

SCIENCE'S COMPASS

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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References

1. A. Pais, *Subtle Is the Lord: The Science and the Life of Albert Einstein* (Oxford Univ. Press, Oxford, UK, 1982).

Our Human-Machine Civilization

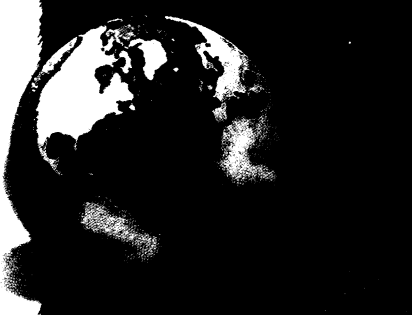
Diane Proudfoot's review (*Science's Compass*, 30 Apr., p. 745) of my book *The Age of Spiritual Machines* (Viking, New York, 1999) ignores its salient arguments and instead mires the reader in obscure and misleading factual objections. For example, she says that Univac was installed in April 1951, and "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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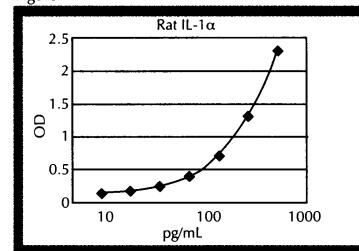
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Figure 1



Show Me! Figure 1 - Rat IL-1α standard curve. The Cytoscreen™ kit specifications: sensitivity <2.5 pg/mL, range= 7.8 - 500 pg/mL.

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