Developing Careers

Gender Differences in Science Careers. The Project Access Study. GERHARD SONNERT, with the assistance of Gerald Holton. Rutgers University Press, New Brunswick, NJ, 1995. xviii, 189 pp. $50.

Who Succeeds in Science? The Gender Dimension. GERHARD SONNERT, with the assistance of Gerald Holton. Rutgers University Press, New Brunswick, NJ, 1995. $49; paper, $16.95.

Despite the passage of 15 to 25 years during which the increased numbers of women who earned doctorates in science in the 1970s and '80s have had time to mature professionally, the proportion of women at high academic ranks has sorely lagged in relation to their numbers in the doctoral pool. In 1973, only 4% of full professors in science and engineering fields were women, in 1987 7%, and in 1991 still just 9% (and the percentages are even lower if psychology and social science are excluded). Yet women with doctoral degrees in science are as intellectually select a group as the men, if not more so. Their IQ levels are at least as high as those of the men, and across science fields women are about as apt as men to have earned their doctorates from top-ranking departments. Women with Ph.D.'s in science have high ability; they have made their way through the proverbial educational pipeline; they have earned credentials for professional participation. What is happening to them in scientific careers—and why?

Project Access, a large-scale study (1987–94) led by Gerhard Sonnert, sociologist, with Gerald Holton, physicist and historian of science, addressed this question by comparing the career paths of a particularly promising group of women and men—former recipients of postdoctoral fellowships from the National Science Foundation, the National Research Council, and the Bunting Institute of Radcliffe College. The study compared backgrounds, education, and career outcomes of the women and men; identified reasons for success and failure; and employed a framework for understanding gender disparities. Project Access has resulted in two books: *Gender Differences in Science Careers*, which reports data, methods, and statistical analyses, and *Who Succeeds in Science?*, a companion volume that provides life histories of a subset of the former fellows and focuses upon situations and strategies contributing to success, particularly in academic careers.

With data from a mail survey of 191 women and 508 men and from 200 face-to-face interviews with former fellows, matched to a substantial degree on type of current position, year of doctorate, and field, Sonnert and Holton find key gender disparities in science:

1) In personal backgrounds, women were more likely than men to have had highly educated parents, especially mothers, to be first-borns, and to have suffered the death of their mothers before age 18—all factors pointing to greater social selection among women.

2) In educational experience, women were less likely than men to have made a "straight and linear" progression from college to full-time graduate study, and, although they were less likely than men to have been parents during graduate school, parenting was more likely to prolong women's than men's time in graduate study. Further, those women who had worked closely with their dissertation advisers were more likely than comparable men to eventually leave science, signaling unique problems for women in adviser-advisee relationships.

3) Although the postdoctoral experience of women and men was similiar in duration of fellowship and in rank and gender of adviser, women's research style during the fellowship was less collaborative than men's and they emerged with fewer publications, a factor that becomes important to career outcomes.

4) Among those who have remained in science, the postdoctoral fellowship translated into different career outcomes for women and men. Higher collaboration during the fellowship predicted lower later academic rank for women but higher rank for men. Further, men's later publication productivity benefited from spending the fellowship in a prestigious department and from affiliation with a senior adviser, but the opposite was true for women. Again, this highlights for women the complexity of close collaboration, and it suggests the importance for women of forming contacts with scientists beyond their advisers.

5) Current career outcomes differ for men and women and vary by field. More markedly than those in life sciences, women in physical sciences, mathematics, and engineering hold considerably lower academic ranks than men and are particularly underrepresented at the level of full professor. Women publish less than men, but with publication productivity controlled for gender differences in rank persist. In general, marriage and motherhood do not have detrimental consequences for women's scientific careers, but certain consequences of being married are notable—women were more likely than men to choose postdoctoral fellowships on the basis of nearness to their spouses, and this correlates with low academic rank at later stages.

In interpreting their data Sonnert and Holton have adopted and adapted a framework of "cumulative advantage and disadvantage," first proposed by Robert Merton and Harriet Zuckerman. They are concerned with "the dynamics of careers in their early phases, which may handicap some scientists more than others who are equally gifted," and with how scientific careers—especially as reflected in publication productivity—are responsive to "small initial differences." With data on such dynamics, they evaluate the "threshold" and the "glass ceiling" models of career development—that is, the extent to which gender differentials operate more at the lower or the upper stages and levels of achievement. Though overall in their elite sample "the women . . . did not do extremely worse than the men," they conclude that, except in biology, the glass ceiling is the dominant pattern.

In reporting a combination of survey data and life histories of scientists told in their own words, the Project Access volumes will help reveal to both aspiring and experienced scientists ways in which advantages do and do not occur and how they can and cannot be converted to positive career outcomes. In addition, the accounts address issues bearing on the question of the existence of a distinctively female style of doing science. Sex differences the study suggests are less in the realm of epistemology or methodology than in the social sphere. In their conceptions of what constitutes "good science," women attached more value to comprehensiveness and integrity and men more to creativity and good presentation. In their practice of science women reported themselves to be more cautious and attentive to detail and more likely to carve out research niches for themselves rather than enter highly competitive arenas in which researchers race toward solution of the same problem. The depictions of these styles ring true and represent plausible adjustments to the realities of women's minority condition in science.

What will improve the career outcomes of women (and other under-represented groups) in science? Such recommended undertakings as workshops, conferences, and fellowships (*Who Succeeds in Science?*, pp. 189–93) that enhance the "human capital" of women are useful. But the findings of Project Access would point to a need for changes in scientific training, workplaces, and disciplinary communities as well. These include matters such as adviser-advisee relationships, collaborative patterns, and access to professional networks.

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