

Henri Bergson (left) thought Albert Einstein's theory of relativity was a flawed philosophy.

## PHYSICS

# Fighting for time

Graham Farmelo enjoys an account of Einstein's clash with philosopher Henri Bergson.

Bertrand Russell is reputed to have said that “science is organized common sense; philosophy is organized piffle”. Although probably being playful, he was articulating the view of many physicists. Theoretical physicist Steven Weinberg declared the “unreasonable ineffectiveness” of philosophy in his field; he was outdone by Stephen Hawking, who in 2011 pronounced philosophy “dead”. Yet only a century ago, the two disciplines coexisted happily.

One theoretician who read widely in philosophy was Albert Einstein. Physicist Nándor Balázs, who worked with him in the early 1950s, told me that Einstein would often spend hours reading philosophy, and admired the work of seventeenth-century Dutch philosopher Baruch Spinoza. However, he had little time for those who expatiated on physics that they did not understand. This seems to have been at the root of tensions between Einstein and French philosopher Henri Bergson. Their quarrel about the nature of time is the subject of *The Physicist and the Philosopher*, a hefty, stimulating study by science historian Jimena Canales.

Canales begins with an account of their meeting, at the French Philosophical Society

## The Physicist and the Philosopher: Einstein, Bergson, and the Debate That Changed Our Understanding of Time

JIMENA CANALES  
Princeton Univ. Press: 2015.

in Paris on 6 April 1922. Bergson was 62 and had long been internationally famous. Einstein, two decades his junior, had recently become an even more prominent celebrity, after astronomers gave widely publicized empirical support to his general theory of relativity.

Their exchange was intellectually sterile. We do not know exactly what Bergson said, but he probably expressed the views set out in his contentious *Duration and Simultaneity* later that year. In it, he chastised relativity theory for going beyond physics to become a “flawed philosophy” that should be strongly resisted. He felt that human consciousness plays a crucial part in our knowledge of the Universe, so a complete account of time must reflect its subjective aspects (our perception of durations of time depend, of course, on the circumstances in which we experience them).

Bergson spent half an hour putting his case; it was certain to raise the hackles of Einstein, who strove to remove subjective elements

from his theories. Einstein's reply was terse to the point of rudeness. He said that there were only two ways of understanding time — psychological and physical — and the philosopher's time did not exist. The rebuttal lasted about a minute. That night, Einstein wrote to his wife: “All went brilliantly well.” He believed that Bergson was confused and ignorant about relativity. Bergson was convinced that his opponent had not understood him.

Bergson plainly did not comprehend basic aspects of relativity, so it is hardly surprising that this spat did nothing to make leading theoreticians reassess the theory. But he did some damage. In 1922, when Einstein received a Nobel Prize for his “services to theoretical physics”, the citation mentioned his work on the photoelectric effect, not relativity. Pressed to explain, Nobel Committee president Svante Arrhenius said: “It will be no secret that the famous philosopher Bergson in Paris challenged the theory.” Four years later, Bergson was awarded a Nobel of his own, for literature.

Canales aims to clarify the essence of the quarrel without taking sides. Reading between the lines, she seems to sympathize with maverick twentieth-century physicist

L: ULLSTEIN BILD VIA GETTY; R: MARTIN HOHLIG/ULLSTEIN BILD VIA GETTY

and critic of relativity theory Herbert Dingle, who lamented that in general the scientist “understands what he is doing about as well as a centipede understands how he walks”.

Einstein does not seem to have spent much time worrying about Bergson's views, although he commented on the meeting occasionally to friends, not giving any ground. Bergson, by contrast, criticized Einstein's relativistic concept of time and promoted his own case indefatigably. He wrote to Einstein's hero, physicist Hendrik Lorentz, who despite differences with Einstein offered little solace. Bergson also conversed with Albert Michelson — a top-drawer experimentalist but not a deep thinker about relativity — and used his insights to inform his case against Einstein. Canales does sterling work investigating these engagements, and even the largely incoherent contributions of the Catholic Church. Regardless of the views of his few critics, Einstein's concept of time, supported by experiment, became part of the bedrock of physics.

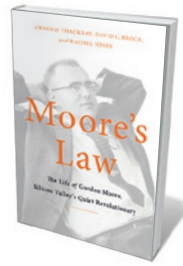
In my view, Canales exaggerates Bergson's influence on our understanding of time, and underestimates Einstein's substantial contribution to philosophy. Throughout his career, he was thoughtful about the philosophy of physics. With colleague Max Planck, he even helped to create a chair in the philosophy of science at the University of Berlin in the mid-1920s. Around that time, the value of philosophy was discounted by several young pioneers of quantum mechanics, notably Paul Dirac.

Canales oddly portrays the development of quantum physics as an embarrassment for Einstein, when he was not only one of its pioneers but also perhaps its most astute and respected critic. She sees the theory as a vindication of Bergson, whom she credits with anticipating Werner Heisenberg's uncertainty principle by some 20 years. It seems to me fanciful to link Bergson's long advocacy of indeterminism with Heisenberg's precise concept of the indeterminability of specific pairs of variables in quantum mechanics. Nor does Canales underline that physicists produced a fully relativistic theory of quantum mechanics, incorporating Einsteinian time.

She does a fine job, however, of highlighting the lack of constructive engagement between physicists and philosophers, beyond a few centres that specialize in the philosophy of physics. I sense that many would like to see some sort of rapprochement, and I warmly agree. On the evidence presented in this stimulating book, however, such a revolution is likely only after physicists shed some of the condescension that they sometimes show to other disciplines, and after philosophers cut from their discourse every last trace of piffle. ■

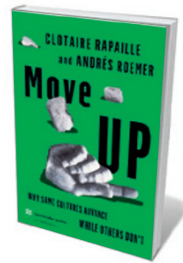
**Graham Farmelo** is a by-fellow at Churchill College of the University of Cambridge, UK, and author of Churchill's Bomb.  
e-mail: [graham@grahamfarmelo.com](mailto:graham@grahamfarmelo.com)

## Books in brief



### Moore's Law: The Life of Gordon Moore, Silicon Valley's Quiet Revolutionary

Arnold Thackray, David C. Brock and Rachel Jones **BASIC** (2015)  
In 1957, experimental chemist Gordon Moore and his colleagues formed a start-up manufacturing silicon transistors in Mountain View, California. Silicon Valley was born, and the prediction known as Moore's Law began to play out: the number of transistors in integrated circuits started to double every two years. Arnold Thackray, David Brock and Rachel Jones transform Moore from a man “doing something inscrutable in the margins” to a comprehensible, fiercely driven technophile who shaped history from the inside out.



### Move UP: Why Some Cultures Advance While Others Don't

Clotaire Rapaille and Andrés Roemer **ALLEN LANE** (2015)  
With gross domestic product looking ever thinner as an index of success, marketing specialist Clotaire Rapaille and diplomat Andrés Roemer proffer a new analytic tool for gauging progress, informed by behavioural economics, neuroscience and evolutionary psychology. Their R<sup>2</sup> Mobility Index rests on a country's cultural capacity to enable upward mobility, and its ability to sensibly support the basic biological imperatives of security, success, survival and sex. Scandinavian nations top several indices here, but Rapaille and Roemer's provocative synthesis throws up surprises too.



### Coastlines: The Story of Our Shore

Patrick Barkham **GRANTA** (2015)  
“The British Isles,” writes Patrick Barkham, “are more edge than middle.” Here he pays homage to the chalk cliffs and tidal flats of the 17,800-kilometre coastline to mark 50 years of National Trust protection of more than half of it. Filtered through his hyper-observant sensibility, it all becomes fabulously strange: Undercliff near Lyme Regis, for instance, is an active landslide festooned with botanical oddities and criss-crossed by shrews. Barkham's tour of the wind-scoured spots on this ragged borderland reminds why it has mesmerized scientists, artists and all those hungering for horizons.



### Pax Technica: How the Internet of Things May Set Us Free or Lock Us Up

Philip N. Howard **YALE UNIVERSITY PRESS** (2015)  
The Internet of Things could encompass 30 billion connected smart devices — from cars to spectacles — within just five years. In analysing this pervasive phenomenon, sociologist Philip Howard emphasizes its potential as the titular “pax technica”, binding industry and government in “mutual defense pacts, design collaborations, standards setting and data mining”. Howard duly notes possible risks, such as intensified mass surveillance, but argues that new devices could become “liberation technologies”.



### The Soul of an Octopus: A Surprising Exploration into the Wonder of Consciousness

Sy Montgomery **ATRIA** (2015)  
“Twisting, gelatinous, her arms boil up from the water, reaching for mine.” So begins naturalist Sy Montgomery's close encounter with a giant Pacific octopus (*Enteroctopus dofleini*) in this delightful study of cephalopods in the wild, aquaria and labs. Montgomery celebrates the solitary invertebrates in all their behavioural and physiological glory — as playful escapologists, problem-solvers and masters of camouflage that can taste and might even see with their skin. **Barbara Kiser**