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ABSTRACT

Although gender differences are fairly consistent when men and women report their general confidence, much less is known about the existence of such differences when subjects are asked to assess the degree of confidence they have in their ability to answer any particular test or exam question. The objective of this research was to investigate gender differences in item-specific confidence judgments. Data were collected from three different psychology courses containing 70 men and 181 women. After answering each item on course exams, students indicated their confidence that their answer to that item was correct. Results showed that gender differences in confidence are dependent on the context (whether items were correct or wrong) and on the domain being tested. In addition, while both men and women were overconfident, undergraduate males were especially overconfident (and inappropriately so) when incorrect. Contains 25 references and 5 tables/figures. (Author)

Highly Confident, but Wrong: Gender Differences and Similarities in Confidence Judgments

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Running Head: GENDER DIFFERENCES IN CONFIDENCE

Abstract

Although gender differences are fairly consistent when men and women report their *general* confidence, much less is known about the existence of such differences when subjects are asked to assess the degree of confidence they have in their ability to answer any *particular* test or exam question. The objective of this research was to investigate gender differences in item-specific confidence judgements. Data were collected from three different psychology courses containing 70 men and 181 women. After answering each item on course exams, students indicated their confidence that their answer to that item was correct. Results showed that gender differences in confidence are dependent on the context (whether items were correct or wrong) and on the domain being tested. In addition, while both men and women were overconfident, undergraduate males were especially overconfident (and inappropriately so) when incorrect.

Highly Confident, but Wrong: Gender Differences and Similarities in Confidence Judgments

Lack of confidence has frequently been cited as a reason inhibiting the persistence of women in higher education and certain professions, i.e., science and engineering (Dix, 1987). Studies using general measures of confidence, such as grade prediction or potential ability to pass a test, have found that women are less confident than men in their abilities in mathematics, problem solving, and science (Campbell & Hackett, 1986; Hornig, 1987; Johnson, 1989; Matyas, 1984). This finding of lesser confidence in females has been observed at the sixth grade level (Fennema & Sherman, 1978), the junior and senior high level (Rosen & Aneshel, 1978), and the undergraduate and graduate levels (Dix, 1987). However, lack of confidence is not necessarily indicative of low ability. Even when female students achieve as well or better than their male counterparts, they tend to underestimate themselves (Fennema & Sherman, 1978; Zukerman, 1987). Moreover, this general lack of confidence does not end with graduation from the academy. Successful professional women may also underestimate their abilities and overestimate others' abilities, a tendency Clance & O'Toole (1988) labeled the "Imposter Phenomenon."

Although gender differences are fairly consistent when men and women report their *general* confidence, much less is known about the existence of such differences when subjects are asked to assess the degree of confidence they have in their ability to answer any *particular* test or exam question. This kind of *item-specific* confidence is usually referred to in the literature on cognitive psychology under the heading of metamemory, or metacognition, comprehension monitoring, and feeling-of-knowing (i.e., Epstein, Glenberg & Bradley, 1984; Glenberg & Epstein, 1987; Maki & Berry, 1984; Pressley, Ghatala, Woloshyn & Pirie, 1990). One might expect (and hope) that students would express high confidence in items they knew the answer to, and low confidence in items they didn't know the answer to; that is, they would be able to distinguish between what they know and what they did not know in their confidence judgements. Interestingly, this research has pointed out that people often are unaware of wrong answers, and/or that they are usually overconfident in their estimated knowledge (e.g., Lichtenstein & Fishhoff, 1981; Pressley, Ghatala, Woloshyn & Pirie, 1990).

To date, few researchers have examined gender differences in item-specific confidence judgements. In one of the rare studies of this question, Lichtenstein & Fishhoff (1981) failed to find gender differences in young adults' calibration of confidence for general world knowledge. In contrast, Jones & Jones (1989) found that the type of item and the achievement level of students resulted in gender differences in confidence judgements.

They asked subjects to decide whether or not they would get the answer right if they attempted four questions: two science questions and two mathematics questions (in each content area, one question was familiar to the students and one question was unfamiliar). Jones and Jones (1989) reported interactions in the ability level of the subject (high or low) and the type of question (science, math, familiar, unfamiliar). Overall, females were less confident on science questions and the unfamiliar math problem-solving question, but more confident than males on the familiar (computational) mathematics problem. The high ability females were less confident than both groups of males (and ironically, low ability females) on the science and mathematics problem solving questions, but more confident than those groups on the mathematics computation question. The authors concluded that high ability female students lacked confidence in their ability to answer novel questions. However, a potential problem is that Jones & Jones (1989) used only four item, a very limited sample.

Jones & Jones (1989) work is valuable in stimulating researchers to further examine the contexts under which gender differences on item-specific confidence might occur. Item-specific confidence can be measured either *before* a subject has attempted to answer an item (as done by Jones & Jones, 1989), or *after* a subject has answered the item. The general literature in comprehension monitoring suggests that subjects are much better at estimating their confidence accurately *after* they have answered an item than prospectively (e.g.,Glenberg & Epstein, 1987).

In the present research, we examine gender differences in calibration of confidence on a much larger number of items than previously studied, with subjects who answer each item *before* they estimate their confidence, in different courses, and with different achievement levels of students. It is important to note that previous studies were conducted in an experimental context, whereas this research is conducted within the context of actual courses.

The basic objective of our research is to investigate potential gender differences in confidence judgements for material studied in college coursework. Two questions of special interest guiding the research are: 1) Are men more confident than women that their answers to exam questions are correct?; and 2) Are men better *calibrated* in confidence than women; that is, do higher confidence ratings indicate appropriate accuracy and lower ratings inaccuracy? Most simply, do the students know what they know, and what they do not know.

To further clarify the potential role of gender differences in confidence judgements, we asked three follow-up questions: 1) Does content of an item (e.g., math, science, psychology) affect gender differences in expressed confidence?; 2) Are students in the top

quartile more confident than bottom quartile students?; and 3) Are graduate students more confident than undergraduate students?

Method

Subjects. Data were collected from three different psychology courses: a two-quarter lower division laboratory methods sequence for Psychology majors (Lab 1 and Lab 2), and an upper-division undergraduate/graduate course in Human Learning and Memory (Memory). Of the 251 students enrolled in these courses, 70 were men and 181 were women: Lab 1 included 23 men and 74 women, Lab 2 included 25 men and 69 women, and Learning and Memory had 22 men and 38 women.

Procedure. In all three courses students took a pretest and final exam. After answering each item, students were asked to indicate their confidence that their answer to that item was correct. All students were told that their confidence judgements would have absolutely no bearing on their grade, and they were urged to give candid responses. In the Lab courses, students rated their confidence on a 5 point scale, with 1 = pure guess, 3 = mixed feelings of confidence and uncertainty, and 5 = very certain. In the memory course, students wrote their subjective confidence estimates on a numerical scale ranging from 50-100 % for true-false items and 25-100% for multiple-choice items. In addition to the pretest, students in the memory course had six quizzes in which they gave confidence estimates.

Tests. The same pretest was used in both lab courses, consisting of 38 multiple-choice items measuring general science background, computational skills, experimental design, descriptive statistics and conceptual content (auditory psychophysics). The final exams in the Lab courses had 27 multiple-choice items (Lab 1) and 23 multiple-choice items (Lab 2) measuring the same areas as the pretest, with the exception of general science questions. The pretest in the Memory course had 25 true-false and multiple-choice items; the objective portion of the final consisted of 23 true-false and 17 multiple-choice items. Both the Memory pretest and the final exam measured subject matter knowledge in the area of learning and memory.

Results

The primary finding of the present research is that gender differences in confidence are dependent on whether subjects were correct or incorrect in their answers and on the domain being tested. While most students were overconfident, they did adjust to some degree their confidence according to the accuracy of their answers. Women, however, showed more accurate perceptions of their potentially incorrect answers than did men, who tended to show inappropriately high degrees of confidence when wrong. This finding was

particularly true of undergraduate males, who were especially overconfident (again, inappropriately so) when they were incorrect.

Similarities and Differences in Confidence

Table 1 compares the confidence of women and men when they answer correctly and when they are wrong. When we compare men's mean level of confidence when correct

Insert Table 1 about here

and wrong with women's mean levels of confidence we find course differences. In the lab courses, men's level of confidence (both when correct and when wrong) was slightly higher than women's confidence. On lab post-tests these differences, although numerically small, were significant ($t(26) = 4.63$ $p < .001$ for confidence when correct in Lab 1, and $t(26) = 3.45$ $p < .002$ for confidence when wrong in Lab 1; $t(20) = 4.7$ $p < .001$ for confidence when correct in Lab 2, and $t(20) = 4.45$ $p < .001$ for confidence when wrong in Lab 2). However, in the upper division memory course, we found no gender differences in overall confidence. Both women and men were correct 69% of the time on the 40 items on the multiple-choice and true/false portion of the final exam, and both overestimated their likelihood of being correct.

Calibration. In general, both women and men showed a moderate degree of *calibration* in their confidence ratings (confidence when answers were correct being higher than confidence when wrong). There is little evidence of gender differences in overall calibration, except that women in Lab 2 are somewhat better at calibration on post-tests than are men. On two types of items, experimental design items and statistical items, women's confidence when correct significantly differed from their confidence when wrong, $t(5) = 3.46$, $p < .018$, and $t(3) = 4.9$, $p < .01$, respectively; men's confidence in these areas did not differ significantly.

Domain-specific Gender differences

Confidence. Aggregating level of confidence across an entire test may obscure gender differences and similarities which may become evident when tests are broken down into specific item content groupings. The Memory course exams did not have component parts: all of the items tested psychological content. However, the items in the Lab 1 and Lab 2 tests were comprised of the following components: science (primarily auditory psychophysics); mathematics (mostly computation); experimental design; and statistics. Table 2 presents the mean confidence levels for these four specific kinds of items when

subjects answered correctly, and when they answered incorrectly on the Lab 1 and lab 2 post-tests.

Insert Table 2 about here

Of the 16 possible instances where gender differences might be obtained (in the two Lab courses and four content domains), there were significant gender differences in 9. Of these nine, two-thirds occur in cases where subjects answered incorrectly (e.g., in statistics, when men were wrong, they were more inappropriately overconfident than women who were wrong [Lab 1: (t (3) = 4.32 p < .02; Lab 2: t (3) = 4.67 p < .018]. Significant differences in confidence when correct and when incorrect and for both courses were evident in only one domain: items assessing computational skills (t (6) = 3.35 p < .02 when correct for computational items in Lab 1; t (6) = 2.91 p < .03 when incorrect for computational items in Lab 1; t (5) = 3.7 p < .01 when correct for computational items in Lab 2; t (5) = 2.5 p < .05 when incorrect for computational items in Lab 2.) However, mens' greater confidence level was not evident consistently across courses and contexts in items assessing science, knowledge of experimental design, or assessing simple descriptive statistics. Moreover, where gender differences in confidence occur, they occur primarily when subjects answer items incorrectly.

Calibration. In both lab courses, calibration of confidence is dependent both on gender and on the domain-specific nature of the items. Calibration here is operationally defined as significant differences between confidence when correct and confidence when wrong. Women calibrated their confidence 75% of the time; men calibrated their confidence half of the time. Both women and men showed significant differences in the calibration of science (auditory psychophysics) items [Lab 1: (t (9) = 3.7 p < .004 for women; t (9) = 3.26 p < .01 for men; Lab 2: t (9) = 3.9 p < .027 for women; t (9) = 3.16 p < .051 for men]. On the statistics items, men showed no calibration, whereas women showed good calibration only in Lab 2 (t (3) = 4.9 p < .01). On experimental design items, men showed good calibration in Lab 1 (t (5) = 3.6 p < .015) but not Lab 2, whereas women showed good calibration in Lab 2 (t (5) = 3.46 p < .018) but not Lab 1. On the items testing computational skills, women calibrated their confidence well in both courses; men calibrated their confidence well only in Lab 2. Figure 1 illustrates confidence when correct and confidence when wrong for women and men answering the math computational skills items in Lab 1.

Insert Figure 1 about here

Women's confidence when correct on such items was significantly higher than when they were incorrect ($t(6) = 7.7$ $p < .001$); men, however, showed no discernable discrimination. In Lab 2, men were better at discriminating correct from incorrect responses ($t(5) = 2.8$ $p < .04$); women consistentiy showed this metacognitive ability ($t(5) = 5.2$ $p < .003$). In general, when men were wrong, their confidence was close to 4 on the 5 point scale ("reasonably certain"), whereas when women were wrong, their confidence was closer to "mixed feelings of confidence and uncertainty". Overall then, although both groups were overconfident, men were consistently more confident than they should have been when they were wrong. Moreover, women showed much greater tendency to calibrate their confidence than did men.

Quartile Differences in Calibration of Confidence

An examination of confidence estimations of students in the top and fourth quartiles of the lab classes also reveals several interesting gender differences. Figure 2

Insert Figure 2 about here

illustrates the calibration of confidence by women and men in the top and fourth quartiles of Lab 1 and Lab 2. Although men and women in the top quartiles in Lab 1 are equally confident in incorrect answers, men in the top quartile in Lab 2 and in the fourth quartile in both courses are much more confident when wrong than women are. Indeed, men in the lower quartile of Lab 1 are so overconfident that their mean confidence in incorrect answers was higher than the mean confidence of women in that quartile in their correct answers! The confidence of men in the fourth quartile in Lab 1 when they are wrong is *higher* than their confidence when correct, and approximately equal to the confidence when wrong of men in the top quartile. In Lab 2, men in the top quartile show little awareness of wrong answers, and are "very certain" they are correct when they are wrong. Women, however, are more aware of incorrect answers, and show greater ability to calibrate their confidence than do men.

Confidence of Undergraduate and Graduate Women Men

The memory course included graduate and upper division undergraduate students, and we were able to compare the confidence of women and men at these levels. Table 3 shows the mean confidence of graduate and undergraduate women and men, as well as their overall accuracy on exam items.

Insert Table 3 about here

As Table 3 illustrates, both men and women at both levels are overconfident in the accuracy of their answers, with confidence estimates ranging from 9 to 13 points higher than the actual percent correct. The trend observed in the lower division lab courses--men's confidence higher than women's confidence--was not replicated here; in fact, just the opposite trend occurred. At both levels, women's confidence was slightly higher than men's, with one exception: When wrong, men gave higher confidence estimates, especially undergraduate men. Undergraduate men's overall confidence when correct (78%) was not significantly different than when they were incorrect (75%). Undergraduate men in this course were thus quite inappropriately confident even when they were wrong!

Discussion

In general, we found scant evidence to support the notion that women lack confidence; any such finding here must be qualified by the particular course involved and by the domain-specific nature of the examination items. Both women and men (but especially undergraduate men) were more confident than warranted in the accuracy of their answers. Apparently, women and men give very different confidence scores when prospectively estimating general feelings of confidence than they do in estimating their confidence in the accuracy of their answers to specific items. Among other things, this finding raises questions about generalizing from people predicting their confidence on a task they have not yet tried to the confidence they feel after answering specific questions.

An important finding is that item-specific gender differences in confidence are dependent on the content of questions asked. In certain domains, such as mathematics, men were more confident than were women, while in other domains (e.g., learning and memory, experimental design), no such difference was observed. These results are consistent with findings that gender differences in performance on achievement tests in math (Hyde,

Fennema & Lanton, 1990; Linn & Petersen, 1986) and science (Linn & Petersen, 1986) are dependent on the content (e.g., biology or physical science) or type (e.g., computation or problem solving) of item. Moreover, research on sex differences in elementary children's causal attributions for academic success or failure also supports content-specific confidence: sex differences were found in social studies and science but not in reading, language or math (Licht, 1987). In a meta-analysis of sex differences in causal attributions, there were no gender differences in attributions overall: differences were dependent on context and task influences (Whitley, McHugh & Frieze, 1986). Thus, these content influences in confidence, achievement, and attributions provide strong support for an interactionist theory of gender differences. As Linn (1986) noted, "Far from being well established and straightforward, gender differences are responsive to a large range of situational factors and background knowledge" (p. 221).

Furthermore, on certain types of items (i.e., computation), we found that women were better than men at *calibrating* their confidence. Female superiority at calibration of confidence is consistent with results on sex differences in the confidence of younger children. Both 6-8 and 9-11 year old girls were more aware than boys that their answers to difficult items might be wrong. Older girls showed even greater discrimination between confidence when correct and confidence when wrong than younger girls, whereas boys' level of certainty in wrong answers remained the same regardless of age (Pressley, Levin, Ghatala & Ahmad, 1987). This gender difference of male overconfidence, especially on hard items, was replicated in a later study with first and second graders, though not with fourth and fifth grade children (Pressley & Ghatala, 1989). Calibration of confidence is an important aspect of metacognition. Certainly, knowing what one knows and what one doesn't know has important implications for study behaviors. Future studies might well examine how to help students better calibrate their confidence judgements. A start along this line has recently been made by LeCount & Fox (1992).

In sum, the present investigation suggests that the problem may not be that women necessarily lack confidence, but that in some cases men have too much confidence, especially when they are wrong! The typical perception of women's lack of confidence, rather than men's overconfidence, may be the result of comparing prospective general confidence rather than retrospective and task or item-specific confidence. In this study, unlike many situations in life, we were able to use an objective standard (accuracy of answer) to judge confidence which eliminates the problem of using men's level of confidence as the norm (Roberts, 1991) or, for that matter, women's. Using this standard highlights limitations of using strictly male behavior as normative. Clearly, being

overconfident when wrong may not be a very desirable trait in most situations, as American humorist Josh Billings put it over a hundred years ago:

"It's not what a man don't know that makes him a fool, but what he does know that ain't so" (1974, p.) Indeed, a growing recognition of this tendency toward male overconfidence in wrong answers was labeled "the male answer syndrome" in a recent popular magazine, and attempted to explain "why men always have opinions even on subjects they know nothing about" (Campbell, 1992, p. 107). Perhaps the question that should be pursued is not why women are less confident than men, but why in our culture we consider it aberrant behavior to recognize and admit uncertainty.

References

Campbell, J. (1992) Male answer syndrome. Utne Reader January/February (49), 107-108.

Campbell, N.D. & Hackett, G. (1986). The effects of mathematics task performance on math self-efficacy and task interest. Journal of Vocational Behavior, 28, 149-162.

Clance, P.R. & O'Toole, M.A. (1988). The imposter phenomenon: An internal barrier to empowerment and achievement. Women and Therapy, 6 (3), 51-64.

Dix, L.S., Ed.(1987) Women: Their underrepresentation and career differentials in science and engineering. Proceedings of a workshop at the National Academy of Sciences.Washington, D.C.: National Academy Press.

Epstein, W., Glenberg, A.M., & Bradley, M. (1984). Coactivation and comprehension: Contributions of text variables to the illusion of knowing. Memory & Cognition, 12, 355-360.

Fennema, E.H. & Sherman, J.A. (1978). Sex-related differences in mathematics achievement and related factors: A further study. Journal for Research in Mathematics Education, 9, 189-203.

Glenberg, A.M. & Epstein, W. (1987). Inexpert calibration of comprehension. Memory & Cognition, 15, 84-93.

Hornig, L.S. (1987). Women graduate students: A literature review and synthesis. In Dix, L.S., Ed.(1987) Women: Their underrepresentation and career differentials in science and engineering. Proceedings of a workshop at the National Academy of Sciences.Washington, D.C.: National Academy Press.

Hyde, J.S., Fennema, E., & Lamon, S.J. (1990). Gender differences in mathematics performance: A meta-analysis. Psychological Bulletin, 107 (2), 139-155.

Johnson, J. (1989). Effects of successful female role models on young women's attitudes toward traditionally male careers. Paper presented at the annual conference of the Association for Educational Communications and Technology, Dallas, February.

Jones, L.P. & Jones, L.G. (1989). Context, confidence and the able girl. Educational Research, 31, 189-194.

LeCount, J. & Fox, P.W. (1992). When are two heads worse thatn one?: The effect of feedback and structured learning groups on confidence calibrations. Paper presented at the Annual Meeting of the American Educational Research Association, San Franscisco, April.

Licht, B.G. (1987). The interaction between children's achievement-related beliefs and the characteristics of different tasks. Paper presented at the Annual Meeting of the American Educational Research Association, Washington, DC, April.

Lichtenstein, S., & Fishhoff, B. (1981). The effects of gender and instructions on calibration. (Decision Research Report 81-5). Eugene, Oreg.: Decision Research.

Linn, M.C. (1986). Meta-analysis of studies of gender differences: Implications and future directions. In Hyde, J.S. & Linn, M.C. (Eds.), The psychology of gender. Advances through meta-analysis (pp. 210-231). Baltimore: The Johns Hopkins University Press.

Linn, M.C. & Petersen A.C. (1986). Gender differences in spatial ability. In Hyde, J.S. & Linn, M.C. (Eds.), The psychology of gender. Advances through meta-analysis (pp. 67-101). Baltimore: The Johns Hopkins University Press.

Maki, R.H., & Berry, S.L. (1984). Metacomprehension of text material. Journal of Experimental Psychology: Learning, Memory, and Cognition, 10,, 663-679.

Matyas, M.L. (1984). Science career interests, attitudes, abilities and anxiety among secondary school students; The effects of gender, race/ethnicity and school type/location. Paper presented at the Annual Meeting of the National Association for Research in Science Teaching, New Orleans, LA, April.

Pressley, M., Ghatala, E.S (1989). Metacognitive benefits of taking a test for children and young adolescents. Journal of Experimental Child Psychology, 47, 430-450.

Pressley, M., Ghatala, E.S., Woloshyn, V. & Piri, J. (1990). Sometimes adults miss the main ideas in text and do not realize it: Confidence in responses to short-answer and multiple-choice comprehension questions. Reading Research Quarterly, 25, 234-249.

Pressley, M., Levin, J.R., Ghatala, E.S, & Ahmad, M. (1987). Test monitoring in young grade school children. Journal of Experimental Child Psychology, 43, 96-111.

Roberts, T. (1991). Gender and the influence of evaluations on self-assessments in achievement settings. Psychological Bulletin, 109, 297-308.

Rosen, B.C. & Aneshel, C.S. (1978). Sex differences in educational-occupational expectation process. Social Forces, 57 (1), 164-186.

Whitley, Jr., B., McHugh, M. & Frieze, I.H. (1986). Sex differences in causal attributions of success and failure. In Hyde, J.S. & Linn, M.C. (Eds.), The psychology of gender. Advances through meta-analysis (pp. 102-135). Baltimore: The Johns Hopkins University Press.

Zukerman, H. (1987). Persistence and change in the careers of men and women scientists and engineers: A review of current research. In Dix, L.S., Ed.(1987) Women: Their

underrepresentation and career differentials in science and engineering. Proceedings of a workshop at the National Academy of Sciences. Washington, D.C.: National Academy Press.

Table 1 Mean Confidence of Women and Men

	Lab 1		Lab 2		Memory	
	Women	Men	Women	Men	Women	Men
			Pretest			
CF Correct	3.0	3.4*	3.8	3.95*	60.0	61.3
S.D.	(.97)	(1.0)	(.6)	(.6)	(10.6)	(10.1)
CF Wrong	2.7	2.9*	3.3	3.4	61.4	60.7
S.D.	(.68)	(.88)	(.6)	(.7)	(9.3)	(9.1)
			Post-test			
CF Correct	4.1	4.3*	4.1	4.3*	85	82
S.D.	(.47)	(.33)	(.4)	(.4)	(4.8)	(3.4)
CF Wrong	3.6	3.9*	3.5	3.9*	75	73
S.D.	(.38)	(.52)	(.49)	(.61)	(4.1)	(2.6)

Note. Asterisks represent significance at .05 or greater levels. Confidence numbers for Lab 1 and Lab 2 represent subjects' estimate that their answer is correct, based on a scale of 1-5 with 1= pure guess and 5= very certain. Confidence numbers for Memory course represent subjects' estimate that their answer was correct, based on a scale of 50%-100% for true/false items, and 25%-100% scale for multiple choice items.

Table 2 Mean Confidence of Women and Men in Lab 1 and Lab 2 by Content Area

	Lab 1		Lab 2	
	Women	Men	Women	Men
		Science		
CF Correct	3.96	4.23*	3.92	4.09
S.D.	(.46)	(.31)	(.54)	(.58)
CF Wrong	3.53	3.86*	3.29	3.53
S.D.	(.40)	(.37)	(.66)	(.68)
		Math		
CF Correct	4.47	4.69*	4.44	4.79*
S.D.	(.19)	(.10)	(.19)	(.12)
CF Wrong	3.86	4.47*	3.75	4.15*
S.D.	(.09)	(.52)	(.30)	(.48)
		Experimental Design		
CF Correct	3.99	4.24	4.06	4.27
S.D.	(.40)	(.36)	(.41)	(.26)
CF Wrong	3.79	3.64	3.54	3.88*
S.D.	(.41)	(.50)	(.34)	(.47)
		Statistics		
CF Correct	3.90	4.20	3.90	4.02
S.D.	(.54)	(.14)	(.33)	(.40)
CF Wrong	3.39	4.01*	3.18	3.99*
S.D.	(.37)	(.25)	(.61)	(.60)

Note. Asterisks represent significant differences at .05 or greater levels between male and female confidence. Confidence scores for Lab 1 and Lab 2 represent subjects' estimate that their answer is correct, based on a scale of 1-5 with 1= pure guess and 5= very certain.

Table 3 Mean Confidence of Undergraduate and Graduate Women and Men

	Undergraduate		Graduate	
	Women	Men	Women	Men
Accuracy	66	66	78	72
Confidence	79.1	76.3	90.1	82.2
S.D.	(7.9)	(8.8)	(6.1)	(7.8)
CF Correct	81.8	78.7	92.1	85.4
S.D.	(9.9)	(10.6)	(5.8)	(8.4)
CF Wrong	73.8	75.4	82.3	70.3
S.D.	(11.7)	(14.7)	(19.3)	17.8)

Note. Accuracy numbers represent the percentage correct. Confidence numbers represent subjects' estimate that their answer is correct, based on a scale of 50%-100% for true/false items and 25%-100% scale for multiple choice items.

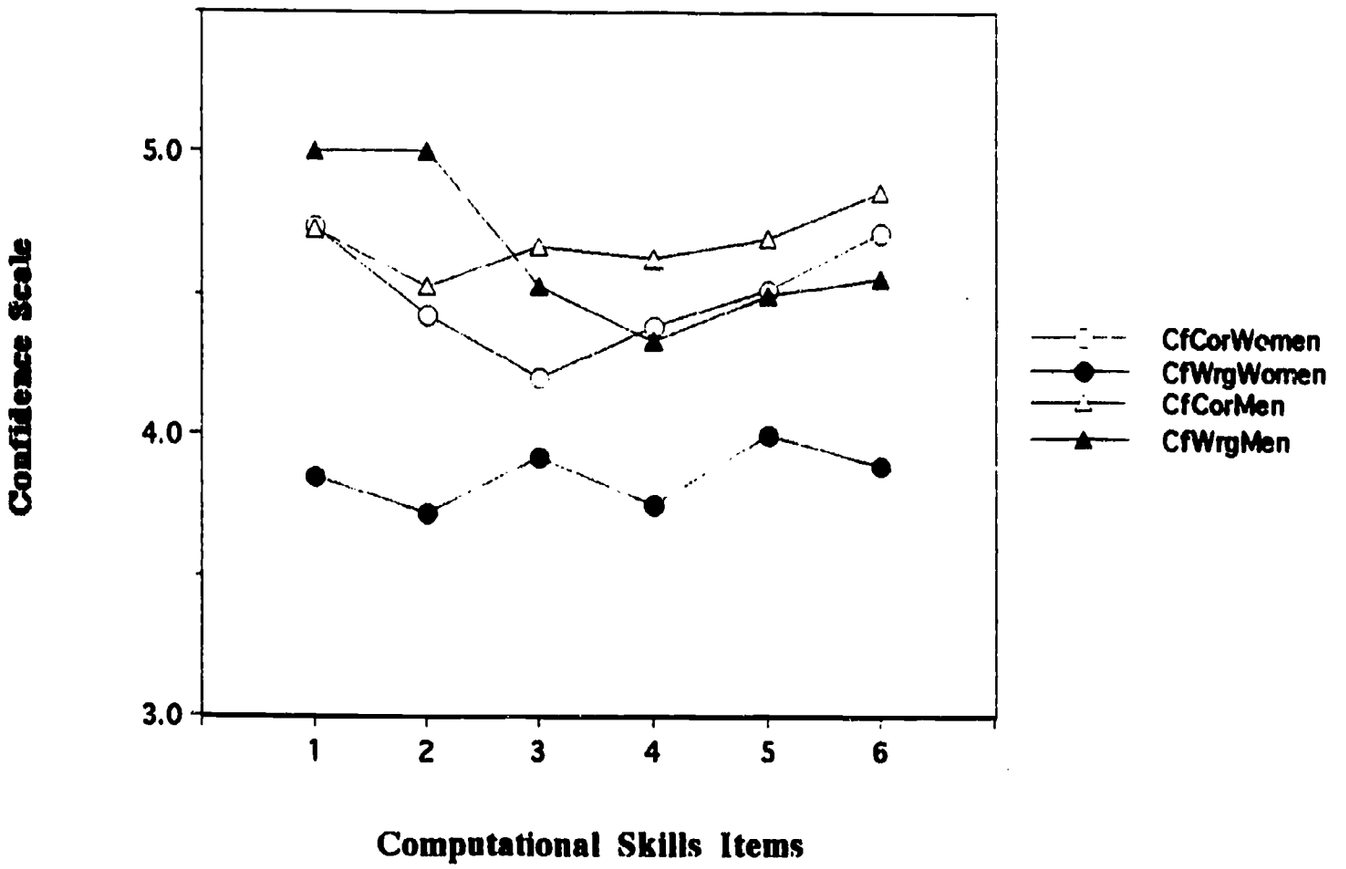

Figure 1. Lab 1 mean confidence of women and men on computational skills items.

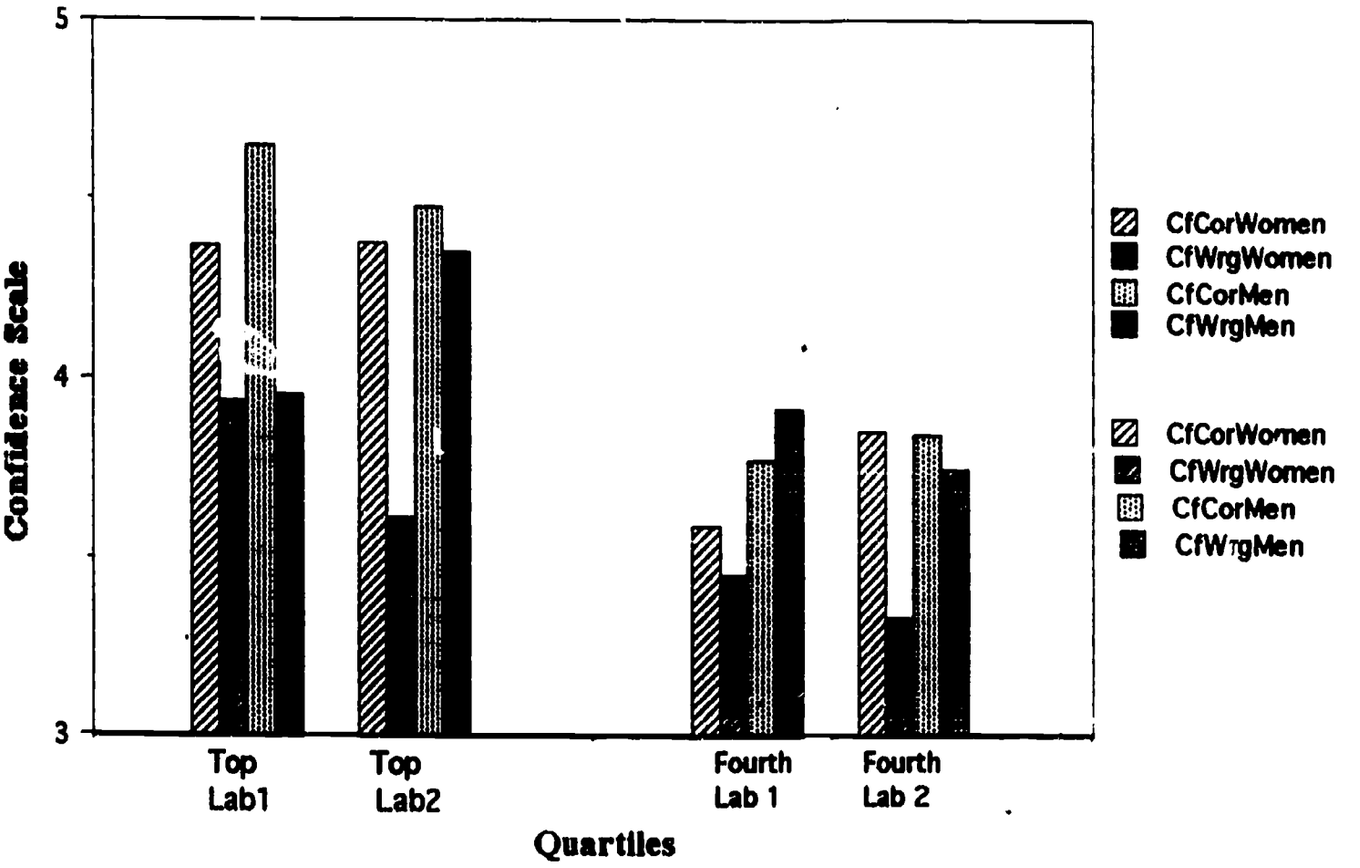

Figure 2. Mean confidence ratings from the upper and lower quartiles of women and men in Lab 1 and Lab 2.