming institutionalized.

In the once legendary Bell Laboratories in New Jersey (now part of Lucent Technologies), for example, researchers kept a tattered notebook in the coffee room to record mind-numbingly technical wagers, such as the specific variables of superconductivity under certain conditions. Across the country at the Stanford Linear Accelerator Center, physicists keep a similar book containing wagers dating back to the mid-1980s, some still unresolved.

Perhaps the most notorious bet of contemporary times was one made between ecologist Paul Ehrlich and the late economist Julian Simon.

In 1980, Ehrlich was among the world's best-known scientists: author of "The Population Bomb," a 1968 bestseller that foresaw a world crippled by overcrowding and the destruction of natural resources. He was a Stanford University professor and, eventually, the recipient of a MacArthur Foundation "genius" grant and the Crafoord Prize, ecology's version of the Nobel.

Simon was less well-known, an influential but iconoclastic economist at the University of Maryland who scoffed at environmentalists' notions that the natural world was heading toward calamitous ruin.

In an article published in the journal *Science*, Simon advocated a much cheerier future in which civilization thrived through beneficent technology. The essay earned him the enmity of many, including Ehrlich, who publicly complained that Simon and like-minded economists were apparently incapable of understanding basic ecological concepts like the Earth's carrying capacity.

"To explain to one of them the inevitability of no growth in the material sector, or ... that commodities must become expensive would be like attempting to explain odd-day/even-day gas distribution to a cranberry," opined Ehrlich in a rebuttal essay penned with his wife, Anne, also an ecologist.

Ehrlich, with two colleagues, then challenged Simon to a wager: They would bet \$1,000 on five metals -- chrome, copper, nickel, tin and tungsten -- and purchase \$200 worth of each, based on current market prices in 1980.

Ten years later, both parties would revisit the commodities market. If the combined price for similar amounts of the five metals was higher, Simon would pay Ehrlich and his collaborators the difference in cash. If prices were cheaper, Ehrlich would pay Simon.

Ehrlich was betting that population growth, industrialization and diminishing world resources would inevitably cause the market costs of metals to rise from 1980 to 1990. He was wrong. Instead, all five metals were below their 1980 prices 10 years later. Ehrlich wrote Simon a check for \$576.07.

The whole thing left Ehrlich with a bitter taste. He later complained that the wager had been ill-constructed and its results meaningless. He told the journal *Nature* that he regretted the whole thing.

Simon, however, enjoyed the fruits of victory. The bet elevated his reputation significantly -- perhaps more than anything else he did as an economist -- and gave ammo to others who contend that environmental worries are overstated and overblown.

Ehrlich's and Simon's bet was, in some ways, personal. The men clearly didn't like each other. Most scientific bets, however, are strictly by the numbers. In the years before the Human Genome Project was concluded in 2003, for example, biologists around the world participated in a pool to guess how many genes were required to build a person.

More than 400 bets, ranging from \$1 to \$20, were proffered, some from the world's top scientists. The bookie was the renowned Cold Spring Harbor Laboratory on Long Island, N.Y. Estimates ranged from less than 26,000 to more than 300,000. When the final human genome number was announced in late 2003, it was just 21,000 genes, only slightly more than a zebra fish.

The "Genesweeps" winner was Lee Rowen, a bioinformation technician from Seattle who guessed 25,947 genes. She won \$570 and a signed copy of "The Double Helix" by James Watson, who co-discovered the structure of DNA with the late Francis Crick.

Genesweeps was a bet with a beginning and an end. It took only about a decade to settle it. But some scientific bets take longer, sometimes a lifetime or more.

Jay Olshansky, an epidemiologist at the University of Illinois in Chicago, and Steven Austad, a biology professor at the University of Texas, study gerontology, or the aging process.

A few years ago, the two scientists who are also friends made a bet. Austad stated that he thought it was possible that at least one person born in the year 2000 would still be alive on Jan. 1, 2150. Olshansky thought living to be 150 years old would require almost impossible, "extraordinary conditions."

(The current documented world record for longest living person is 122 years, held by Jeanne Calment, a French woman who died in 1997.)

The stakes of Olshansky's and Austad's bet: \$500 million.

Neither scientist has that kind of money. Gerontology doesn't pay that well. Nor can either man, both in their 50s, expect to be around for the bet's conclusion. Instead, Olshansky and Austad each deposited \$150 into a trust fund and promised that they or their heirs would contribute an additional \$10 annually until 2150.

By their calculations, compounding interest would balloon the total amount of the fund to at least \$500 million by 2150. At that time, a panel of notable scientists will determine the winner and award the prize to the victorious bettor's heirs.

"I thank Steve every time I see him for making my future relatives rich," laughs Olshansky.

Noble motives

Olshansky and Austad had other motives for making their bet beyond enriching relatives yet to be born. They both thought the bet would stimulate public interest in gerontology, which is has.

"It has been wildly successful," said Austad. "Both Jay and I have done dozens of interviews, taken inquiries from around the world." Olshansky said the bet was probably what got them an invitation to speak before the President's Council on Bioethics and inspired the Methuselah Mouse Prize, an ongoing effort to extend the life span of lab mice and, in the process, better understand how aging works.

Olshansky and Austad aren't alone in their high-minded motives for betting. Tom Bell, an attorney at Chapman University in Orange County, is attempting to create an online scientific wagering center called The Simon Market in honor of the economist who died in 1998 (www.simonmarket.org).

The idea is to encourage scientists to buy shares of a scientific idea, such as what the average global temperature will be in 2010. By doing so, he says, researchers and the public will get a sharp, accurate snapshot of current thinking since scientists seem unlikely to put their money on what they consider to be bad bets.

Bell is still looking for a sponsor, but a similar effort is up and running at the Foresight Exchange (www.ideosphere.com), in which traders bet coupons (not real money) on predictions of all sorts.

Lots of other predictions await challengers.

By the year 2020, for example, Sir Martin Rees, England's Astronomer Royal, has predicted that an act of bioterror or bioerror will lead to 1 million casualties. Talk about losing by winning.

Sixteen years from now, Robert A. Freling, executive director of the Solar Electric Light Fund, predicts solar electricity will be as cheap or cheaper than that generated by fossil fuel.

By 2150, Alex K. Rubin thinks half of the schools in the United States or Europe will be teaching defense courses against robots.

Whether any are good bets is debatable, though the English astronomer Arthur Eddington once offered this advice: "You should never bet on anything in science at odds of more than 10 or 12 to one."

Long-shot wagers

In 2002, Stewart Brand, founder of Well, a think tank, and Kevin Kelly, editor of Wired, a technology magazine, created a Web site to put people's money where their minds are (www.longbets.org). Scientists to ordinary folks offer up predictions and place bets, including these ongoing wagers:

Mitch Kapor, creator of the Lotus business software programs, and Ray Kurzweil, a high-tech inventor and guru, have a \$20,000 bet on whether a "machine intelligence" can successfully pass the Turing Test by 2029. This requires a computer to answer questions and conduct conversation in such a way that the quizzer cannot determine whether he is communicating with a machine or human.

Danny Hillis, inventor and computer designer, has bet Nathan Myhrvold, a high-tech entrepreneur, that the universe will eventually stop expanding. The stakes: \$2,000. The payoff date: Sometime in the unknown future, if Hillis is correct.

Cosmologist Freeman J. Dyson, a renowned physicist and author, has bet Peter A. Spark, an environmentalist/ businessman, that the first extraterrestrial life will be discovered someplace other than on a planet or satellite of a planet. The stakes are \$2,000, with no time limit.

Kelly and Brand have the ultimate bar bet. Kelly contends that by 2025, scientific evidence of "a hitherto-unknown, large bipedal great ape will be sufficient to convince at least half of primatologists that a yeti/bigfoot-like creature exists." Brand says Kelly is myth-staken. The bet is for \$800.

For chart see end of text.

1 PIC | 1 DRAWING | 1 CHART; Caption: 2. Long-shot wagers 3. Stephen Hawking has a history of finding time for the occasional physics bet.; Credit: 1. Cristina Martinez 2. Scott LaFee 3. Sion Touhig / Getty Images

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