RANDOM SAMPLES

edited by CONSTANCE HOLDEN

How the Chinese Do It

Dismayed over the sorry international standing of U.S. children in math, educators have become intensely interested in the question: What are the Asians doing right that we aren't?

To address this question, an American-Chinese team headed by psychologist David C. Geary of the University of Missouri in Columbia has recently compared the performance of Chinese and U.S. students in elementary arithmetic.* The researchers did this, they say, because studies have shown that "performance in arithmetic is likely to be predictive of skill acquisition in more complex mathematical domains." Their finding? The Chinese are faster and use more sophisticated strategies—and they can do this at least partly because their schooling relies heavily on rote memorization.

The 52 first-graders in the study, who were from comparable areas in Hangzhou, China, and Columbia, Missouri, were given a traditional timed pencil-and-paper test, as well as a computer-administered "cognitive addition task." Based on observation, as well as on questions to the children, the experimenters assessed the uses of four problem-solving strategies: counting on fingers, verbal counting, decomposition (recasting the problem into a set of simpler problems), or retrieval from memory.

The results were striking: The Chinese children correctly answered about three times as many questions as the Americans did. That, say the researchers, is because the Chinese both worked faster and used more "developmentally mature" strategies. For example, the Chinese relied on decomposition (the most advanced approach) as a "backup strategy" 68% of the time, compared with 13% for the Americans. And they relied on direct retrieval more frequently than did the Americans. Counting was the "primary strategy" for the U.S. students, which not only slowed them down but suggests they had "few basic facts committed to memory," say the researchers. But even when the same strategies were used, the Chinese were often quicker: Their reaction times were faster on both retrieval and decomposition.

Geary says the findings can be explained by cultural differences in attitudes toward math. But he also has a message that runs against today's prevailing wisdom: Rote memorization works. Geary says there has been a "linear decline" in basic numerical skills among American children corresponding with a de-emphasis on rote learning—which in fact involves the employment of important strategies. "So," maintains Geary, "practice really facilitates conceptual development."

*"Numerical Cognition," by David C. Geary, Liu Fan, and C. Christine Bow-Thomas, *Psychological Science*, May 1992.

Ice Capade for Science

Remember that team of Russian and American scientists who climbed aboard a 6 1/2-foot-thick, 1.7-square-mile chunk of ice drifting north from Antarctica last winter (*Science*, 17 January, p. 276)? Where are they now?

Four hundred miles later they've completed their voyage through the Antarctic's Weddell Sea, the body of water whose movements they were eager to study in hopes of gaining insights into global climate change. It's been 4 months, from early February until 7 June, since 43 researchers from the two countries set up camp on the frigid berg and, says Arnold Gordon, a physical oceanographer from Lamont-Doherty Geological Observatory in Palisades, New York, who coordinated the expedition's science program: "Already an early assessment of the data suggests that we will have to alter our views of how this region fits into the global climate system."

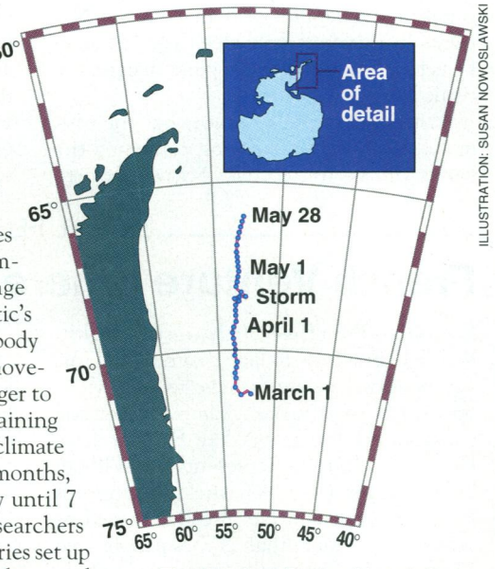

ILLUSTRATION: SUSAN NOWOSLAWSKI

Floating lab. Route of ice station through Weddell Sea.

The project's chief scientist, Doug Martinson, also from Lamont-Doherty, says researchers on the floating laboratory were able to study the upper ocean/sea ice interaction, and got a first-hand look at how that process changes as fall moves into winter. An unexpected finding made from the ice camp was that the continental slope off the Antarctic Peninsula is about 62 miles farther west than previously thought, a change that will affect extant models of ocean circulation.

TB RATES IN EUROPE AND U.S.

Country	Lowest recorded rate per 100,000	Most recent rate per 100,000	% increase
Switzerland	13.8 (1986)	18.4 (1990)	33.3
Denmark	5.2 (1984)	6.8 (1990)	30.7
Italy	5.7 (1988)	7.3 (1990)	28.0
Norway	7.0 (1988)	8.5 (1991)	21.4
Ireland	15.1 (1988)	17.9 (1990)	18.5
Austria	17.8 (1989)	20.8 (1990)	16.8
Finland	15.5 (1990)	18.1 (1991)	16.7
United States	9.3 (1985)	10.4 (1991)	11.8
Netherlands	8.4 (1987)	9.2 (1990)	9.5
Sweden	6.4 (1988)	6.7 (1990)	4.6
United Kingdom	10.1 (1987)	10.5 (1991)	3.9

European scourge. Although the comeback of tuberculosis in the United States has grabbed headlines (*Science*, 10 January 1992, p. 148), the news media appear to be relatively unaware of the fact that some industrialized countries are having an even tougher time of it. Numbers released last month by the World Health Organization (WHO) show that in Switzerland, the rate of TB cases has been rising nearly three times as fast as in the United States since the mid-'80s. In many countries, including the United States, Italy, and France, the TB resurgence is being attributed to AIDS. But in countries such as Switzerland and Denmark, immigrants not infected with HIV are bringing in the disease. While 96% of TB cases occur in developing countries, the increasing movement of people from one country to another means that the disease can no longer be contained in particular regions, says WHO. Many of these new European cases are being caused by super-virulent strains, resistant to standard TB treatments, that are similar to those plaguing the U.S.

Fusion Explosion Mystery Solved

Some 6 months after a lab explosion at SRI International killed one scientist and injured three others who were working on a cold fusion experiment (*Science*, 10 January, p. 153), an investigation has nailed down what really happened. The verdict: The disaster was not caused by a runaway fusion reaction, as some (particularly the die-hard fans of cold fusion) have speculated. Rather, the investigation concluded that an unexpected pressure buildup in a sealed test cell triggered a deuterium-oxygen explosion.

SRI has concluded that two separate equipment failures—one of a chemical catalyst designed to recombine the deuterium and oxygen into water, the other of a gas outlet valve that became accidentally blocked—created a highly pressurized mixture in the cell. The gases then ignited after scientists moved the cell, possibly because a platinum catalytic converter grew hot as it emerged from its water bath, the report states.

At the time of the explosion, many in the small but dedicated cold fusion community considered the SRI experiments, conducted in the laboratory of electrochemist Michael McKubre, among the most compelling evidence for the controversial phenomenon. While his lab has not yet published its findings, McKubre last summer reported measuring reproducible "excess" heat in a deuterium-palladium electrolysis cell using a sensitive flow-rate calorimeter.

Now SRI, located in Menlo Park, California, plans to ask the local fire department to lift an injunction suspending the research, and McKubre intends to continue his work. He says the Electric Power Research Institute, which has so far spent $2 million on SRI's cold fusion research, has agreed to let him publish his results in the open literature. Papers should start "trickling out" of his laboratory in the near future, he says.

Europe Plans Cosmic Road Show

How old is the universe? How were atoms created? How did life start? These are the "big questions" that lay people ask of science, says Brian Southworth of CERN, the European particle physics laboratory in Geneva. So, to answer them, CERN, along with the European Southern Observatory, the European Space Agency, and the European Molecular Biology Laboratory, is launching Cosmorama, a Walt Disney-type experiment in science communication for Europe's citizens.

Cosmorama's main aim is education—schoolchildren will be admitted free. Visitors will start with a 20-minute tour through a series of chambers, where they'll be bombarded with audiovisual effects designed to illustrate the Big Bang, the evolution of our galaxy and solar system, and the activity of a living cell. After being suitably awed, people can then explore the underlying science at exhibits based around the four organizations' current research programs, according to Southworth. The beauty of the concept is that this will be a movable feast, touring major cities in 20 European countries over a 4-year period.

TV science scripwriter Nigel Calder, who's been hired to provide Cosmorama's storyline, believes that success will depend on an absolute ban on jargon and a strong central theme. All the big questions, he says, can be rolled into one: "Where did the stuff in my body come from?" Then again, success will also depend on sponsorship deals Southworth is negotiating with European high-tech companies. Theme-park style science, it seems, doesn't come cheap, and entrance fees won't cover the several million dollars needed. If all goes well, Cosmorama should hit the road next February.

Superconducting Super Collider as Panacea

Anti-SSC scientists may not care for the kinds of arguments its proponents in the high-energy research community make for it–that it is important for the United States to stay Number One in high-energy physics, for instance, and that the benefits of fertilizing the economy with $8.25 billion in tax dollars won't be trivial–but wait 'til they hear what distinguished members of the U.S. House of Representatives said during debate over the SSC last month.

Bob Livingston (R–LA): **"High-energy research with particle accelerators has resulted and will result in plastics for medical use, solutions for DNA research and...maybe even for AIDS...,nuclear waste disposal..., pollutant removal..., location of oil deposits, creation of integrated circuits..., studies of watertables..., cryogenic engineering, tumor and body chemistry detection..., ultra-fast computers..., and lots, lots more...."**

Sam Johnson (R–TX): **"They have already, as a result of this program, developed cancer technology, developed treatment for tumors, developed advanced plastics that can be used in hospitals to reduce hazardous waste....The SSC is also driving supercomputer technology, and supercomputers are what has made the United States an advanced technology [sic] in a lot of areas."**

Bill Sarpalius (D–TX): **"What will happen once this giant laboratory is finally completed? It deals with compressed energy. Scientists say that they will be able to build a battery about this size [holds up thumb and forefinger] that will have enough energy to run an automobile.... In the medical profession, they will have a machine that [can] find any tumors or cancers in your body, never using a knife."**

Whistleblower Prize for O'Toole

Blowing the whistle is notoriously unrewarding, at least financially. But it's paid off a tiny bit for one of the best-known whistleblowers in science: Margot O'Toole. Last week in Washington, O'Toole received $10,000 for her willingness "to speak out when it would have been far easier to remain silent" from the Cavallo Foundation, a small, nonprofit group in Cambridge, Massachusetts, set up to reward "acts of moral courage in business and government."

O'Toole is the former postdoc whose persistence in pushing her concerns about a 1986 paper in *Cell* eventually led NIH's Office of Scientific Integrity to accuse Tufts immunologist Thereza Imanishi-Kari of fraud—triggering a series of events that compelled Nobelist David Baltimore to resign as president of Rockefeller University.

At the ceremony, O'Toole observed that the "ridicule" and "professional isolation" she had endured reminded her of the saying that "all professions are conspiracies against the laity." By the time people are "expert enough to spot something wrong," she said, they have become insiders with a vested interest in not rocking the boat. O'Toole thanked a long list of supporters including NIH fraudbusters Walter Stewart and Ned Feder; Representative John Dingell (D–MI) and his aides, who held the key hearings on the matter; former OSI deputy director Suzanne Hadley; and Harvard scientists John Edsall and Mark Ptashne.