

Cosmology's worst gambler

Stephen Hawking lost most of his bets, but beat all the odds to take physics forward and to the people



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Stephen Hawking had a rich history with bets; particularly losing them. The best known was the one with Caltech (California Institute of Technology) cosmologist Kip Thorne, about the existence of black holes, which was in many ways at the heart of Hawking's scientific success. Cygnus X1 was a mysterious galactic source of X-rays and appeared to be a black hole. It was the first time that physical evidence for one seemed to be on the horizon. Hawking said this was unlikely and Thorne – later on scientific consultant to *Interstellar* – was certain it was. Fifteen years down, in 1990, Hawking conceded defeat and gifted Thorne the wager, a year's worth of *Penthouse* magazines.

He later on bet Gordon Kane of Michigan University that the Large Hadron Collider wouldn't be able to detect the Higgs boson, the 'God particle' that is one of the foundational bricks on which the standard model of particle physics rests. Hawking had to pay up \$100 for that.

Then – this time with Kip Thorne as an ally – he went up against John Preskill, another Caltech physicist, and bet that 'information' couldn't leak out of a black hole. This was unusual for someone who made a career by proving that black holes were not dead ends but gave off radiation. In 2004, he admitted defeat and gave away a baseball encyclopaedia – as agreed in the wager – to Preskill.

In 2014, an Irish bookmaker had him devise an equation on the odds that England would win that year's football World Cup. According to a report in *The Guardian*, his formula suggested that England was best poised to win if the team wore red, played a 4-3-3 formation, kicked off in the afternoon and "avoided referees from South America to best succeed in Brazil." The eminent physicist, science writer and amateur footballer, Jim Al-Khalili, went on record to describe the equations as "meaningless." That year, for the first time since 1958, England failed to



PAUL E. ALERS/NASA VIA THE NEW YORK TIMES

qualify beyond the group stages.

How does one reconcile this image of one of the greatest scientific minds of this century with his record of perpetually losing his wagers? It's unlikely that he was regularly blindsided by his calculations. Moreover, the marked quirkiness of the objects being wagered shows that Hawking wasn't a person who played by the odds.

The will to pull along

The chances, in 1963, that his 21-year-old self would survive a motor neurone disease much more than two years were next to zero. Yet through an extraordinarily-consistent force of will that he would live, think and strive to accomplish as much as he could, he carved out a dream-reality and permeated popular culture far more deeply than any other scientist – Albert Einstein and Richard Feynman included – and without even winning a Nobel, a pre-requisite for immortality.

Carl Sagan, Jayant Narlikar, Stephen Weinberg were all excellent scientists who also took communicating popular science very seriously and did it marvellously. Hawking ho-

wever did something more: he proposed some of the most original ideas in cosmology; wrote, arguably, the most popular science book ever, *A Brief History of Time*; and proved that esoteric scientific ideas like black holes could become part of the popular imagination.

It helped of course that he was brilliant, that he was brought up in a background of intellectual achievement – both his parents studied at Oxford University – and he had access to the likes of Roger Penrose and got to work on black holes even as experimental evidence was piling in cosmology that the universe didn't just exist forever but was probably born out of a Big Bang. He was lucky that there existed the technology to translate the movements of his cheek into English.

Anyway you look at it these are incredibly long odds that have combined together, much like how physicists describe our universe as a 'Goldilocks' universe, or one where a confluence of physical constants have come together to bring about the conditions that ultimately led to a habitable Earth. A slight change in the gravitational constant, for in-

stance, and this world would be impossible.

There's a famous remark by Albert Einstein that God did not play dice with the universe. Hawking had an alternative take on it: "Einstein was wrong when he said, 'God does not play dice'. [A] consideration of black holes suggests, not only that God does play dice, but that he sometimes confuses us by throwing them where they can't be seen."

Hawking celebrated the role of chance and made it an integral part of the way he approached cosmology. He left open the possibility of a traditional 'God' in *A Brief History...* but over the years settled upon a theory grounded in physics, or 'M-theory,' as one that didn't leave any place for the existence of God. Nothing, in this sense, was worth dismissing and every idea was a star in its own right provided it was backed by mathematics and evidence.

That a monotonic, electronic voice is now an endearing, eternal element of pop-culture – existing in avatars as varied as a voice-over in a Pink Floyd song, or episodes in *The Simpsons* and *The Big Bang Theory* – only underlines how significantly he has altered the stereotype of the ivory tower cosmologist.

Changing Jantar Mantar

When he visited India, wooden ramps installed at Jantar Mantar to enable access and – to an extent – this has facilitated setting up such spaces in several other monuments. Much of science revolves around proposing competing theories and using statistical tests that weigh the odds of one scenario being more likely than the other. For a person, who lived every day since he was 21, by defying the medical odds surrounding Amyotrophic Lateral Sclerosis (ALS), there was certainly a different calculus at work. In most of the wagers that Hawking lost, science was pushed forward. The nature of black holes was better understood and exotic particles – that existed only in equations – detected for real.

And then, what are the odds that exactly 300 years after Galileo was born a cosmologist, in the same month as Isaac Newton, and died on the 14th of March, precisely on Albert Einstein's birthday?

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