quality of the individual canvas but largely from the reputation of its putative creator. Today the art world is not appreciably different. Wynne concludes with an object lesson: In 2004, casino developer Steve Wynn paid $30 million at auction for a Vermeer that is far from the artist's best—and one not all experts agree is authentic.

Everyone wanted van Meegeren's forgeries to be masterpieces. The buyers and curators wanted desperately to acquire a Vermeer for their collections. The critics wanted, no less desperately, to claim responsibility for adding one more work to Vermeer's all-too-slim catalogue raisonné. And experts such as Bredius wanted to confirm their pet theories. Pride and self-regard colored judgment, and no one truly saw what he was looking at, because no one dared look closely.

The forger's story may be read as an enduring fable about the art world. A modern-day Aesop might cast the tale with a wily crow and selfish foxes: One day, the crow set the foxes fighting for control of an apple. The apple, the crow swore, was unlike any other in the world, and the foxes chose to believe him. But the apple was really nothing special, and the crow, in the end, was found out and driven from the forest for its lies. But what of the foxes that desired blindly and wildly, and so were fooled? Should not they too learn a moral from such a story?

Paul Maliszewski's writing has appeared in *Granta, Harper's,* and *The Paris Review.* He is currently completing a collection of essays about the varieties of faking.

# Strung Out

*Reviewed by David Lindley*

**THE TROUBLE WITH PHYSICS:** The Rise of String Theory, the Fall of a Science, and What Comes Next.

*By Lee Smolin. Houghton Mifflin. 392 pp. $26*

**NOT EVEN WRONG:** The Failure of String Theory and the Search for Unity in Physical Law.

*By Peter Woit. Basic. 291 pp. $26.95*

Until just over two decades ago, string theory was an esoteric branch of mathematical physics that held the attention of only a handful of maverick researchers. For their efforts, these pioneers endured a mixture of puzzlement and derision from their colleagues, and had trouble finding positions at academic institutions where they could pursue their quirky endeavors. But nowadays, it's hard to land a job in a high-powered department of theoretical physics if you don't do string theory.

Aficionados claim that string theory provides the foundation for a "theory of everything"—a harmonious unification of all of fundamental physics. To the contrary, declare Lee Smolin, a physicist at Canada's Perimeter Institute, and Peter Woit, a mathematician at Columbia University, string theory has thus far explained exactly nothing. But Smolin and Woit offer conflicting recommendations on how to restore sanity to theoretical physics, suggesting that string theory's dominance does not yet face a wholly persuasive challenge.

The essence of string theory is a literal assertion: Elementary particles—electrons, photons, quarks, and their numerous cousins—are not pointlike objects but "strings" of energy forming tiny, wiggly loops. If a stringy loop vibrates one way, it manifests itself as an electron. If it shimmies some other way, it looks like a quark. Wacky as this idea may sound, there are good reasons why physicists so fervently embraced it. Smolin, the more elegant writer, is far better at conveying the conceptual import of physical theorizing with a minimum of technical detail. Neither book, though, is easy reading for the uninitiated.

To put it very briefly, what turned interest in string theory from an oddball enthusiasm to a mainstream occupation was a twofold realization that came in 1984. That's when two of the early string pioneers, John Schwarz of Caltech and Michael Green, who was based in London, published a paper showing that just a handful of possible string theories were free of mathematical inconsistencies that plagued traditional particle-based models, and also had sufficient capacity (the number and variety of internal vibrations, roughly speaking) to accommodate all the known elementary particles and their interactions. There was one little difficulty: The systems these theories described existed only in 10 dimensions.

Since we live in a world that has but three dimensions of space and one of time, that last point might seem to be a deal breaker, but so appealing were the other virtues of string theory that physicists found a solution. The "extra" dimensions, they proposed, could be wrapped up so tight that we couldn't see them. In effect, what we thought of as points in our world were tiny six-dimensional structures. A little bizarre, to be sure, but not impossible.

It even seemed possible, in those heady early days, that mathematical reasoning alone might select one unique string theory to play the role of a theory of everything. That utopian dream, alas, quickly faded. Not only were several distinct string theories plausible candidates, but for each theory, the wrapping up of the extra dimensions could happen in an enormous number of different ways, with no obvious reason to choose one over another. In the early 1990s, a new proposal emerged: String theories were not, after all, fundamental, but rather the numerous manifestations of a still-deeper mathematical system dubbed M-theory (the M standing for mystery, murk, mother of all, or something similarly clever). Trouble is, no one has yet proved that M-theory exists, or, if it does, what it looks like.

And the multiplicity of possible string theories has forced physicists to a desperate resort. Enthusiasts now declare blithely that an almost unimaginably large number of universes exists, each with its own implementation of string theory. If you ask why the universe we live in happens to look the way it does, with its particular complement of elementary particles and forces, the only answer is no answer at all. It just happens to be that way.

The concern that string theory might lead physicists into a rarefied regime beyond the reach of experimental scrutiny is not entirely new. John Horgan, in his book *The End of Science* (1996), adverted to this danger, and, if I may be immodest, so did I in my 1993 book *The End of Physics*. (And perhaps I should add that Woit makes a brief reference to my book, in which he misstates one of its arguments.)

But Smolin and Woit go much further, arguing that by making string theory infinitely malleable, theorists have now consciously put their work beyond the reach of any conceivable experimental test. Even so, they continue to declare that string theory is the only game in town. Ambitious young researchers must either worship at the altar of string theory or risk accusations of heresy for trying out alternative theoretical strategies (putting themselves, as Smolin points out, where the string theorists themselves were not so long ago).

> By making string theory infinitely malleable, Smolin and Woit argue, theorists have now consciously put their work beyond the reach of any conceivable experimental test.

If their assessment of these ills is broadly the same, however, Smolin and Woit differ on how a way forward may be found. Woit has the narrower perspective. A mathematician by training and inclination, he is peeved, evidently, at the sloppy way in which physicists have made use of mathematics, and thinks that if physicists persuaded themselves to think more rigorously—more like real mathematicians, that is—they could reason their way out of trouble.

That's almost the opposite of Smolin's diagnosis. He has a deep knowledge of the history of physics, and understands that physicists have always been a little cavalier in their use of mathematics. He focuses instead on the conceptual puzzles that physicists face, and emphasizes, as

Woit does not, that string theory from the outset possessed serious deficiencies in its ability to address certain crucial issues.

Advocates of string theory have always touted, as one of its chief virtues, its prediction of the existence of a particle known as the graviton, which had been hypothesized earlier as a key element in efforts aiming to unite general relativity, Albert Einstein's theory of gravity, with quantum mechanics. But as Smolin makes clear, a genuine theory of everything must do more than merely possess a graviton. The most profoundly new aspect of general relativity was the way it transformed space-time into a dynamic quantity. That is, the presence of mass causes space-time to become curved, and as matter moves around, the shape of space-time changes in response. String theory captures none of this. It exists in a static geometry only, and no one has any idea, Smolin says, whether it can be adapted to live in space-times that shift and flow as Einstein requires.

The problem with string mania, Smolin concludes, is that it suits the wrong kind of mentality. He makes a nice distinction between scientific seers—people such as Einstein and Niels Bohr, his heroes, who deeply pondered the working of nature and were by no means brilliant mathematicians—and craftspeople, who are enormously adept at intricate calculation but don't seem to think much about the larger meaning of their ingenious manipulations. Seers are always in short supply, and the technical demands of mastering string theory are such that would-be researchers of a more philosophical stripe can rarely meet the price of entry.

Both authors plead for universities and granting agencies to consciously find room, every now and then, for the mavericks and eccentrics who might bring much-needed new ideas into the excessively closed world of theoretical physics. Fat chance, unfortunately, was my instant reaction, given the way the scientific world, like academia in general, rewards careerism more than brilliance.

On the other hand, as Smolin suggests, the true originals have always had to find their own paths. Think of Einstein, hatching his most brilliant ideas in the patent office in Bern. As for string theory, it's likely to unravel only when its practitioners begin to get bored with their lack of progress. Like the old Soviet Union, it will have to collapse from within. The publication of these two books is a hopeful sign that theoretical physics may have entered its Gorbachev era.

David Lindley is the author, most recently, of *Degrees Kelvin: A Tale of Genius, Invention, and Tragedy* (2004), and is at work on a history of Heisenberg's uncertainty principle.

# The Perils of Going Dutch

*Reviewed by Eric Weinberger*

**MURDER IN AMSTERDAM:** The Death of Theo van Gogh and the Limits of Tolerance.

*By Ian Buruma. Penguin. 266 pages. $24.95*

"First of all you have to say there is provocation, and the guilty one is the one who does the provoking. The response is to always punish the reaction, but if I react, something has happened." So said the French soccer hero Zinedine Zidane on why he head-butted an Italian opponent during the World Cup final, offering an apology that expressed no regret for his action, which he saw as the defense of his honor against the Italian's insults.

It would surely pain the carefully apolitical Zidane, a non-practicing Muslim born to Algerian immigrants, to be drawn into the aftermath of the 2004 murder, in Amsterdam, of the Dutch filmmaker and provocateur Theo van Gogh. But we should note the similar cause-and-effect reasoning offered by van Gogh's killer, a