



As reactions to winning a multimillion-dollar prize go, Alexander Polyakov's words were less than gushing. It was the culmination of a glittering award ceremony in Geneva, Switzerland, in March, hosted by Hollywood actor Morgan Freeman and featuring an operatic interlude from British singer Sarah Brightman. After a hushed pause, the physicist from Princeton University, New Jersey, was revealed as the winner of the 2013 Fundamental Physics Prize and an accompanying payment of US\$3 million. "This new prize is an interesting experiment," a flustered Polyakov said moments later, after walking off stage clutching his sculptured silver trophy. "Such big prizes could become very influential and

they can have a positive impact, or they can be very dangerous."

Polyakov's ambivalence echoes the sentiments of many scientists towards the rash of big-money science prizes that have emerged over the past year. Sponsored by billionaire entrepreneurs, including Russian Internet mogul Yuri Milner, Facebook supremo Mark Zuckerberg, Google co-founder Sergey Brin and property developer Samuel Yin, the new awards outstrip the \$1.2-million Nobel prizes in monetary value. In addition to Milner's Fundamental Physics Prize, the Internet billionaires have together created the Breakthrough Prize in Life Sciences, and Yin has introduced the Tang Prize as an Asian complement to the Nobels.

The founders of these 'new Nobels' hope that

the winners will act as role models, inspiring future generations to pursue science, and that they will attract status and funding to the entire discipline. "We wanted to choose an amount that would be shocking," says Anne Wojcicki, a biotechnology analyst and Brin's wife, who sits on the board of the Breakthrough Prize. "We wanted to create science superheroes."

But the lavishness and ambition of the prizes have sparked criticism. "I don't want to run these awards down, but I find it offensive that people are trying to either borrow the prestige of the Nobel, or buy it," says Frank Wilczek, a physicist at the Massachusetts Institute of Technology in Cambridge, who won a share of the Nobel Prize in Physics in 2004. "The suspicion is that these provide more benefit

to the egos of the founders than to science,” adds Jack Stilgoe, a lecturer in science policy at University College London.

And although they support the goals of the prizes, critics say that the strategy for achieving them is at best misguided, and at worst, could backfire. By bestowing riches on a few individuals, they say, the prizes could funnel money and attention towards people and fields that are already prestigious and well funded or, in some cases, could reward weak scientists or untested ideas. “Prizes are a good thing, but the question is, if your goal is to help science, are large prizes the most efficient way to do that?” asks Wilczek.

TOWARDS THE NEXT GENERATION

First awarded in 1901, the Nobel prizes have become established as the benchmark of excellence in the sciences. Since then, other awards have sprung up and gained prestige within specific disciplines. Some, such as the Fields Medal and the Abel Prize for mathematics, were designed to reward achievements in disciplines that are not covered by the Nobels. Others, such as the Lasker Awards for medical sciences, have gained a reputation for predicting future Nobel winners.

The Fundamental Physics Prize was the first of the latest breed of awards (see ‘Follow the money’). It burst on the scene in July 2012, when Milner announced that he had given nine awards of \$3 million each to prominent theoretical physicists, and that he planned to sponsor one additional award each year. (Polyakov was the first single-award winner.) Milner, who himself pursued graduate studies in theoretical physics, says that he wants to show that foundational research can be as financially rewarding as careers in sports, entertainment or business; indeed, he chose the size of the prize to mirror the type of annual earnings seen in the financial world. “The best minds should make at least as much as any trader on Wall Street,” Milner says.

In January, Yin launched the Tang Prize, four awards of 40 million Taiwanese dollars (US\$1.3 million) for the winners, plus a grant of 10 million Taiwanese dollars each for their research. The Tang Prize will be awarded every two years from 2014 onwards and will recognize advances in sustainable development, biopharmaceutical science, Chinese studies and law. “For the past 100 years, it is mainly Western countries and Western research institutions that have fostered talented researchers,” Yin says. “Now, as Asian economies are developing well, we should also shoulder part of the responsibility and contribute to world development.”

The Breakthrough Prize in Life Sciences,

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announced in February, also originates with Milner — but this time, he brought in friends and colleagues including Zuckerberg, Wojcicki and Brin. They split \$33 million equally between each of 11 laureates, and have committed to giving five new prizes of \$3 million each year. “We all have a background in science, though we weren’t all the best students,” says Wojcicki. “This is a way for us to reconnect with that and to give something back.” March saw the inaugural award of the United Kingdom’s £1-million (US\$1.5-million) Queen Elizabeth Prize for Engineering, which is supported by charitable



Alexander Polyakov receives the 2013 Fundamental Physics Prize from actor Morgan Freeman at a ceremony modelled on the Oscars.

donations from corporate sponsors and was set up by the Royal Academy of Engineering explicitly to give engineers a taste of the glamour and recognition that comes with the Nobels.

After the initial surprise at the big sums involved, the first question in most people’s minds was how the winners would spend their cash. “I really admire these billionaires for wanting to give back to science — but I do hope some of these large amounts goes into research,” says geneticist and entrepreneur Craig Venter, of the J. Craig Venter Institute in San Diego, California. “It’s not so great if the winners just go and buy a bigger house with their prize money.”

Many of the winners seem a little sheepish about their windfall; those who are willing to be interviewed tend to mumble that they have not yet decided what proportion to keep and what to give to research. One person who has decided is Tejinder Virdee, a particle physicist at Imperial College London, who in December 2012 shared a \$3 million ‘special’ Fundamental Physics Prize with six other leaders of the hunt for the Higgs boson at the Large Hadron Collider (LHC) at CERN, Europe’s particle-physics lab near Geneva. (The special prizes were in addition to the nine prizes Milner had previously announced.) Virdee plans to use his winnings to pay for science equipment in

schools in sub-Saharan Africa and to support an exchange programme to bring teachers from these schools to visit the LHC. “I wanted to find the way to get the most leverage out of the money,” he says. “It costs relatively little to train a teacher, but in turn they could reach 500 students in the next few years.”

Even if winners invest in their work, some researchers worry that the prize money will largely reward those who already have ample funding and recognition. Although the physics prizewinners do not include any Nobel laureates, between them they have won pretty much every other major award, including the Wolf Prize in Physics, the Fields Medal for mathematics and the MacArthur ‘genius grant’. “These are not underfunded or unappreciated people,” says Peter Woit, a mathematician at Columbia University in New York. Many of the Breakthrough Prize winners are already regarded as shoo-ins for future Nobels; one, Shinya Yamanaka, a stem-cell biologist at Kyoto University in Japan, already won a share of a Nobel last year.

This means that the prizes could end up increasing the divide between the scientific haves and have-nots. “There’s a huge disparity between the money that the big-wigs are getting and that going to other scientists,” says Bob O’Hara, a biostatistician at the Biodiversity and Climate Research Centre in Frankfurt, Germany. “US\$33 million could fund my whole institute for three to four years.”

O’Hara and other researchers also complain that the Breakthrough Prize recognizes the same popular fields as the Nobels. “One frustration for biologists is that the Nobel prize is focused on physiology and medicine and so it neglects other areas of the life sciences, which are just as important,” O’Hara says. The Breakthrough Prize does little to redress the balance, overlooking areas such as ecology and evolutionary biology in favour of research into molecular biology and disease. What is more, O’Hara says, “there was an emphasis on diseases of the rich, in the West, at the expense of diseases that are prevalent in the developing world”.

Wojcicki notes that there is a catch-22: awards that recognize the most extraordinary scientists will reflect existing trends in funding, because popular areas will provide a bigger pool of candidates from which to choose. But, she says, “I do agree that we should use the awards to drive change.”

EXPENSIVE GAMBLE

Although the Breakthrough Prize has been censured for playing it safe, critics are arguing that the Fundamental Physics Prize is making choices that are too risky. Woit notes that five out of the nine initial physics recipients — four of whom are based at the Institute of Advanced

Study in Princeton, New Jersey — study string theory, the idea that elementary particles are composed of vibrating loops of energy. A vocal critic of string theory, Woit has long argued that this research area has attracted a disproportionate amount of funding, despite lying beyond the range of direct experimental testability. “The obvious danger is that you may be giving a large award to someone for a completely wrong idea,” he says.

Polyakov, whose own award was partly for contributing mathematical techniques to string theory, sees this willingness to gamble on ideas as the new prize’s niche. “For me, ideas have their own reality,” he says. But because in future the Fundamental Physics and Breakthrough prizes will be awarded by committees made up of the previous laureates, critics fear that current biases will be reinforced. Woit points to this year’s selection of Polyakov. “When string theorists at the Institute of Advanced Study give their first award to a colleague who works on the same stuff as them, then it is a serious problem,” he says.

Milner counters that next year the winners of the ‘special’ prizes — the seven Higgs hunters and physicist Stephen Hawking — will shift the balance on the judging panel. “It is a self-correcting loop,” he says.

PUTTING ON THE RITZ

The physics prize’s black-tie ceremony in Geneva, consciously modelled on the Oscars, highlighted the ambition of its founders to inspire current and future scientists. “I don’t see why millions shouldn’t ultimately watch this ceremony,” says Milner. Scientists in the audience were both entertained and bemused; one described it as “lots of fun”, another as “excruciatingly long”.

The question is, will the money and razzle-dazzle have any real impact? Stilgoe challenges Milner’s claim that the awards will encourage early career scientists to stay the course, rather than — like Milner, Zuckerberg and Brin — leaving for more lucrative pastures. “The idea that anyone would make a career choice based on the minuscule chance of winning, say, a Nobel, is ridiculous,” he says. “Scientists, on the whole, are not in it for the money — and I am not sure we should want them to be.”

Fred Cooper, a physicist and a visiting scholar at Harvard University in Cambridge, Massachusetts, also questions whether the awards will really speak to the public. “Visit YouTube and you’ll see that the public already turns to science celebrities — Michio Kaku, Brian Greene and Sean Carroll — to learn about physics, not to the winners of the Fundamental Physics Prize,” he says. “If outreach is your aim, then give money to those that are already great communicators.”

Even if the awards do inspire young people, Stilgoe argues that they send out the wrong message. “The prizes reinforce the mythology



FOLLOW THE MONEY

A crop of new science prizes (pink) offers winnings greater than the Nobels.

Name | Year introduced

Breakthrough Prize in Life Sciences (2013)
Fundamental Physics Prize (2012)
US\$3,000,000

Tang Prize (2013)
\$1,675,000

Queen Elizabeth Prize for Engineering (2013)
\$1,500,000

Nobel prize (1901)
\$1,200,000

Blavatnik Award for Young Scientists (2013)
Lasker Award (1946)
\$250,000

Fields Medal (1936)
\$14,700

of science in which lone geniuses come up with brilliant ideas on their own,” he says.

And some say that the prize money would be better used to drive research directly. In 2011, for example, Venter joined forces with the X Prize Foundation and health-care firm Medco Health Solutions, based in Northampton, UK, to offer a US\$10-million prize to the first team to sequence accurately the genomes of 100 centenarians. “I’m always more excited by awards that push or drive innovation, rather than ones that just recognize past achievements,” Venter says.

Many researchers favour the idea of targeting awards at promising scientists early in their careers. “A small award at this stage is a fantastic idea,” says Cooper. At this point, scientists

for something they did 30 or 40 years prior to that,” he recalls. “I thought, in terms of impact on the world, it would be good to award young people and create something that would allow them to thrive.” One of the first winners of the regional Blavatnik Awards, Ruslan Medzhitov, an immunobiologist at the Yale School of Medicine in New Haven, Connecticut, says that the honour enabled him to attract funding and more prizes, including a share of the \$1-million Shaw Prize in Life Science and Medicine.

As for the new breed of mega-prizes, even some of the critics acknowledge — with a laugh — that they would accept one if it were offered to them. And Hans Clevers, a molecular geneticist at the Hubrecht Institute in Utrecht in the Netherlands and one of the inaugural

“I find it offensive that people are trying to either borrow the prestige of the Nobel, or buy it.”

are in a vulnerable position, struggling to win grants and often supporting young families. “It will just free scientists up to do more research — it’s about getting the biggest bang for your buck,” Cooper says.

This month, billionaire investor Len Blavatnik launched an award with prizes of \$250,000 for young scientists. The scheme, which builds on a previous, regional version that has been running since 2007, will be administered by the New York Academy of Sciences. (*Nature Publishing Group*, Wilczek and Venter are among the advisers for the award.) Blavatnik says that he saw a gap in the prizes market when he attended a Nobel ceremony several years ago. “What struck me was that most of the laureates were quite old and they received the award

Breakthrough Prize winners, says that the new Nobels could rival the prestige of the old ones in 30 years or so, if they can consistently identify high-calibre winners.

The organizers of the Nobel prizes, however, remain unruffled by the upstarts. “For us, the important issue is to continue the good history and track record that we have,” says Lars Heikensten, executive director of the Nobel prizes, based in Stockholm. “If we fail, it will be because we fail to maintain that level of respect, not because other prizes are acting as rivals to us. We’ve been in this business for 110 years and we plan to be in it forever.” ■ SEE EDITORIAL P.138

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