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the interests of that privileged minority of Soviet scientists who are trusted by the Party and the KGB to deal with Americans inside the country and occasionally go outside. He is their mouthpiece, as well as that of the supervising comrades. Not only does he share their goals, he also uses their methods.

Self-interest and ignorance are our common human weaknesses, to which one should be tolerant. Still, there are limits, which are known as simple decency.

VALENTIN TURCHIN
The City College

3/84

City University of New York

Complementarity in technology

Bohr's complementarity and Heisenberg's uncertainty principle may be generalized to: "Disadvantages come with advantages." We can design cars with either good fuel mileage or good acceleration but we cannot have both desirable characteristics in the same car. Recently, Robert Yaes (January, page 126) pointed out that sophisticated weapon systems are also trouble-prone systems. Similarly, a perfect weapon may also be an obsolete weapon. The biggest and most powerful battleships, Yamato and Musashi of the Imperial Japanese Navy, never accomplished much in their short and ill-fated careers. In the time it has taken battleships to be perfected, the basic concept of the battleship (big guns and heavy armor) itself has become obsolete and has been superseded by airplanes and guided missiles.

Because of successes such as moon landings—where small rockets may be scaled up to large rockets, and six rockets may be combined to give more thrust than one rocket—there has been great emphasis on perfect research programs. However, a perfect research program may also be an obsolete research program. On the other hand, it would have been very difficult for Albert Einstein to formulate his simple yet profound ideas, such as $E = mc^2$ or $E = hf$, into sophisticated research proposals or grant applications. Thus it is not surprising that true pioneer scientists are often amateurs.

Unfortunately, the uncertainty principle and complementarity are not easily understood. Meanwhile, administrators are often mesmerized by sophistication and perfection. For example, the European aerospace industry has tried hard to overcome the complementarity between supersonic speed and fuel economy. Though glamorous, the Concorde supersonic transport was an economic disaster, with total production of only 16 planes. (The figure is

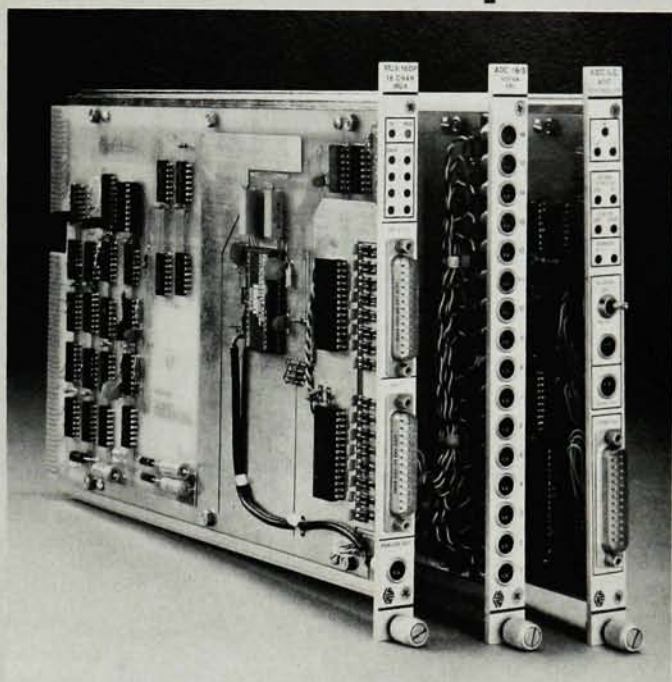
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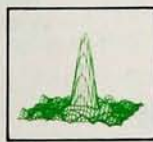
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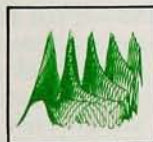
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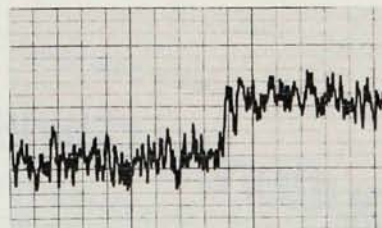


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over 1300 for the less glamorous Boeing 727, which did not violate the uncertainty principle.) This mesmerization has set the European aerospace industry back for at least a decade!

In research, innovation and risk may also be regarded as complementary variables. The bigger the innovation, the bigger the risk. We tend to remember the successes and forget the failures. In the decade following the Bohr atom, the list of famous physicists who worked on quantum mechanics is far longer than the few names we remember today. With the current emphasis on perfect research programs, there is a tendency to adopt the safe approach of putting the same problem on a slightly bigger computer for a slightly more accurate answer. These trends have contributed to the well-publicized breakdown of US innovation.

T. TSANG

Howard University
Washington, DC

2/85

Military strategy

Although Joseph J. Davaney (August 1984, page 15) claims to have only a very modest knowledge of foreign affairs, he still seems to overestimate it. This is shown by his lumping Finland together with a number of other countries as an example of Soviet aggression and enslavement. This is, of course, utter nonsense and very offending to the Finns. I suggest that Davaney first find out about how things really are before making such statements. A visit to Finland could be a good way to start.

RISTO NIEMINEN

10/84

Jyväskylä, Finland

Corrections

January, page 63—In the article entitled "Applications of neutron scattering to biology" by Peter B. Moore, the last sentence in the second paragraph of the first column should read: One of the more interesting results obtained with low-resolution experiments so far, the location of protein spheres in a ribosome subunit, is shown in figure 1.

page 66—In the same article, in the first paragraph of the third column, the value for the scattering length of oxygen, b , should read $+0.58 \times 10^{-12}$ cm, and not $+0.667 \times 10^{-12}$ cm.

March, page 90—In the preview of the APS March meeting, the description of the John H. Dillon Medal should have indicated that the award was established in 1983 and first presented in 1984. □