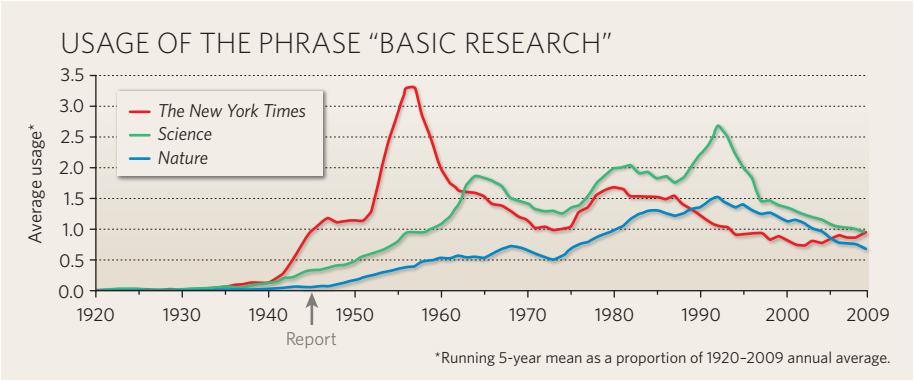
SOURCE: R. PIELKE JR



The fluid meaning of "basic research" galvanized science-policy discussions in the mid-twentieth century.

the early 1920s (one of the first narrow uses of the phrase) that the agency should fund more "basic research" to enhance agricultural productivity. At the time, Wallace's call for investment was counter-intuitive because US agriculture was suffering from being too efficient; a surfeit of production depressed prices and caused hardship for farmers. But he reasoned presciently that consumption would catch up in the longer term. Wallace did not live to see his vision realized, but his son, Henry A. Wallace, picked up the baton, first as agriculture secretary under Roosevelt (1933–40) and then as Roosevelt's vice-president (1941–45). During the war, the younger Wallace served as liaison between Roosevelt and Bush.

Bush was selected by his friend and neighbour Vice-President Wallace to draft *Science — The Endless Frontier*. As director of the Office of Scientific Research and Development, Bush had credibility and good connections within both the science and policy camps. This meant that when the report was released — less than two weeks before the Hiroshima atomic bomb was detonated — it was well positioned to influence. When Wallace's political fortunes fell, leadership in science policy completed its switch from the agriculturists to the physicists, and the language of science policy changed too.

With its inherent inscrutability, Bush's 'basic' research descriptor helped to secure a pragmatic compromise between scientists and politicians. The concepts of 'pure' and 'fundamental' research had long presented a narrow view of science in terms of benefits only to scientists. By contrast, basic research could be carried out for curiosity's sake — satisfying scientists — and could meet national needs, pleasing the politicians. Bush later recalled how the phrase made it easy to convey that "work that had been regarded by many as interesting but hardly of real impact on a practical existence, had been basic to the production of a bomb that had ended a war."

The publication of *Science — The Endless Frontier* entrenched the concept of government patronage of scientific research in policy discourse. The setting up of the National Science Foundation and countless other policy reports cemented it. "Institutions and statistics are what gave stability to the fuzzy concept of basic research," wrote science-policy scholar Benoît Godin in 2000. The speed with which science and society discussions were reframed is demonstrated by usage of the phrase in *The New York Times*, which rose rapidly from 4 mentions in 1944 to a peak of 159 mentions in 1957 (see 'Usage of the phrase "basic research"').

In recent decades, science policy has shifted its focus towards conferring measurable benefits to society. The fuzzy concept of basic research no longer seems to fit — nebulous descriptions of benefit are insufficient in today's competitive environment for public funds. Consequently, use of the phrase has declined since the early 1990s, as indicated by mentions in *Science* and *Nature* (see 'Usage of the phrase "basic research"'). Other terms, such as 'transformative research', have sprung up to fill the gap; even 'fundamental research' has made an ironic return. And science policy itself has been renamed by scholars of science studies: as collaborative assurance, socially robust science, use-inspired basic research and other monikers that have meanings largely known only to that community.

Words alone cannot bridge the gap between the different interests of scientists and politicians in pursuing research: governments demand relevance; scientists desire freedom. The so-far futile search for a language that is relevant today both reflects and reinforces the unsettled nature of science policy. In the six decades since *Science — The Endless Frontier* was written, research and policy have been transformed. Our framework for discussing both needs to catch up. ■

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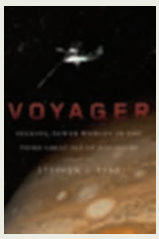
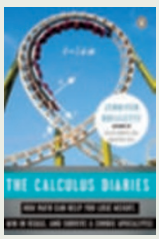
BOOKS IN BRIEF



Launched in 1977, the twin Voyager probes are true explorers. Among the earliest spacecraft to visit the neighbourhoods of Jupiter and Saturn, they will soon exit the Solar System and witness interstellar space. Environmental historian Stephen Pyne sets these missions within the wider arc of human exploration in *Voyager* (Viking, 2010). He examines the origins of the planetary exploration programme in cold war politics, and looks to modern frontiers of discovery, such as journeys to the ocean floor or beneath Antarctica's ice sheets.

Pythagoras held that the Universe is rational, and that there is order and unity to all things. In *Pythagoras* (Icon, 2010), science writer Kitty Ferguson pieces together the life story of the ancient Greek philosopher and his followers. She asks how his interest in mathematics arose and how his convictions developed. She unravels how Pythagoras's influence has spread across the ages, to underpin the work of great scientists such as Nicolaus Copernicus, Johannes Kepler and Isaac Newton, together with modern figures such as Stephen Hawking.



Mathematics fills some people with fear. In *The Calculus Diaries* (Penguin, 2010), science writer Jennifer Ouellette makes maths palatable using a mix of humour, anecdote and enticing facts. She describes how she overcame her own phobia of numbers and how maths forms the basis of modern life. Using everyday examples, such as petrol mileage and fairground rides, Ouellette makes even complex ideas such as calculus and probability appealing.