Association for Women in Mathematics

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PRESIDENT'S REPORT

Emmy Noether Symposium. I have just returned from Bryn Mawr, where the Emmy Noether Symposium sponsored by AWM took place on March 17, 18 and 19. The Symposium began on the evening of the 17th with a welcome address by President Mary Patterson McPherson who gave a short history of the Mathematics Department at Bryn Mawr and the circumstances that led to Noether's appointment there. The scientific program was inaugurated by the distinguished algebraist Nathan Jacobson of Yale University who knew Noether personally when she was at Bryn Mawr, and was appointed to the faculty there after she died. Prof. Jacobson is editing Noether's Collected Works which will be published soon by Springer-Verlag. The remainder of the scientific program consisted of talks by Richard Swan, Judith Sally, David Mumford, Michele Vergne, Karen Uhlenbeck, Olga Taussky-Todd, Walter Feit and Armand Borel. The presiding officers at these talks were Alice Schafer, Ty Cunningham, Michael Artin, Bettye Anne Case, Linda Rothschild, Vera Pless, Yitz Herstein and John Oxtoby. On the evening of March 18 there was a panel on "Emmy Noether at Erlangen, Göttingen and Bryn Mawr" chaired by Martha Smith. Gottfried Noether, a nephew of Emmy Noether, talked about the difficulties faced by Noether in her professional life in Germany (cf. the article by Emiliana Noether in the AWM Newsletter, Nov.-Dec. 1976). Marguerite Lehr, Ruth McKee, Grace Quinn and Olga Taussky-Todd who knew Noether at Bryn Mawr gave their personal reminiscences of her as a woman completely devoted to mathematics, yet warm, loving, outgoing and extremely helpful to her students.

Over two hundred people attended the Symposium and made it an exciting and successful event. People came from all over the country, and there was even one person who came all the way from Beirut. At the last minute we got a travel grant from IBM, and we were able to help a few people who had applied to AWM for funds, to attend the Symposium. The Symposium was preceded by a meeting of the American Mathematical Society at which there were many Special Sessions, some of them relating to Noether's work. The Proceedings of the Symposium will be published by Springer-Verlag and will be edited by Judith Sally and myself.

I am grateful to the local organizing committee at Bryn Mawr headed by Rhonda Hughes for working hard for the success of the Symposium. Many of us were emotionally involved with this project from its inception, and as I think about it I realize that this symposium is unlike others of its kind in the following way: many mathematicians have had conferences held in their honor, but I wonder if they have received the loving and the caring and the giving that seem to have gone into the making of this one; in this, as in many other respects, Emmy Noether is unique indeed. Indeed, I sensed a strong feeling of involvement among many of the participants at the Symposium.

Cincinnati. I would like to correct a misprint in my last report; the term of the alternate member on the Executive Committee is until December 31, 1983, and not 1982, as stated. Also, the Executive Committee resolved that in the future AWM will not routinely endorse candidates for AMS elections. Statements from AMS candidates will be published in the AWM Newsletter and members will be able to make their own decisions.

NSF Visiting Professorships for Women in Science and Engineering. This program, which was mentioned in our March-April Newsletter, has now been approved. Under this program, women who hold doctorates in science or engineering fields normally supported by the NSF may apply for up to 24 months full or part-time research and teaching as visiting professors at academic institutions in the U.S.A. [Ed. note: application deadline for this year was April 15.]

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LETTER FROM THE EDITOR

Thanks to all of you who have been sending me articles you have written or interesting articles you think we should reprint. I really appreciate the help. You are, in a sense, my staff of reporters. I hope you continue your efforts.

I am issuing a call for more of you to contribute. Right now, I am facing an editor's nightmare--I don't have any backlog. This newsletter is the shortest in a long while. There are two articles waiting for reprint permission, but other than that, I'm out. This makes me at least a tad nervous. Please, folks, send me stuff, or I may have to start writing my autobiography a little earlier than I'd planned.

Actually, that might not be so terrible an idea, if it were my mathematical autobiography. Topics of recent autobiographical articles were how to deal with the combination of family and career lives and how to deal with being a graduate student at a prestigious graduate school. In articles of this sort, we can pass on to each other ways of coping, surviving, even triumphing.

Biographical articles about women in the present and in the past are also needed. We need to keep up with studies on women in academe, on the differences between men and women in mathematics performance, on whatever is relevant to women in mathematics.

I have been asked why I don't print Letters to the Editor. Well, I do, but I just don't get that many. A more active Letters to the Editor section would be a good means for setting up more dialogue among members, since only a minority of us make it to any given national meeting. Also, although a letter should be well thought-out, it is easier to write than an entire article. I would like to see the Notes from members section become more active. Here we can report on local meetings or pass on some short piece of information. If you know of a woman in the mathematical sciences who should be honored for some achievement, let me hear about that, too. If you have an idea for an article, pass that along--someone just might write it.

Your editor, Anne Leggett

NOTE

An informal AWM meeting was held April 30, 1982 at 5 p.m. in conjunction with the meeting of the Illinois Section of the MAA held at Southern Illinois University at Edwardsville.

DIRECTORY OF WOMEN IN THE MATHEMATICAL SCIENCES

A new Directory of Women in the Mathematical Sciences has recently been published by the AMS-MAA-NCTM-SIAM Committee on Women in Mathematics. The Directory contains biographical and bibliographical information on nearly one thousand female mathematicians, nearly all of whom have doctorates.

The members of the joint Committee in 1981 were Pamela Cook-Ioannidis, Jessie Anne Engle, Etta Z. Falconer, Phyllis Fox, Mary W. Gray, I.N. Herstein, Edith H. Luchins, Cathleen S. Morawetz, Jacqueline C. Moss, Katherine L. Pedersen, Alice T. Schafer, Joel E. Schneider, Barbara Searle, and Gail Williams. The new Directory was produced with partial support provided by the AMS, MAA, SIAM, AWM and several commercial publishers: Addison-Wesley Publishing Company; Birkhäuser Boston, Inc.; Marcel Dekker, Inc.; W. H. Freeman & Co.; Harper & Row; Krieger Publishing Company, Inc.; and Springer-Verlag, New York.

Copies of the Directory are available at $3 per copy, prepaid, from Professor Alice T. Schafer, Women's Research Center, Wellesley College, Wellesley, MA 02181.

COMETS

With support from the National Science Foundation, COMETS (Career-Oriented Modules to Explore Topics in Science) have been developed to supplement science career education materials for grades 5-9 to encourage more students - both girls and boys - to consider science-related careers and to continue studying science in high school. COMETS provides over 100 activities organized into 24 modules. There is information about contributions women have made in science. Most modules have Challenge Cards outlining open-ended student investigations. Many activities are brief, but others are longer, and extension activities are included. There are directions for finding resource people in the community. Lots of experimentation and hands-on experiences are included in each module. There are computer activities, and many activities allow students to practice math skills. Also, there is a companion set of 24 biographical Profiles, each of which features a woman pursuing a science career, plus language arts activities such as content quizzes, vocabulary building exercises, and directions for writing and projects.

In order to fieldtest COMENTS around the country, we are offering COMETS at cost to teachers and asking them to return a one-page questionnaire to us. COMETS is a non-profit enterprise. For information write: Walter S. Smith, Director, 205 Bailey Hall, University of Kansas, Lawrence, KS 66045.

NSF NEWS

The NSF has eliminated special individual travel grants for attending conferences in foreign countries. However, it will still consider requests for group travel to foreign conferences. AWM may be willing to act as a sponsor for such a request to the NSF by a woman invited to a conference abroad who could organize a group. Please write to Linda Rothschild c/o AWM if you are interested.

$500,000 for Fiscal Year 1982 has been allocated for NSF Visiting Professorships for Women in Science and Engineering. The objectives of the program are to develop and encourage careers in research for women in science and engineering and to provide greater visibility for women scientists and engineers employed in industry and government or in academic research.

SOCIAL FORCES SHAPE MATH ATTITUDES AND PERFORMANCE

by Dr. Jacquelynne Eccles Parsons, Associate Professor, Department of Psychology, University of Michigan, Ann Arbor
Thanks to Chandler Davis for bringing Dr. Parson's work to our attention.

Abstract. In a study of 250 average and above average students, differences in math anxiety, in the stereotypic beliefs of one's parents, and in the value attached to mathematics emerged as the primary determinants of sex differences in mathematical course enrollment plans. Contrary to the suggestion of Benbow and Stanley (1), mathematical aptitude, as reflected in previous course grades and in previous performance on standardized mathematics tests, was only indirectly related to students' (especially female students') subsequent math grades and plans to enroll in advanced math courses.

Over the last decade there has been a continuing debate over the existence and possible causes of differences between males' and females' mathematical skills. Several recurring observations have provided the focus of this debate. First, adolescent boys have been found to score higher than girls on standardized tests of math achievement (2). Second, males are more likely than females to engage in a variety of optional math-related activities ranging from technical hobbies to careers in which math skill play an important role (3). Third, adolescent males typically perform better on tests of spatial visualization (4). While explanations for these differences have involved a variety of hereditary and environmental factors, there has been no definitive resolution of the debate.

Critique of Benbow and Stanley

The latest addition to the controversy over the origins of sex differences in math achievement came in a recent Science article (1). Within a sample of highly gifted seventh and eighth grade children, Benbow and Stanley found that, on the average, boys scored better than girls on the College Board's Scholastic Aptitude Test for Mathematics (SAT-M). This difference was especially marked at the extreme upper end of the distribution. While these data extend a pattern of commonly found sex differences to a select population of junior high school students, the results themselves are neither surprising nor particularly novel (5). What is novel, however, is Benbow and Stanley's interpretation of their data. They argue that "superior male mathematical ability" is the probable cause of the sex differences in their data since the boys and girls have had essentially identical mathematics training prior to the seventh grade. Furthermore, they suggest that the "superior male mathematical ability" is the probable cause of general sex differences in both mathematical achievement and attitudes toward mathematics. These conclusions have sparked both renewed controversy in the scientific community and a disturbing response from the mass media. The present article questions the assumptions underlying Benbow and Stanley's conclusions and presents data counter to their conclusions.

Benbow and Stanley's conclusions rest on the following assumptions: a) students' scores on the SAT-M are primarily a measure of their mathematical aptitude; b) similarities in formal educational course-taking are evidence for similar mathematically relevant experiences; and c) the demonstration of a sex difference in mathematical reasoning supports the conclusion that "less well-developed mathematical reasoning contributes to girls' taking fewer mathematics courses and achieving less than boys."

In their rebuttal to Benbow and Stanley, Schafer and Gray (6) concluded that there is no justification for the assumption that the SAT-M measures mathematical aptitude. Moreover, Slack and Porter (7) and Jackson (8) have pointed out that the SAT measures acquired intellectual skills. Thus, one must question Benbow and Stanley's assumption that the SAT-M measures mathematical aptitude.

The assumption that the boys and girls have had equivalent mathematical experiences is also problematic. Assessing the quantity of a student's mathematical experience is extremely difficult. Counting the number of one's math courses is only one possible method and is feasible only in the secondary school years. The fact that all of the children in Benbow and Stanley's sample had completed the sixth grade does not support the inference that their subjects have had equivalent formal educational experiences with mathematics. Concluding that their informal experiences have been equivalent is even more suspect. Before such inferences are justified, one would need to develop appropriate measures of the quantity and quality of elementary school children's mathematical experiences and then to test whether there are sex differences on these measures. Other investigators have done this. Leinhardt, Seewald, and Engel (9) observed the formal teaching practices of 33 second grade teachers. Their teachers spent significantly more time teaching boys math than teaching girls math. Based on their results, in fact, it is possible to estimate that boys have received an average of at least 36 more hours of formal mathematics instruction than girls by the time they reach the seventh grade. Both Astin, and Fox and her colleagues have investigated informal math related experiences (10). According to their results, boys are more likely than girls to have informal, mathematically related experiences such as playing with scientific toys or mathematical games and reading mathematics books. Thus, Benbow and Stanley's assumption that their boys and girls have had equivalent mathematical experiences is questionable, precluding definitive conclusions regarding the origin of the observed differences on the SAT-M scores (11).

Benbow and Stanley's assumption that their data contribute new information to the debate over the origins of sex differences in math achievement, course enrollment, and math attitudes is also suspect. They do not provide any data regarding the power of SAT-M scores as predictors of future math achievement, attitudes toward mathematics, or course enrollment. Other investigators have suggested that the link is weak, if present at all. For example, Slack and Porter (7) concluded that the SAT-M score is a poorer predictor of college mathematical achievement than either high school grades or the SAT-Mathematical Achievement Scores. Further, in a recent summary of a follow-up of the 1976 cohort of the sample used by Benbow and Stanley, Fox and Cohn (12) reported a non-significant negative relation between SAT-M scores and girls' subsequent educational acceleration. And finally, Steel and Wise (13) found that, although math ability is a significant predictor of subsequent math achievement and course enrollment, it does not account for the sex differences in either high school seniors' mathematics grades or their high school mathematics enrollment patterns. Apparently variations in mathematical reasoning ability do not contribute to variations in subsequent course-taking patterns for either the group of gifted girls studied by Benbow and Stanley or for more representative samples of competent high school students.

Predictors of Math Achievement and Math Participation

What does predict the course-taking plans and achievement of math-competent (as distinguished from gifted) junior high school students? Contrary to the conclusion reached by Benbow and Stanley, our data suggest that social and attitudinal factors have a greater influence on junior and senior high school students' grades in mathematics and course enrollment plans than do variations in mathematical aptitude. Further, our data suggest that sex differences in mathematical achievement and attitudes are primarily the consequence of sex differences in math anxiety, the stereotyped beliefs of parents, especially mothers, and the value attached to mathematics.

These conclusions are based on a two-year longitudinal study of 250 average and above average seventh through ninth grade students, their parents, and their mathematics teachers. We gave questionnaires to the students in two successive years. Mathematics course grades and performance on a standardized achievement test (either the Michigan Educational Assessment Program or the California Achievement Test) were collected from the student's school records each year of the study. Questionnaire data were also gathered from both parents and teachers. Exploratory Factor Analysis was used on the student and parent questionnaires to create the major variables (14). The following four significant parent factors emerged: mother's estimates of the difficulty of math for her child, father's estimates of the difficulty of math for his child, both parents' estimates of their child's math ability, and both parents' estimates of the importance of enrolling in mathematics courses. Three significant student factors emerged: students' self-concept of their math ability, students' estimates of the difficulty of math, and students' rating of the utility value of mathematics courses. Three additional scales were derived: (a) a scale reflecting the teacher's estimate of each student's mathematical ability, (b) a scale reflecting the student's math anxiety, and (c) a composite mathematical aptitude/achievement score based on the student's previous year's math grade and most recent standardized test score (15).

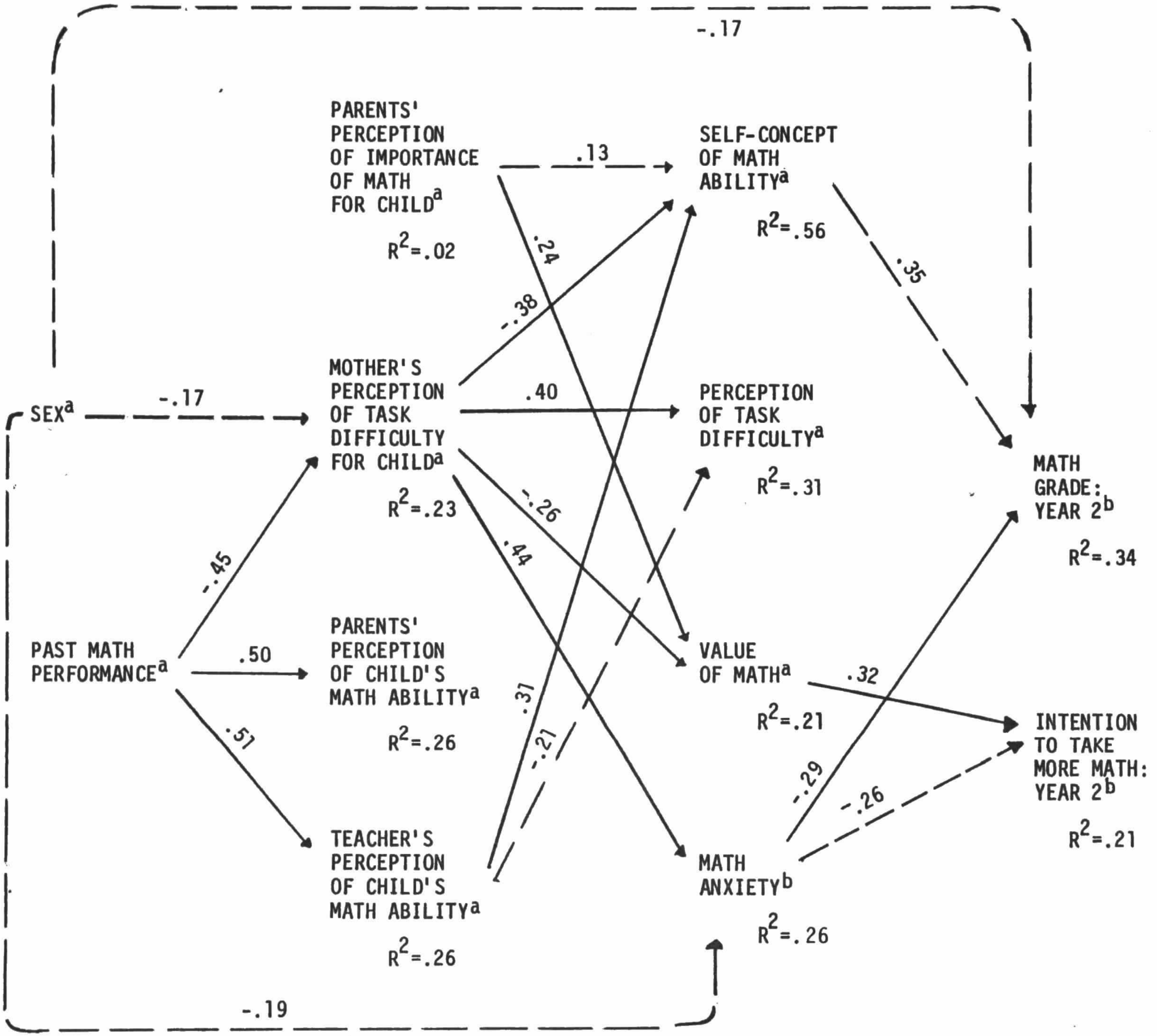
Each of these scores, along with the student's sex, was entered into a multiple regression, recursive path analysis. To facilitate interpretation of the causal direction of significant paths, parent, teacher, and student attitudinal variables from the first year (16) were used as predictors while grades and course plans from the second year were used as criterion measures (17). The reduced path diagram is depicted in the Figure.

Grades and plans to continue taking math are predicted most directly by the students' self-concept of their mathematical ability, their estimation of the value of mathematics courses, and their math anxiety. These variables, in turn, are related most strongly to mothers' beliefs regarding how difficult math is for their child. Parents' estimates of the importance of mathematical courses for their children and the teachers' estimates of each student's math ability are also significant predictors. There are significant zero-order correlations between the mathematics aptitude/achievement score and both subsequent grades (r=.40, p<.01) and plans to continue taking math (r=.17, p<.05). However, these correlations are low and the effect of previous mathematical achievement on subsequent performance appears to be mediated by mothers' and teachers' beliefs, by students' confidence in their mathematical ability, and by students' estimations of the value of mathematics. Further, when one compares boys and girls on the zero-order correlations between their estimates of the value of mathematics and objective indicators of mathematical ability, an interesting difference emerges. Boys' estimates of the value of math are significantly related to their past math performance (r=.33, p<.01) and to both their teachers' and parents' estimates of their math ability (r=.33, p<.01; r=.28, p<.01). In contrast, girls' estimates of the value of math are not significantly related to any of these measures (r=.06, r=.03, and r=.06, respectively). Math aptitude, as measured in this study, is only indirectly predictive of future mathematics achievement and course plans. Social factors appear to have much stronger direct

Figure Caption

Reduced path analytic diagram: longitudinal determinants of grade in mathematics course and enrollment plans. (Column-wise multiple regression equation procedures were used to estimate the path coefficients. At each step, each endogeneous variable was regressed on the set of all predictor variables to the left of the column to which it belongs. Shared explanatory variance is divided among the relevant predictor variables. The standardized path coefficients, which are standardized regression coefficients, reflect the relative predictive power of the predictor variables in comparison to one another. Specification of the path model, i.e., assignment of variables to particular columns, was based on the theoretical model laid out by Parsons et al. (20). All possible paths across columns were estimated by regression procedures. No paths were specified within columns. A t-test was used to test for the significance of each path coefficient. Only paths significant at p<.02 are presented in the figure. Dashed lines are significant at p<.02; solid lines at p<.001; N=164. R^2=the percent of variance of each endogeneous measure accounted for by the model, and R^2 is listed under each variable.)

[a]Based on year one data.
[b]Based on year two data.



SEX[a]
PAST MATH PERFORMANCE[a]
PARENTS' PERCEPTION OF IMPORTANCE OF MATH FOR CHILD[a]
R^2=.02
MOTHER'S PERCEPTION OF TASK DIFFICULTY FOR CHILD[a]
R^2=.23
PARENTS' PERCEPTION OF CHILD'S MATH ABILITY[a]
R^2=.26
TEACHER'S PERCEPTION OF CHILD'S MATH ABILITY[a]
R^2=.26
SELF-CONCEPT OF MATH ABILITY[a]
R^2=.56
PERCEPTION OF TASK DIFFICULTY[a]
R^2=.31
VALUE OF MATH[a]
R^2=.21
MATH ANXIETY[b]
R^2=.26
MATH GRADE: YEAR 2[b]
R^2=.34
INTENTION TO TAKE MORE MATH: YEAR 2[b]
R^2=.21
-.17
-.17
-.19
.13
.24
-.38
.40
-.26
.44
.35
-.45
.50
.51
.31
-.21
.32
-.29
-.26

effects, especially among girls. Math anxiety has a particularly interesting effect on the relation between sex and math grades. The zero-order correlation between sex and math grade is not significant. However, when math anxiety is included in the path analysis, a significant relation emerges between sex and math grades. The direction of this relationship suggests that, other things being equal, females might do better in mathematics than males if males and females had equivalent levels of math anxiety. But they do not; females are more math anxious than males ($p<.008$).

This result is even more interesting when one considers three additional relations. First, in this sample of math-competent students, math anxiety is only weakly related to the students' previous math performances (zero-order $r=-.17, p<.05$). Consequently, the individual variations in math anxiety are not primarily a consequence of objective differences in performance. Second, math anxiety has a larger and more direct relation to math grades and to students' future plans for taking math than does the mathematical aptitude/achievement score. And third, math anxiety is directly and strongly influenced by social factors, in particular by mothers' beliefs regarding the difficulty of math for their children. Thus, math-anxiety appears to be an important social/attitudinal variable that might account for sex differences in mathematical achievement. Furthermore, given the common finding that anxiety has a debilitating effect on children's scores on standardized achievement tests (18), one has to question whether the sex differences in math anxiety are not strong enough to account for most of the variance in the SAT-M scores attributed by Benbow and Stanley to superior male mathematical ability.

The path analytic results also point out the importance of mothers as critical socializers of sex differences in math attitudes and achievement (19). While teachers' beliefs are predictive of students' beliefs, teachers' attitudes are not sex differentiated, are not as large as the parental effects, and do not relate directly to students' plans to continue taking math. These data suggest that exposure to mothers' sex stereotyped beliefs is also a viable alternative explanation for the sex differences reported by Benbow and Stanley. Although it could be argued that mothers' beliefs regarding the difficulty of math for their children are veridical, and that the sex stereotypes in their attitudes reflect a real difference in the children's behaviors, the following additional results suggest that this is not the case. First, girls and boys, in this sample, had equivalent grades and standardized test scores at the start of the study. Second, when asked how much homework they do, the boys and girls report equivalent amounts. Third, teachers' estimates of these children's mathematical ability do not differ for boys and girls. And finally, mothers who endorse the stereotype that boys do better than girls in advanced high school mathematics courses also think that mathematics is harder for their daughters than do mothers who believe that girls and boys can do equally well in advanced mathematics courses ($r=.19$, $p<.05$). Thus, it does not appear that the sex difference in mothers' beliefs is grounded in reality. The extent to which it reflects a "real" sex difference in math aptitude remains to be demonstrated.

Thus, Benbow and Stanley's conclusion that sex differences in math achievement and attitudes toward math result from "superior male mathematical ability" is premature at best. While they may favor a biological explanation, their data do not provide a test of that hypothesis. Further, one must be concerned about the possible impact of their conclusion on girls' future mathematics achievement and attitudes. This concern is especially justified given the distorted over-generalization of their findings by the popular media and the potency of parental stereotypes about math ability in shaping both girls' attitudes toward mathematics and their actual achievement. This is not to say that we should rule out the possibility of biological influences on mathematics competence. Biological processes may be important. But the nature, the magnitude, and the malleability of those processes are not yet understood. Our data suggest that, at present, social factors are still a major cause of sex differences in both mathematics performance and attitudes toward mathematics in the population at large.

References and Notes

1. C.P. Benbow and J. C. Stanley, Science, 210, 1262 (1980).

2. For example, see L.H. Fox, L. Brody, D. Tobin, Eds., Women and the Mathematical Mystique (Johns Hopkins University Press, Baltimore, 1980).
3. For example, see L. Sells, ibid., p. 66; D. Tobin and L.H. Fox, ibid., p. 179; and G. Dunteman, J. Wisenbaker, M.E. Taylor, Race and Sex Differences in College Science Program Participation (Research Triangle Institute, Research Triangle Park, North Carolina, 1979).
4. For example, see M.A. Wittig and A.C. Peterson, Eds., Sex-related Differences in Cognitive Functioning (Academic Press, New York, 1979).
5. Portions of these results have been reported in other sources. For example, L.H. Fox and S.J. Cohn in (2), p. 94 and L.H. Fox, D.P. Keating, Eds., Intellectual Talent: Research and Development (Johns Hopkins University Press, Baltimore, 1976). The reported pattern of sex differences, in fact, forms part of the collection of results researchers are now seeking to explain.
6. A.T. Schafer and M.W. Gray, Science, 211, i (1981).
7. W.V. Slack and D. Porter, Harvard Ed. Rev., 50, 154 and 392 (1980).
8. R. Jackson, Harvard Ed. Rev., 50, 382 (1980).
9. G. Leinhardt, A.M. Seewald, M. Engel, J. Ed. Psych., 71, 432 (1979).
10. H.S. Astin in Mathematical Talent: Discovery, Description and Development, J.C. Stanley, D.P. Keating, L.H. Fox, Eds. (Johns Hopkins University Press, Baltimore, 1974), p. 70; L.H. Fox and S.J. Cohn, op.cit., p. 94.
11. It is possible that sex differences in innate mathematical aptitude account for boys having greater interest in mathematically-related activities. But it is impossible to separate out the cause and effect relations among innate aptitude, interest and subsequent skill without extensive longitudinal testing. The critical point here is that one cannot assume equivalent mathematical experiences in a population of seventh grade boys and girls.
12. L.H. Fox and S.J. Cohn, op.cit., p. 94.
13. L. Steel and L. Wise, paper presented at the American Educational Research Association, San Francisco, 1979.
14. K.G. Joreskog and D. Sorbon, Ed., Advances in Factor Analyses and Structural Equation Models (Abt Books, Cambridge, Mass., 1979). Factor loadings can be obtained from the author.
15. The mathematics aptitude/achievement was composed of the student's past math grade and any previous scores on either the MEAP or the California Achievement Test. We assumed, based on arguments put forward by Slack and Porter (op. cit., pp. 154 and 392) and others that a composite score reflecting both one's performance on standardized tests and school achievement as measured by course grades is at least as good an estimate of math aptitude as is the SAT-M score alone. To the extent that the mathematics achievement scores reflect mathematical aptitude, this measure provides an estimate of individual differences in math aptitude. Moreoever, given that it is a summary of the performance information that is provided to students, parents, and teachers, it is also an indicator of the objective performance differences on which children, parents and teachers base their estimates of individual students' math potential and ability.
16. The father's estimate of the difficulty of math for his child did not contribute to the prediction of math achievement or math plans and including it in the analysis reduced the sample size considerably. Thus it was omitted from all analyses reported here. The math anxiety scale was given only in the second year. Therefore, the score entered for math anxiety was taken from the second year of testing. Sex was entered as a dummy variable with females scored 1 and males scored 2.
17. Comparable results, however, are obtained for year one outcome measures.
18. K.T. Hill, Educator, 19, 15 (1977); D.W. Ruble and A. Boggiano in Advances in Special Education, B. Keogh, Ed. (JAI Press, Greenwich, Conn., 1980), pp. 183-238.
19. Fathers' effects in this data set appear to be redundant with, but less powerful than the mothers' effects.
20. J.E. Parsons in Assessing Achievement, J.T. Spence, Ed. (W.H. Freeman, San Francisco, in press).

21. I would like to thank Carol Midgley, Carol Kaczala, David E. Meyer, Judith Meece, D. Bruce Carter, Toby Jayaratne, Diane Gromala, and Terry Adler for their assistance in preparing and reviewing this article. The research reported herein was funded by NIMH grant 1 R01 MH 31724-0 to the author.

CAREERS IN APPLIED MATHEMATICS

A booklet describing career opportunities in applied mathematics has been published by the Society for Industrial and Applied Mathematics. The booklet is designed for high school students and collegiate underclassmen and is expected to become a valuable resource for counselors. Entitled Careers in Applied Mathematics, the 12-page booklet introduces students to the extraordinary range of work done by applied mathematicians in business, government and academic environments, and discusses the preparation students must receive in mathematics and computer science. Career options based upon attainment of either the bachelor, master or doctoral degree are concisely summarized. A wide-ranging bibliography provides suggestions for additional reading. The booklet is intended as a companion to Profiles in Applied Mathematics, which describes the role of applied mathematics within specific industrial concerns, government agencies and national laboratories.

Single free copies of each booklet may be obtained by writing SIAM, 1405 Architects Building, 117 South 17th St., Philadelphia, PA 19103. Quotations for bulk orders are available upon request.

SEX DISCRIMINATION IN HIGHER EDUCATION

Sex Discrimination in Higher Education: Strategies for Equality by Jennie Farley, documents a conference sponsored by the Extension and Public Service Division of Cornell's New York State School of Industrial and Labor Relations in November 1980. This volume comes at a time when women faculty members have been successful in class action suits against two major universities, Brown and the University of Minnesota, and when other universities across the country have become defendants in similar proceedings. It examines the costliness, effectiveness and tactical hazards in litigation; a framework for establishing mentorship; the components of an effective grievance procedure; and an agenda for political action by women's groups. Recurring themes are the undeniable findings of discrimination by social scientists, the use of statistics to prove discrimination, the hotly disputed principle of confidentiality in faculty employment decisions, and sexual harassment. It includes update reports from many institutions. For a copy, send $7.50 prepaid (check to NYSSILR) to ILR Publications, New York State School of Industrial and Labor Relations, Cornell University, Ithaca, NY 14853.

CBMS REORGANIZED

At the January meeting of its Council in Cincinnati, the Conference Board of the Mathematical Sciences completed a reorganization that had been in progress since last spring. Dictated by financial considerations, the reorganization has had as its main objective to preserve the most essential function of CBMS as a Washington interface for the professional community in the mathematical sciences. The other major function of CBMS, securing and carrying out grant-supported projects of joint concern to member societies, has become increasingly difficult in recent years and is being largely eliminated.

The new CBMS Council consists of the presidents of the member societies together with the three or four officers. The thirteen member societies are now all of one class, rather than the former two. These societies are: the American Mathematical Association of Two-Year Colleges, the American Mathematical Society, the American Statistical Association, the Association for Computing Machinery, the Association for Symbolic Logic, the Association for Women in Mathematics, the Institute of Mathematical Statistics, the Mathematical Association of America, the National Council of Teachers of Mathematics, the Operations Research Society of America, the Society of Actuaries, the Society for Industrial and Applied Mathematics, and The Institute of Management Sciences.

OF POSSIBLE INTEREST

The 1982 Summer Institute in Women's Studies, Toward a Feminist Transformation of the Curriculum, will be held June 20 to July 10 at the University of Michigan.

Women's Studies, University of Texas Press, P.O. Box 7819, Austin, TX, 78712.

The fourth annual conference of NWSA (National Women's Studies Association), Feminist Connections throughout Education, will be held June 16-20, 1982 at Humboldt State University, Arcata, CA. The plenary address will be delivered by Angela Davis. Write: NWSA Fourth Annual Conference Registration, Jolly Giant Conference Center, Humboldt State University, Arcata, CA.

The Society of Women Engineers is holding its annual national convention at the Hyatt Regency in Dearborn, Michigan, June 16-20, 1982. Interested persons may write: 1982 SWE Convention-Registration, 21981 Heatherbrae Way South, Novi, MI 48050.

Women's Studies, Greenwood Press, 88 Post Road West, P.O. Box 5007, Westport, CT 06881.

DEADLINES: May 24 for July-Aug., July 23 for Sept.-Oct., Sept. 24 for Nov.-Dec.
AD DEADLINES: June 5 for July-Aug., Aug. 5 for Sept.-Oct., Oct. 5 for Nov.-Dec.

ADDRESSES: Send all material except ads to Anne Leggett, Math. Dept., Western Illinois University, Macomb, IL 61455. Send everything else, including ads, to AWM, Women's Research Center, Room 204, Wellesley College, 828 Washington St., Wellesley, MA 02181.

ASSOCIATION FOR WOMEN IN MATHEMATICS
MEMBERSHIP APPLICATION

The AWM membership year is October 1 to October 1.

Name and Address ______________________________

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