

ket share. The United States can meet its domestic and national security uranium enrichment needs now and in the future without any taxpayer bailout. Moreover, it can continue to be a reliable supplier to such foreign customers as desire its services without cost to the taxpayer. Why should Congress and the American people support the Senate approach, or DOE's current policies?

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Indictment of Soviet Physicist

I am writing in response to the Research News article "Glasnost comes to Soviet physics" by Arthur L. Robinson (8 May, p. 671).

I believe the article that appeared in the Soviet magazine *Literaturnaya Gazeta* is an unfair and incorrect indictment of Soviet physicist Evgenii N. Yakovlev, the acting director of the famous Institute of High-Pressure Physics located just outside Moscow. The thesis of the Soviet accusations against Yakovlev is an unequivocal allegation that Yakovlev's work on the pressure-induced metallization of hydrogen diluted, diverted, and stagnated the efforts of the institute for a 10-year period and, furthermore, that Yakovlev's announcements that he had achieved the metallic state of hydrogen were blatantly incorrect. Perhaps the Soviets are trying to find excuses for failing to first report the pressure-induced high-transition-temperature ceramic oxides.

I take logical and forceful issue with the above Soviet position. As a professional Defense Department physicist working in the area of high-pressure for the past 22 years, I am very familiar with Yakovlev and with his work. I have met him on many occasions and have engaged in intensive discussions with him at conferences sponsored by the International Association for the Advancement of High Pressure Science and Technology (AIRAPT). I have discussed with him in detail recent work (including his own) on the pressure-induced insulator-to-metal transition in sulfur and in other insulators, as well as theoretical work in hydrogen. I have interacted with Yakovlev at conferences in Le Creusot, France, and in Uppsala, Sweden. I have found him to be knowledgeable and competent and to be far more cooperative and interactive than most Soviet physicists, especially those in the high-pressure field.

I have also become aware of Yakovlev as a humanistic and humanitarian scientist with

characteristics that would clearly identify him as a sensitive, well-meaning member of the community of nations rather than a representative of a nation normally thought to be politically hostile. Yakovlev is, in my mind, a deeply sensitive and profound thinker and speaks better of the human quality of Soviet scientists, often thought to be unapproachably aloof from social and emotional values.

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Is Female Math Anxiety Real?

Constance Holden (News & Comment, 8 May, p. 660) reports that "Female math anxiety [is] on the wane." It may be that there never were many male-female differences in "math anxiety," at least insofar as secondary school and college-age populations are concerned. For college-age populations this was already suggested in a study of 1045 students at the University of Rochester in which there were no discernible differences between males and females in mathematical anxiety among students at the same level of ability (1). Already in the late 1970s Wesleyan University, which had one of the first "mathematical anxiety" clinics at the college level, reported proportionately as many males as females registered for its programs for the "math-anxious" (2).

What then explains the popular association of "math anxiety" with females (tacitly assumed to hold at all age levels)? It seems to stem from a 1976 article by John Ernest (3) later reprinted by the Ford Foundation, and an article by Sheila Tobias (4), followed by a book (5). Actually the Mathematical Anxiety Rating Scale (MARS) was developed by Richardson and Suinn around 1972 (6). Although 80% of the students in the Richardson-Suinn sample were female, no significant difference in mean scores or standard deviations was found between males and females. Rounds and Hendel (7), who used the MARS scale, actually studied older female college students who were enrolled in math anxiety programs, for whom an average of 16.5 years had elapsed since their last mathematics course and whose approximate average age was 35 years. No wonder they were "math-anxious"! In any case a good deal of caution is necessary in interpreting data based on the MARS scale (1, p. 44).

A recent study by Hallinan and Sørensen (8) indicated that female students (in fourth through seventh grades) ranking high in mathematics achievement were less likely to

be assigned to high-ability groups by their teachers than were males with comparable scores. Even though the study also showed that "sex, *per se*, is not a determinant of assignment" (8, p. 67), the idiosyncratic assignment of *high-achieving* females (emphasis added) as influenced by sex is a major conclusion of the study. Furthermore (8, p. 71) girls "are more likely to be misassigned than boys." Although Hallinan and Sørensen do not believe that at the age level they studied the sex considerations in the assignment process affect mathematics achievement, this may happen for older children. The steady increase of the percentage of U.S. citizen female Ph.D.'s (in a declining total) each year (9) may be an indication that properly nurtured and encouraged at home and school, women are as capable as men in the upper levels of mathematics.

Finally, a distinction is frequently made in discussions of this sort between "verbal" and "mathematical" ability. In studies done as long ago as the 1960s, the Russian educational psychologist V. Krutetskii (10, 11) showed that while, on the one hand, ability to visualize abstract mathematical relationships and ability to visualize spatial geometric concepts were highly correlated, neither was a necessary component in the structure of mathematical abilities. Their strength or weakness determined the type of mathematical giftedness, rather than its extent. In addition, he found that the verbal-logical component of thinking is well developed in all mathematically able pupils, and one can therefore only talk about a greater or lesser development of the visual-pictorial component. Indeed students with "little capacity for mathematics" are primarily defective in the verbal-logical components of reasoning (11). Could it be that purported male-female differences in math anxiety have always been fictitious?

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