ship in ODP was also unanimously approved by a committee representing all the oceanographic institutions that participate in the program.

When the Soviets signalled their acceptance, William Graham, who had then just been appointed President Reagan's science adviser, asked NSF to put the agreement through another interagency review. No serious objections were raised until early February. The day before U.S. officials were to depart for Moscow to sign an agreement, the National Security Council put the matter on hold for further review.

It did so after Defense Department officials claimed that the Soviets could gain access to sensitive technology aboard the drilling vessel. The objections came from the office of Stephen Bryen, who heads export control policy in the Pentagon. Bryen is said to have enlisted the support of then Secretary of the Navy John Lehman and Defense Secretary Caspar Weinberger. The security council upheld the Defense Department's objections even though the Departments of Commerce and State are said to have supported going ahead with the agreement. Bloch was told to withdraw the invitation.

Administration spokesmen will say only that technology transfer problems were a concern, but they decline to discuss specifics. Others say that questions were raised about the dynamic positioning system, which enables the drill ship to maintain a precise location, a technique for reentering a borehole, and the onboard computers. However, only seven technologies on the vessel even require export licenses, and according to several experts, the Soviets already have more advanced systems than those on the JOIDES *Resolution*. "There's nothing on that ship the Russians don't have," says Douglas Caldwell, chairman on the executive committee that represents the member institutions. Philip Rabinowitz, who heads the ODP at Texas A&M, says most of the equipment on the ship is widely available. "I'm sure they have access to anything we are using," he says.

NSF officials also note that Soviet participation in the program might have helped ease potential objections to drilling in politically sensitive areas. "The Soviets would have brought a lot to the table and we turned them down," laments one official.

The withdrawal of the invitation is the second episode in a month in which the Administration has blocked a scientific program with the Soviet Union because of objections raised principally by Bryen. In March, the National Security Council disapproved an NSF grant to the International Institute for Applied Systems Analysis (*Science*, 1 May, p. 514). ■ COLIN NORMAN

Female Math Anxiety on the Wane

But data from standardized achievement tests in math and science still show male superiority, particularly among the highest scorers

At the recent annual meeting of the American Educational Research Association, no fewer than 25 sessions dealt with male-female differences in achievement and interest in mathematics and science.

The topic is undeniably provocative. On the one hand, it appears that "math anxiety," the much touted explanation for girls' lower achievement in the 1970s, is no longer much in evidence. But despite this, boys are doing significantly better than girls in the upper reaches of scores from standardized tests in math, science, and even history.

Julian Stanley. *Director of Johns Hopkins Study of Mathematically Precocious Youth.*

The apparent decline of math anxiety was documented in a presentation by Frank Besag of the University of Wisconsin (Milwaukee), who surveyed the school records of 7500 students from grades 9 through 11 and gave them the MARS test on math anxiety and a test measuring their self-esteem. He and Maureen Wahl found few sex differences on course participation, grades, or dropout rates, and found no differences between boys and girls on math anxiety or self-esteem. "It would certainly seem to me that some of it [math anxiety] has been overcome," said Besag.

The impression given from several of the sessions was that if math anxiety still exists for girls, it kicks in relatively late, since they have better grades than boys do on all subjects through elementary school. The problem is that the sexes begin to diverge in science and math interest and achievement in high school, and the divergence becomes more pronounced in higher education.

Much of this disparity has to do with divergent interests. Linda K. Zimmerer and Susan M. Bennett of the California Assessment Program reported that a survey of high school students throughout the state showed that "boys have more positive attitudes toward science," even though girls got better grades. Boys spent more time than girls studying 9 of the 12 topics surveyed. On achievement tests, boys scored significantly higher in 25 of 33 categories. Girls did better on two: laboratory safety and observation (telescopes and microscopes were their favorite instruments). Girls did better on reading, memory, and comprehension, and boys on science vocabulary. Girls were good at inferring; boys at predicting. The researchers concluded that the differences were "a reflection of more than simply classroom instruction."

This seemed to be borne out in observations by Sharon Rallis of Rhode Island College who said the "differential course work hypothesis may be inadequate to explain differences in achievement and career choice" between males and females.

Rallis and her colleagues selected two groups from 2200 Rhode Island 12th graders: those who were "academically prepared" for science careers, with course work including calculus and physics, and those expressing an intent to have a science career. The "most striking revelation" was the small number of prepared girls who indicated a career interest in engineering, science, or technology—11 of 59, compared with 47 of the 74 "prepared" males.

Why the difference? Rallis said teachers and counselors insisted there were no relevant differences between males and females

as a group. But they would also make comments such as, "girls don't like mechanical stuff as much as boys." Prepared females were more likely to be interested in other professional fields such as business, medicine, and law; yet pay was mentioned as a factor in career choice twice as often by boys. Half the students said their parents were influential in their choices. The researchers concluded that information and encouragement (from sources outside school) were more important for girls than boys in choosing science as a career.

Camilla Benbow of Iowa State University, who is involved in the Johns Hopkins University Study of Mathematically Precocious Youth (SMPY), had a similar message. She reported that of 2000 mathematically gifted students, 63% of the males and 35% of the females chose to major in math or science. She also said males were twice as likely as females to choose research careers. "Attitudes toward science" emerged as the most powerful variable, followed by "family support for goals" and the educational levels of subjects' fathers. Irene T. Miura of San Jose State University, who compared science interests between the sexes in high and low socioeconomic groups, also concluded that the sexes "did not differ on variables most likely to be influenced by schools."

Marlaine Lockheed of the World Bank suggested that sex differences stem more from affective (emotional) differences than from "a reasonably nonexistent cognitive deficiency." She noted that there have been "major changes" in course participation by females and that "as courses become required there are fewer and fewer differences."

This observation, however, does little to explain the findings that have been emerging from the group at Johns Hopkins, headed by Julian Stanley. The findings from SMPY suggest that sharp sex discrepancies exist at the extreme end of the achievement spectrum in many subjects.

The Johns Hopkins group has been looking at thousands of youths who score 700 or above on the mathematical portion of the Scholastic Aptitude Test by the age of 13. The sex ratio at this level is 12.9 males to every female. At 451 (the male mean), they found the ratio to be 1.5:1. This increases to 2:1 at 500 and 4:1 at 600.

The group has been analyzing national data from a variety of standardized aptitude and achievement tests, and has found that males consistently score higher in the quantitative domains than do females. They compared gender differentials among tests by estimating the "effect size," which is computed by dividing the difference between the male and female means by the standard deviation of the scores. An effect size of 0.8 is large, and 0.2 or below is small.

In the Differential Aptitude Test, for example, 8th-grade females show a modest superiority in numerical ability, abstract reasoning, and verbal reasoning, but this disappears by the 12th grade. Males, on the other hand, show an effect size of 0.66 on mechanical reasoning, which goes up to 0.89 by the 12th grade. The male effect size for space relations goes from 0.13 in 8th grade to 0.22.

The general pattern is similar for high school students taking the American College Testing Program, where male effect sizes range from 0.23 to 0.40 in social studies, math, and natural sciences. In College Board Achievement tests, females did slightly better in English and composition, but males showed intermediate effect sizes in biology, math, chemistry, and European history. Graduate Records Examinations revealed two of the largest effect sizes favoring males—0.79 in political science, and 0.71 in math.

Graduate and professional school entrance examinations tell the same story. Effect sizes are negligible only in the Law School Admissions Test, which is the most difficult in terms of logic and reasoning but contains no quantitative questions. The largest effect size favoring females was 0.19, on the verbal portion of the management test.

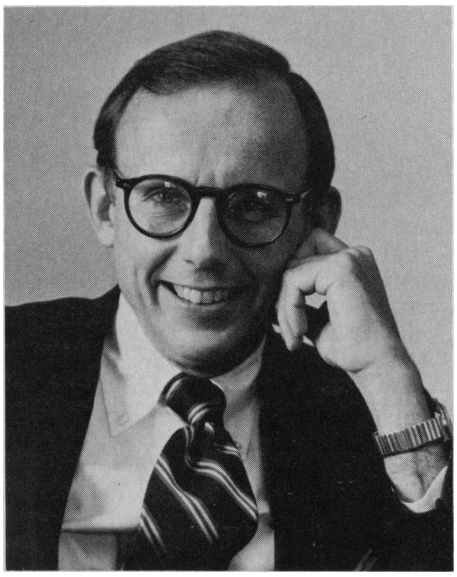
Although many of the effect sizes are not large, Stanley said they can result in severe discrepancies in the upper scores. For example, the male advantage in spatial relations (0.22) translates to a male-female ratio of almost 2 to 1 in the top 10% of scores. The male effect size of 0.63 in European history in 1985 corresponds with a 10 to 1 ratio among the highest scorers.

Stanley observed that females are overall better students from kindergarten through graduate school, and that they do better on course-related exams than on standardized tests. He characterized women as being more oriented to social interaction and aesthetics, while men go for the quantitative, the abstract, "power and control." He did not hazard any explanations for this—"we've tried to firm up the whats so that other researchers may pursue the whys."

It remains a matter of debate whether observed sex differences in math and science achievement are significant, and whether they represent a problem to be solved. Some cling to the view that the discrepancies can be explained by differential course-taking; others believe that they stem from factors as yet unmeasured. Some think the subject has been blown all out of proportion. Said Susan F. Chipman of the U.S. Office of Naval Research: "People are just *too* interested in this topic." ■ CONSTANCE HOLDEN

Academy Rejects Huntington Nomination

For the second time, the National Academy of Sciences (NAS) has voted not to accept political scientist Samuel P. Huntington of Harvard University as a new member. Huntington, a prominent author and president of the American Political Science Association, was turned aside in a vote on 28 April. He was nominated in 1986 and again this spring by NAS's Class V, representing the behavioral and social sciences.



Samuel P. Huntington

The campaign to keep Huntington out of the Academy—at times acrimonious—was led by mathematicians and other "hard" scientists who took issue with his use of statistics. Yale mathematician Serge Lang publicized a charge that Huntington engaged in "pseudomath" by larding his work with mathematical terms (*Science*, 5 December 1986, p. 1192).

In response, Huntington said that Lang had taken out of context some mathematical figures in Huntington's book, *Political Order in Changing Societies*. The figures in question were not meant to be read as equations, he said, but to serve as "a shorthand way of summing up a complicated argument." After the NAS vote, he reportedly said the Academy appears to be suffering from "an acute case of Langitis."

Lang's attack prompted some strong reactions. Herbert Simon, a professor of computer science and psychology at the Univer-