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AUTHOR Nelson, Lori J.; Cooper, Joel
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ABSTRACT

This study was conducted to examine three explanations for gender differences in computer use and attitudes: (1) sex-typed females avoid computers if they perceive computers to be a male domain; (2) sex differences in video game use mediate sex differences in computer use; and (3) sex differences in attributional style mediate sex differences in computer use and perceived abilities with computers. Subjects were 127 fifth graders who completed questionnaires assessing attributional style, sex role identity, and computer and video game experience. Several weeks later, subjects used either a frustrating or non-frustrating computer program to solve anagrams, evaluated their performance, and made attributions for their performance. Also assessed were anxiety, attitudes toward the program, perceptions of anagrams, perceptions of one's own ability with computers, expectations for future performance, attitudes toward using computers in the future, and performance on a second computer program. The findings revealed that both boys and girls were enthusiastic about using computers and had positive attitudes toward computers, yet girls used computers less often than boys did, and girls felt that they had less ability with computers than did boys. None of the three possible explanations for sex differences in computer use and attitudes could adequately account for the results. (NB)

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SEX ROLE IDENTITY, ATTRIBUTIONAL STYLE, AND ATTITUDES TOWARD COMPUTERS

Lori J. Nelson & Joel Cooper
Princeton University

Survey research from schools and computer camps has shown that girls use computers less than boys at home and at school, girls know less than boys about computers, and girls feel more anxious when using computers and often have negative attitudes toward computers (Felter, 1985; Hess & Miura, 1985; Hawkins, 1985; Wilder, Mackie, & Cooper, 1985). The research that I will summarize today was designed to help discover why there are sex differences in computer use and attitudes toward computers.

One common explanation for sex differences in computer use is the existence of a stereotype of computers as a male domain (Felter, 1985; Hawkins, 1985; Kiesler, Sproull, & Eccles. 1985; Ware & Stuck, 1985). Bem & Lenney (1976) provide evidence that sex-typed individuals are likely to avoid public cross-sex behavior; although they did not specifically examine computer use, their study does suggest that feminine sex-typed females may try to avoid computers, particularly if they perceive computers to be a male domain.

A second explanation for boys' greater interest in computers has been proposed by Loftus & Loftus (1983). They point out that boys play video games much more often than girls do, and that boys are more interested in video games. According to Loftus & Loftus, boys' use of and interest in video games causes them to become interested in how computers work, which will ultimately lead boys, more than girls, to become interested in computers.

A third explanation for sex differences in computer use and in attitudes toward computers involves sex differences in patterns of explanations for success and failure experiences with computers. Research by Weiner and his colleagues (Weiner, Frieze, Kukla, Reed, Rest, & Rosenbaum, 1971) has shown that an individual's attributions for success and failure determine affective reactions in achievement situations, expectations for success or failure in the future, and persistence. Other researchers have suggested that males and females provide different attributions for success and failure in achievement situations (Dweck &

Repucci, 1973; Nicholls, 1975; Frieze, 1975; Deaux, 19 `6). These researchers have generally described the "helpless," "self-derogating," or female attributional style as attributing success to good luck and attributing failure to lack of ability, and they have described the "mastery-oriented," "self-enhancing," or male attributional style as attributing success to ability and attributing failure to bad luck. These differences in attributional style might lead males to persist and females to give up when faced with difficulties with a computer. So, Weiner's attributional approach to achievement motivation, in combination with theories about sex differences in attributional style, is a plausible explanation for sex differences in reactions to computers and use of computers.

The purpose of our study was to examine all three of these explanations for sex differences in computer use and attitudes, although we focused on the attributional explanation.

127 5th graders, from three schools in which computers were not used much in the classroom, filled out questionnaires assessing attributional style[1], sex role identity[2], and computer and video game experience. Subjects were asked about their attitudes toward computers, how often they used computers at home and at school, their family members' use of computers, their perceptions of the appropriateness of computers for boys and for girls, and their perceptions of their own ability with computers. Subjects were also asked similar questions about video games.

Several weeks later, subjects used either a frustrating or a non-frustrating computer program to solve anagrams. Pilot interviews with adults and 5th graders who had used computers revealed that subjects often described frustrating experiences with computers in terms of feeling a lack of control over the computer or feeling that the computer was inconsistent. Based on these pilot interviews, the operationalization of a frustrating experience (or a failure experience) with a computer was developed. The frustrating version of the

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1. Attributional style was measured using a modified version of the Intellectual Achievement Responsibility (IAR) Scale developed by Crandall, Katkovsky, & Crandall (1965). The scale was modified to include an ability, effort, task difficulty, and luck choice for each question, rather than just internal and external choices. In addition, the version of the IAR used was a short form that we had developed in previous research.

2. The Adolescent Sex Role Inventory was used to measure sex role identity (Thomas & Robinson, 1981).

computer program was designed so that error messages would appear inconsistently and independent of subjects' responses--in other words, the subjective experience of many new computer users was translated into objective reality. The non-frustrating version of the program was the same as the frustrating version, except that the messages appearing on the screen were "Please wait for the next anagram " rather than error messages.

After using either the frustrating or the non-frustrating version of the computer program, subjects were asked to evaluate their performance with the program and to make attributions for their performance. At that time, we also assessed anxiety, attitudes toward the program, perceptions of anagrams (the subject of the program), perceptions of one's own abilities with computers, expectations for future performance, and attitudes toward using computers in the future. Finally, performance on a second computer program was measured.

Contrary to expectations, there were no sex differences in liking for computers; both boys and girls were very enthusiastic about using computers. However, in line with previous research, boys thought that they had more ability with computers, boys had more experience with computers, and boys were more likely to have a computer at home. Girls tended to see computers as equally appropriate for males and females, whereas boys felt that computers were a male domain. Results were similar for liking for video games, video game use, and perceptions of own abilities with video games. In contrast to computers, *both* girls and boys felt that video games were a male domain.

The experimental manipulation of frustration and perceived control was successful in that subjects in the frustrating or failure condition realized that they had received many error messages, and they felt less in control and less comfortable than those in the non-frustrating or success condition. In both conditions, boys felt more relaxed than girls while using the computer program. Boys also expected to do better given the chance to use a different computer program, particularly if they had used the frustrating program. Regardless of the program used, boys felt better than girls about their performance. After using the frustrating program, girls felt that they weren't quite as good at computers as others, whereas, after using either program, boys felt that they were better at using computers than others.

Boys who had been in the frustrating condition and girls who had been in the non-frustrating condition performed better on a subsequent computer program than boys who had

been in the non-frustrating condition and girls who had been in the frustrating condition. One interpretation of this finding might be that success facilitates performance most for girls, but failure facilitates performance most for boys.

We were unable to test the hypothesis that feminine sex-typed girls who saw computers as a male domain would have more negative attitudes toward computers, because only a handful of the girls in our sample perceived computers to be a male domain. Therefore, sex-typing and perceptions of computers as a male domain did not account for the sex differences in our sample, and, to the extent that our sample is representative, it may not be a good explanation in general. However, we did find that girls who viewed the computer as especially appropriate for females (rather than gender-neutral) had more positive attitudes toward computers and felt more competent with computers.

Our results only partly supported the hypothesis that boys' greater use of video games is the reason that they become more interested than girls in using computers. For boys, frequency of video game use was related to frequency of computer use. On the other hand, for girls, frequency of video game use was not related to any of the variables measuring computer use or attitudes. So video game use does not seem to be mediating sex differences in computer use.

Our results also only partly supported the sex differences in attributional style explanation for sex differences in computer use and attitudes. Girls did tend to attribute success to good luck, but they did not show any special tendency to attribute failure to lack of ability. In addition, girls did not provide significantly different attributions for success and failure with the computer program. Boys were not especially likely to attribute success to ability, and they were just as likely to attribute failure to lack of effort as to bad luck. Boys did provide different attributions for success and failure; in particular, boys provided more unstable explanations for failure than for success. Within the frustrating or failure condition, boys provided unstable attributions more often than girls did; whereas, in the non-frustrating or success condition, boys provided stable attributions more often than girls did. There were no sex differences or differences between conditions for internal vs. external attributions.

The type of attribution made for performance on the computer program predicted responses on several measures of reactions to the program and expectations for future performance, although many times attributions predicted these responses differently for males and for females. For example, compared to all other subjects, boys in the frustrating condition who made external attributions for their difficulties expected to improve their performance

given the chance to use a different computer program. Overall, subjects who made stable attributions for success and those who made unstable attributions for failure were more enthusiastic and confident about using computers in the future.

To summarize the attributional data, we found that girls and boys did provide somewhat different attributions for success and failure with the computer program, and we also found that the type of attribution a subject made was related to reactions to the program and expectations for future performance. But because the relationships between attributions and reactions and between attributions and expectancies were often different for boys and for girls, it is not clear that sex differences in attributional style mediate sex differences in reactions to computers or sex differences in frequency of computer use.

In this study, we found that both boys and girls are enthusiastic about using computers and have positive attitudes toward computers, yet girls use computers less often than boys do, and girls feel that they have less ability with computers. We examined three likely explanations for these sex differences. The first possibility was that sex-typed females avoid using computers if they perceive computers to be a male domain; the second possibility was that sex differences in video game use mediate sex differences in computer use; and the third possibility was that sex differences in attributional style mediate sex differences in computer use and perceived abilities with computers. But none of these three explanations prided an adequate account of our results.

So what does account for the fact that, compared to boys, girls use computers less and feel less competent with computers, even though they like computers just as much as boys do? Frequency of computer use was correlated with feeling competent with computers, and the two variables seem to be related intuitively--that is, children who use computers often are likely to feel more competent with computers. If this is the direction of causality, then an exploration of an expectancy-value account of girls' and boys' use of computers might be the next direction for our research.

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