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DIFFERENCES IN THE PROPORTION OF WOMEN TO MEN INVITED TO GIVE SEMINARS: IS THE OLD BOY STILL KICKING FIVE YEARS LATER?

The current interest in gender equality prompted one of us (King) to develop a seminar on gender issues in science. One topic was gender differences in pay, productivity and prestige. Women biology faculty make considerably less money than their male counterparts (Benditt 1992), even after controlling for discipline, type of institution, rank, and years of experience (Babco 1987). Female ESA members make about \$5000 less annually than male members, even after controlling for age and time since degree was granted (Lawrence et al. 1993).

Most women and men scientists do not differ in publication rate. However, average publication rates of men as a group are higher than average publication rates of women partly because those few scientists with extremely high publication rates are consistently men (Zuckerman 1987; Primack and O'Leary 1989). Publications by women and by men are of similar quality, based on number of citations per paper (Zuckerman 1987; Primack and O'Leary 1989; but see Long 1992 for evidence of greater citation of women's publications). These publication and citation patterns hold true not only for scientists as a group, but also for ecologists in particular (Sih and Nishikawa 1988; Primack and O'Leary 1989).

Whether women and men differ in the prestige they receive is difficult to determine, in part because prestige is hard to define. One measure of prestige is an invitation to give a seminar or participate in a symposia at a national meeting. In 1988 Gurevitch demonstrated that women were less likely to be speakers in symposia at the 1987 ESA meeting when only men were involved in soliciting speakers. Five years have passed since Gurevitch's article, here we ask, has the situation changed at the annual ESA meetings? Our purpose follows that of Gurevitch: 1) to compare the proportion of women authors presenting invited papers versus voluntarily submitted papers at the 1991-1992 and 1993 ESA meetings, 2) to determine whether women were more likely to be invited when a women was among the symposium organizers and 3) to see if the proportion of women symposium speakers has changed since 1987.

Methods

Our methods were essentially identical to those of Gurevitch (1988), with these exceptions: 1) we only examined first authors; 2) we randomly selected contributed sessions, and 3) we excluded symposia that were not exclusively organized by ESA (i.e., AIBS symposia in 1992). Symposia organizers, presiders of contributed sessions,

and first authors of both symposia and contributed sessions were categorized by gender based on first names. When initials were given, we obtained first names from the ESA membership directory. Any cases where gender could not be determined were excluded from the analyses. We did not include introductory or closing remarks for symposia. Data for the 1991 and 1992 meetings were combined because at the 1991 meetings there was only one symposium where a woman was one of the organizers.

Results

Symposia organizers.--Women comprised 14% of symposia organizers in 1991-92 (an average of 15% on a per session basis) and 23% in 1993 (an average of 17% on a per session basis). Of the 30 sessions in 1991-92, 3 had both female and male organizers, 3 had only female organizers, and 24 had only male organizers. Of the 16 sessions in 1993, 6 had both female and male organizers, and the other 10 had only male organizers; there were no symposia with only female organizers in 1993.

Invitation of women in relation to symposia organizer's gender.--In 1991-92, symposia with at least one woman organizer had a greater proportion of female first authors than symposia with only men as organizers (Table 1) (35.1% versus 17.8%; $G = 4.90$, $P < 0.05$). None of the 30 symposia in 1991-1993 had only female first authors, whereas at least 6 symposia had only male first authors (at least 5 of the 24 symposia organized by men only and at least one of the 6 symposia including at least one woman as an organizer).

In contrast to 1991-92, in 1993, whether a woman was involved in organizing a symposium had no significant effect on the proportion of women invited. When women were involved as organizers, 29.6% of symposia speakers were women, versus 27.8% when men only were organizing ($G = 0.042$, $P > .5$). In 1993, of the 10 symposia with men only as organizers, only one had no female first authors. All 6 of the sessions organized by at least one woman had at least one female first author.

The loss of a significant effect of organizer gender on proportion of women invited to speak resulted from a nonsignificant increase between 1991-92 and 1993 in the proportion of women invited by men only organizers (17.8% to 27.8%, $G = 2.85$, $0.10 > P > 0.05$) and a slight but nonsignificant decrease between 1991-92 and 1993 in the proportion of women invited to speak when one of the organizers was a woman (35.1% to 29.6%, $G = 0.29$, $P > .50$).

Comparison of symposia versus contributed sessions.--Any biases in the proportion of women invited to speak may be confounded with differences in the proportion of women among subdisciplines. We follow Gurevitch (1988), in taking subdiscipline effects into account by comparing the proportion of women speakers in symposia versus contributed sessions. We make this comparison first when the organizers of the symposium were men only and the presider of the contributed session was a man, then when the organizers of the symposium included a woman and the presider of the contributed session was a woman. Whereas symposium organizers are responsible for inviting speakers, presiders of contributed sessions are not. Presiders are chosen by the

meeting organizers and are usually speakers in their sessions. In 1991-92, the proportion of women among symposia organizers (14%) was significantly less than the proportion of women among presiders of contributed sessions (41%) ($G = 7.39, P < .01$). In 1993, the proportion of women among symposia organizers (15%) did not differ significantly from the proportion of women among presiders of contributed sessions (12.5%) ($G = 0.75, P > .10$). The proportion of women among first authors was not significantly different between symposia and contributed papers regardless of year and regardless of whether the organizer or presider was male or female (Tables 1 and 2: male organizer/presider: in 1991-92, $G = 3.23, P > 0.05$; in 1993, $G = 0.32, P > 0.50$; female organizer/presider: in 1991-92, $G = 0.05, P > 0.50$; in 1993, $G = 1.61, P > 0.10$). There was no difference in the proportion of female first authors when the presider was a man versus a woman (Tables 1 and 2: 1991-92: $G = 2.84, P > 0.05$; 1993: $G = 1.72, P > 0.10$). Overall, disregarding gender of the organizer or presider, women were less likely to be first authors in symposia than in contributed sessions in 1991-92 (Table 1, $G = 4.32, P < 0.05$) but not in 1993 (Table 2, $G = 0.77, P > 0.10$).

Historical trends.--Although the proportion of women among symposia organizers increased from 8.6% in 1983 (Blumer 1984) to 25% in 1987 (Gurevitch 1988), it has not since increased. However, the proportion of women first authors among both contributed papers and symposia does appear to have increased (contributed papers: 22.7% in 1983, 26.9% in 1987, 29.0% in 1991-92, 33.2% in 1993; symposia: 9.1% in 1983, 14.3% in 1987, 21.1% in 1991-92, 28.5% in 1993). In 1993 the proportion of female first authors in symposia (28.5%) did not differ significantly from the proportion of female ESA members (23%) ($G = 1.61, P > 0.10$) (Lawrence et al. 1993). The proportion of female first authors in contributed papers (33.2%) was greater than in the 1993 survey of ESA members ($G = 9.63, P < 0.005$), probably because females are disproportionately represented in lower age classes (Lawrence et al. 1993), the group probably most likely to present their research as contributed papers.

Discussion and Conclusions

There is no question that there has been discrimination against women in science and that some of this discrimination is due strictly to perceived rather than real differences between women and men (Fidell 1975). However, our results and those of others suggest that some gender differences may be narrowing (Zuckerman 1987).

At the ESA annual meetings there has been an increase over the last ten years in the proportion of women first authors in both contributed sessions and symposia. By the 1993 meetings, the earlier bias of some male organizers against inviting women speakers (Gurevitch 1988) appears to have vanished so that a woman had about the same chance of being invited as first author in a symposium at the 1993 annual meeting regardless of whether a woman was involved in organizing the symposium. The proportion of female first authors in symposia organized solely by men increased from 6.9% in 1987 (Gurevitch 1988) to 17.8% in 1991-92 and 27.8% in 1993. In contrast to Gurevitch's (1988) findings for the 1987 meeting, women in 1991-93 were invited as first authors in symposia as frequently as they contributed papers. Whether

results for 1993 meetings become the norm will need to be tested in subsequent years.

Possible reasons for the increased inclusion of women as speakers in ESA symposia are that more women are now far enough along in their careers to warrant invitation to symposia; symposia organizers may be making conscious efforts to include women, perhaps in response to Gurevitch's (1988) article; women may be moving into fields within ecology previously populated by just men. Whatever the cause, our results indicate that gender representation can change relatively rapidly and easily.

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Table 1. Numbers of men and women in symposium and contributed sessions who were symposium organizers, presiding, and first authors at the Annual Meetings of the ESA in 1991 and 1992.

Symposium Sessions Organizers	First authors			
	Male	Female	% female	
Men only	24	129	28	17.8%
Women/women and men	6	24	13	35.1%
Totals	153	41		21.1%

Contributed Sessions Presiding	First authors			
	Male	Female	% female	
Men	20	166	57	25.6%
Women	14	125	62	33.2%
Totals	291	119		29.0%

Table 2. Numbers of men and women in symposium and contributed sessions who were symposium organizers, presiding, and first authors at the Annual Meeting of the ESA in 1993.

Symposium Sessions Organizers	First authors			
	Male	Female	% female	
Men only	10	52	20	27.8%
Women/women and men	6	31	13	29.6%
Totals	83	33	28.5%	

Contributed Sessions Presiding	First authors			
	Male	Female	% female	
Men	14	120	55	31.4%
Women	2	15	12	44.4%
Totals	135	67	33.2%	