

SCIENCE'S COMPASS

vention...and blind allegiance to dogma." This statement is without foundation. Stone's first mistake is to view "religion" as a monoculture, and his second is to associate that monoculture with fundamentalist, dogmatic belief. Where does Unitarian Universalism fit in Stone's formulation? Reform Judaism? Even liberal Protestantism and Catholicism do not resemble Stone's odd picture of religion. After all, it was the liberal Protestant theologian Paul Tillich who, writing in 1940 (1), said "God does not exist" and then attempted to work out what this meant for religious symbolism in 20th-century Christianity. Stone's depiction of religion does not acknowledge biblical criticism, diverse and intensive questioning of traditional theologies, or the changes both of these have brought about.

It should be immediately obvious that science is incompatible with any fundamentalism—including that of scientism. The interaction between science and religion supported by the Templeton Foundation provides opportunities to resist fundamentalism and to recognize the depth to which both religion and science interact within culture. Neither science nor religion will go away, despite the most fervent

wishes of fundamentalists in both religion and science. They are not epistemologically equivalent, but both are involved in making sense of the world. This recognition calls for more dialogue and an end to the fundamentalisms of both sides.

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Ejnar J. Fjerdingstad's notion (Letters, 11 June, p. 1773) that atheists would be no more or less forgiving than theists is empirically answerable. One would need good definitions of belief and forgiveness as well as a means of disassociating absence of caring about others' actions from caring deeply but being able to overcome ones negative feelings. Such an investigation would likely replicate earlier work showing a U-shaped trend (1).

Articulate atheism and articulate theism both require the maintenance of refreshing apologies in the face of bright and active imaginations and should leave their holders capable of seeing, appreciating, and accommodating a wide variety of views and be-

haviors. Those who are not prone to notice or wonder at their own inconsistencies are more problematic.

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The Frist-Rockefeller Scenario

Science headlined an article in News Focus by David Malakoff, "Community divides over push for bigger budget," "A plan to double federal civilian research spending over a decade is surprisingly contentious because it could cramp biomedicine's push for even faster growth" (28 May, p. 1452). Nothing could be further from the truth. The doubling measure proposed by U. S. senators Bill Frist (R-TN) and Jay Rockefeller (D-WV), to which the article refers, was amended during its Senate Commerce Committee mark-up specifically to meet that concern and its corollary that other science agencies could be hurt by rapid growth of the National Institutes of Health (NIH).

The amendment is simple—not com-

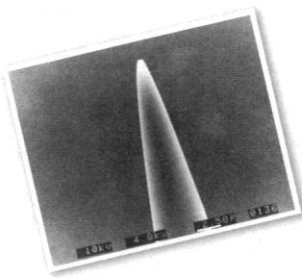
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plex, as the article reports: If any agency exceeds an 8% growth rate, it is removed from the base calculation of the bill, which treats civilian research in the aggregate. Therefore, NIH or, for that matter, any other agency that develops political steam, can grow much more rapidly than the annual 5.6% aggregate called out in the bill without harming other accounts.

In addressing the NIH issue, the bill's Senate sponsors worked closely with a number of science, math, and engineering organizations to prevent any disciplinary rifts from developing. They succeeded admirably. Moreover, inspired, in part by intersociety cooperation on the Frist-Rockefeller bill, the presidents of the American Chemical Society, the American Mathematical Society, the American Physical Society, and the Federation of American Societies for Experimental Biology recently presented joint testimony before the House Veterans' Administration-Department of Housing and Urban Development appropriations subcommittee.

The article also states that backers of the Frist-Rockefeller bill were attempting to do an "end run" around House Science Committee Chairman James Sensenbrenner (R-WI), who has shown "distaste" for the bill, by having the Commerce Committee take the lead. The truth is that last year U.S. Representative Heather Wilson (R-NM) submitted the bill in the House, and she is a member of the Commerce Committee. This year, the science and engineering communities have been working with both House committees, since both lay jurisdictional claim to the proposed legislation.

Finally, the article presents pie charts projecting how NIH and other civilian research agencies would fare proportionately in the year 2003 under the Frist-Rockefeller scenario. The charts are now moot, because the amended Frist-Rockefeller bill establishes no constraint on the growth of any agency and no penalty for the remaining ones, if appropriators or authorizers see fit to exceed the 8% threshold established in the legislation. Therefore, no projections can be made, absent assumptions not present in the legislation.

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Einstein's Diploma

In his Letter to the Editor to "set the record straight" about Albert Einstein (*Science's Compass*, 21 May, p. 1273), Harold I. Brown, citing Abraham Pais's splendid biography (*I*), writes that "Einstein had received a diploma from the Federal Institute of Technology in Zurich,

which indicated that he was qualified to teach physics at the university level."

Although Einstein, upon graduation, repeatedly sought a university position (unsuccessfully), the 4-year curriculum, according to Pais (*I*, p. 41), qualified Einstein "as a Fachlehrer, a specialized teacher, in mathematics and physics at a high school." And until he got the patent office job, Einstein did teach at high schools.

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Our Human-Machine Civilization

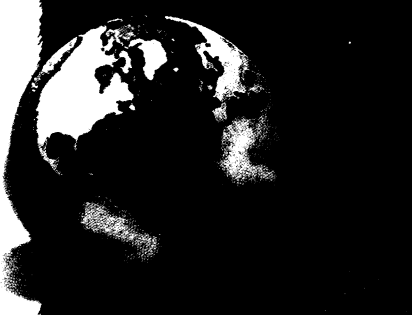
Diane Proudfoot's review (*Science's Compass*, 30 Apr., p. 745) of my book *The Age of Spiritual Machines* (Viking, New York, 1999) ignores its salient arguments and instead mires the reader in obscure and misleading factual objections. For example, she says that Univac was installed in April 1951, and "not in 1950 as Kurzweil claims." Actually, I made no such claim, but correctly stated that Univac was developed during 1950. Later (p. 320), I cited 1951 as Univac's installation date. And Univac was installed in March, not April, 1951.

If this all seems petty, then you have a good fix on the spirit of the review. Proudfoot says that Ludwig Wittgenstein's *Tractatus* "says nothing about brains." But Wittgenstein describes it as an examination of what humans can "know," and it is generally accepted that the brain is the organ responsible for knowing.

Proudfoot complains about anthropomorphizing, but there is no harm in using such terms; we routinely speak of the legs of a chair or the hands of a doll. It doesn't follow that it is our intent to endow these objects with human qualities. I clearly state that today's machines do not have the endearing qualities of humans—they are, after all, still a million times simpler, although this disparity is rapidly shrinking. She makes no comment on the book's specific theses, such as reverse engineering the human brain and harnessing its methods in increasingly powerful computational mediums. We are already able to replicate the detailed input-output response of extensive clusters of human neurons, and there is nothing to prevent these efforts from scaling up to the entire human brain.

Instead, she drags out old anti-artificial-intelligence (AI) arguments: some early predictions were wrong (which I discuss); many AI projects have crashed (al-

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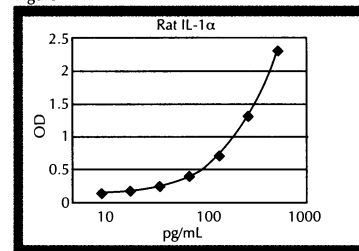
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Figure 1



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