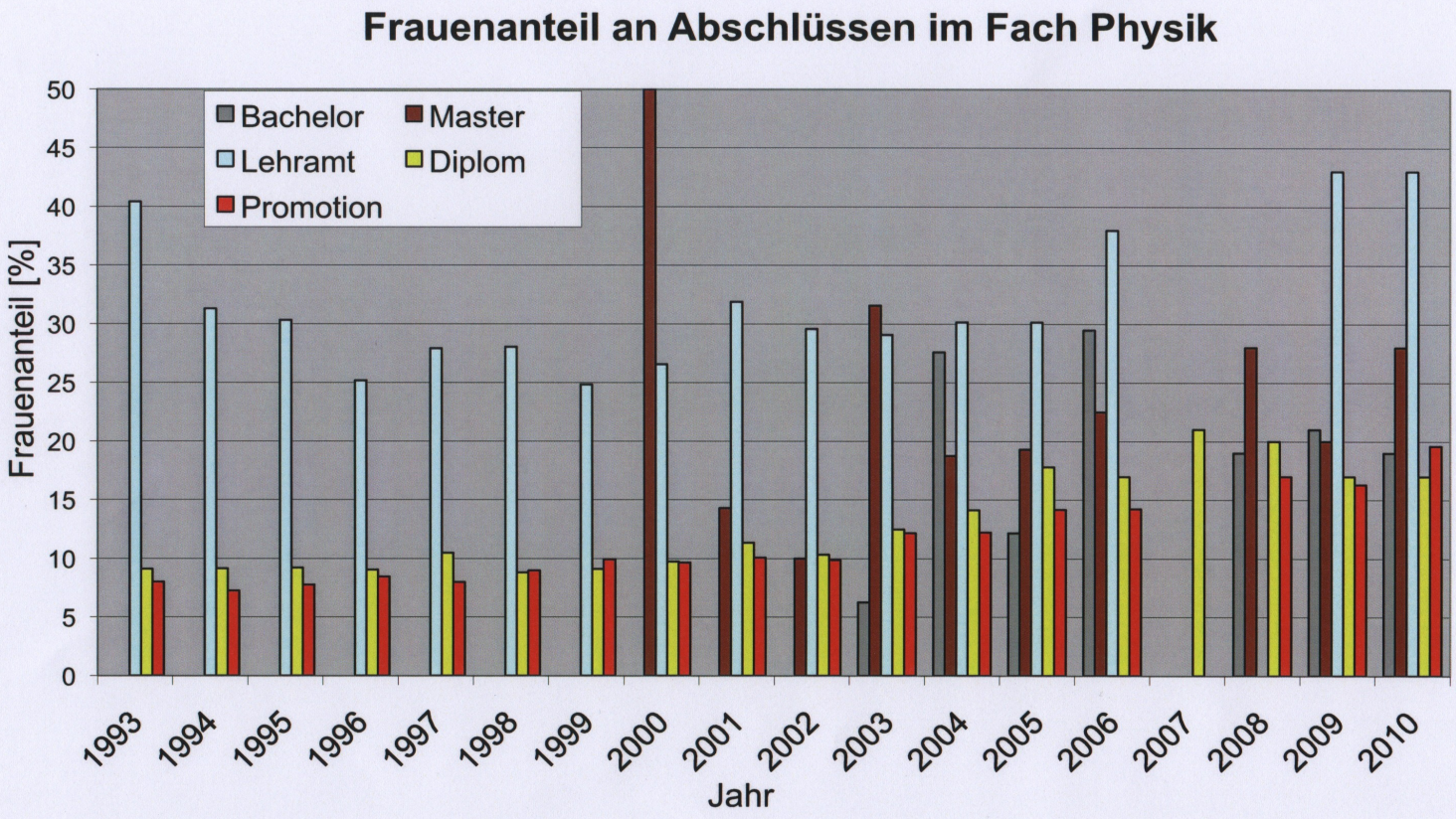
# Are women contributing enough to their own career advancement?

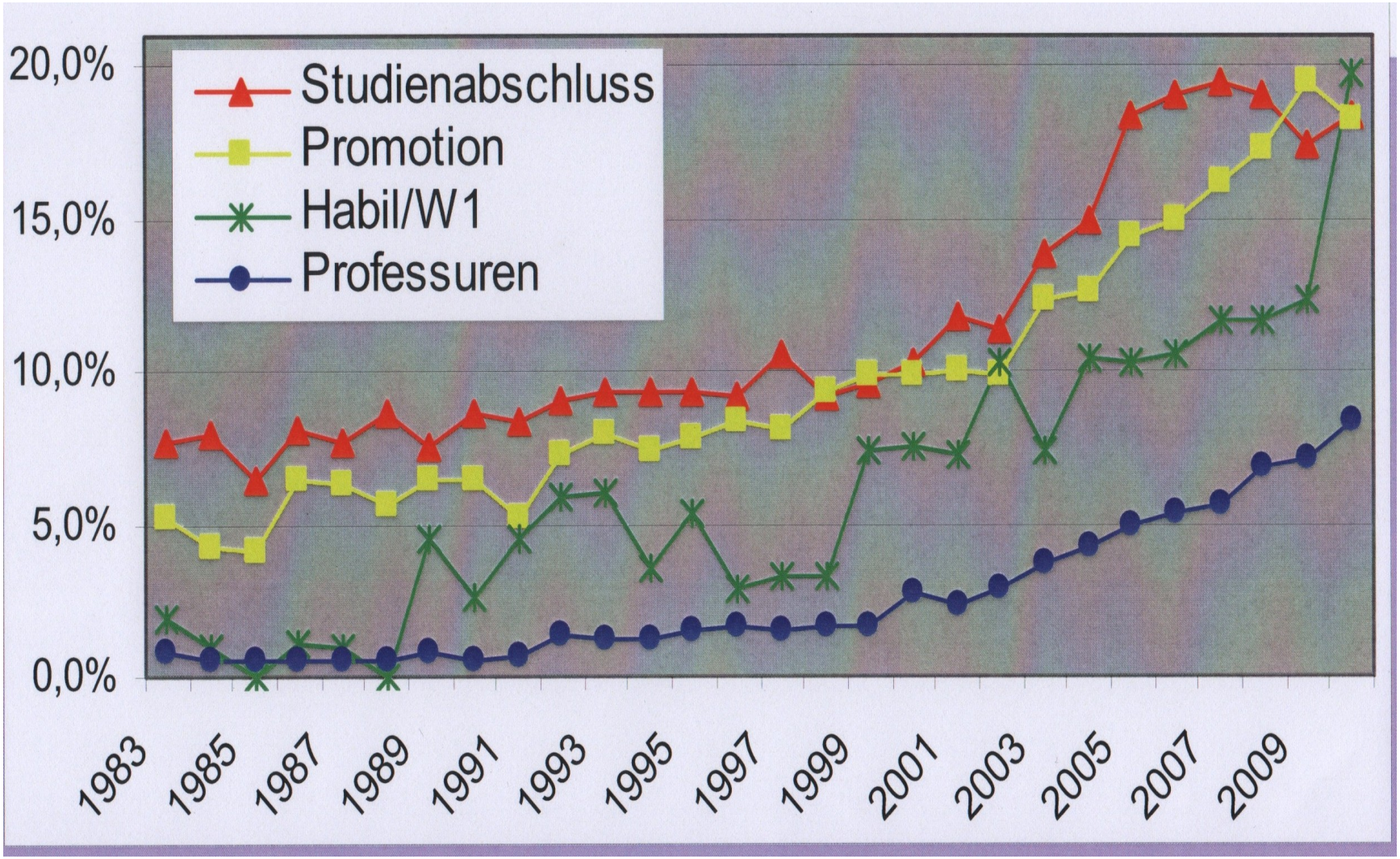
Role Model Meeting
Panel Discussion

# Women in Physics - Germany




Source: DPG

# Women in Physics - Germany

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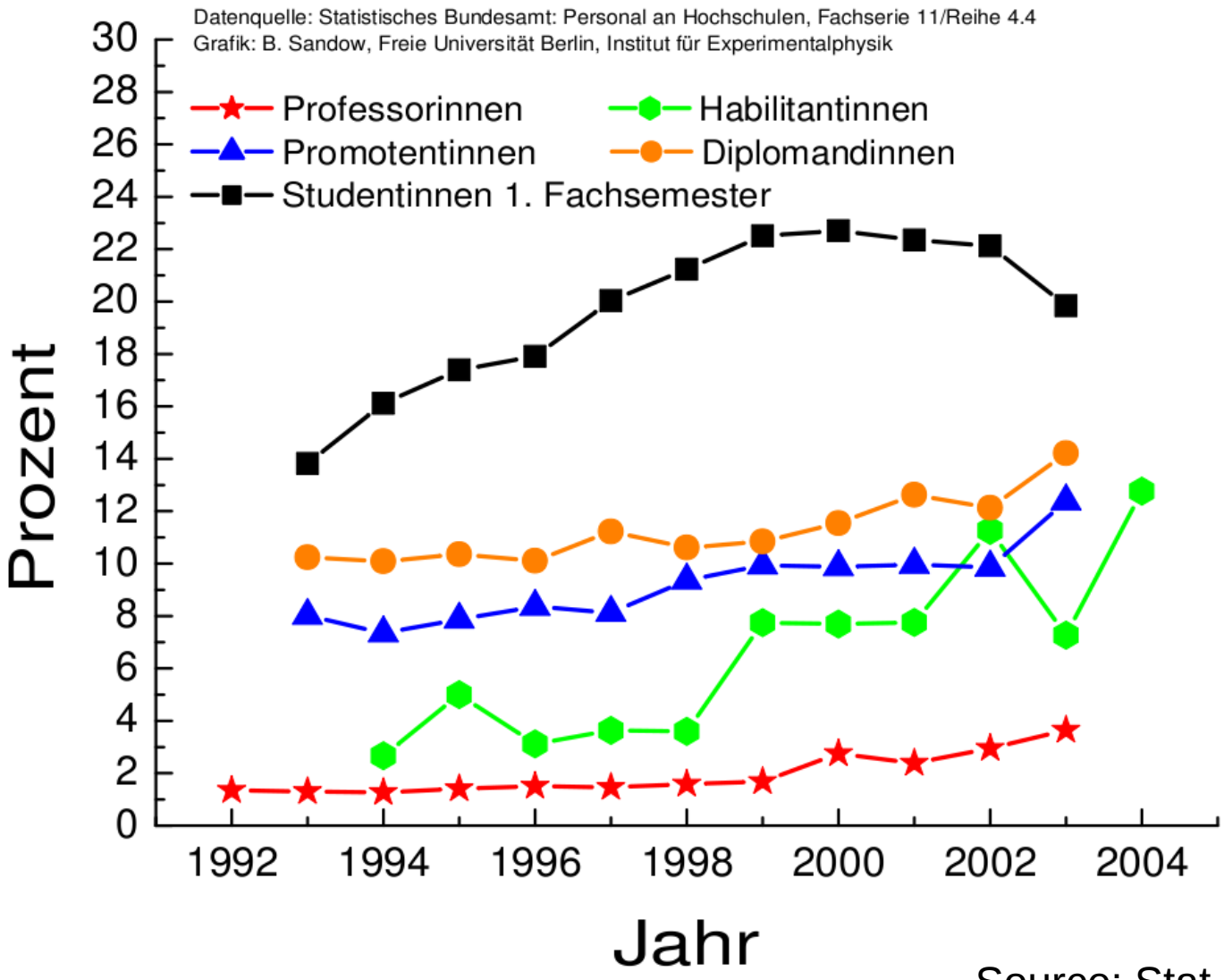
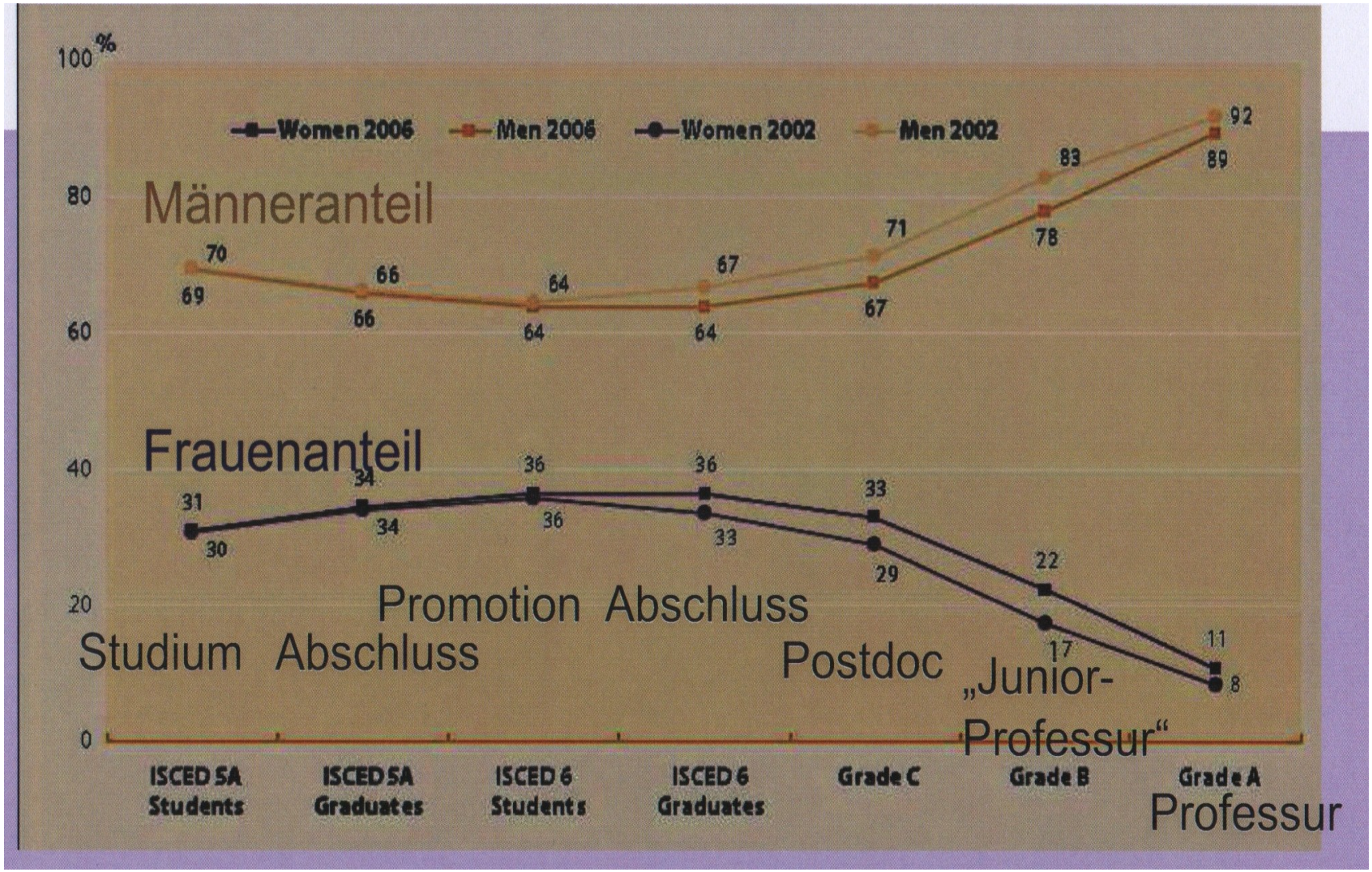
# Women in Physics




Source: Stat. Bundesamt

# Women in Natural Sciences and Engineering

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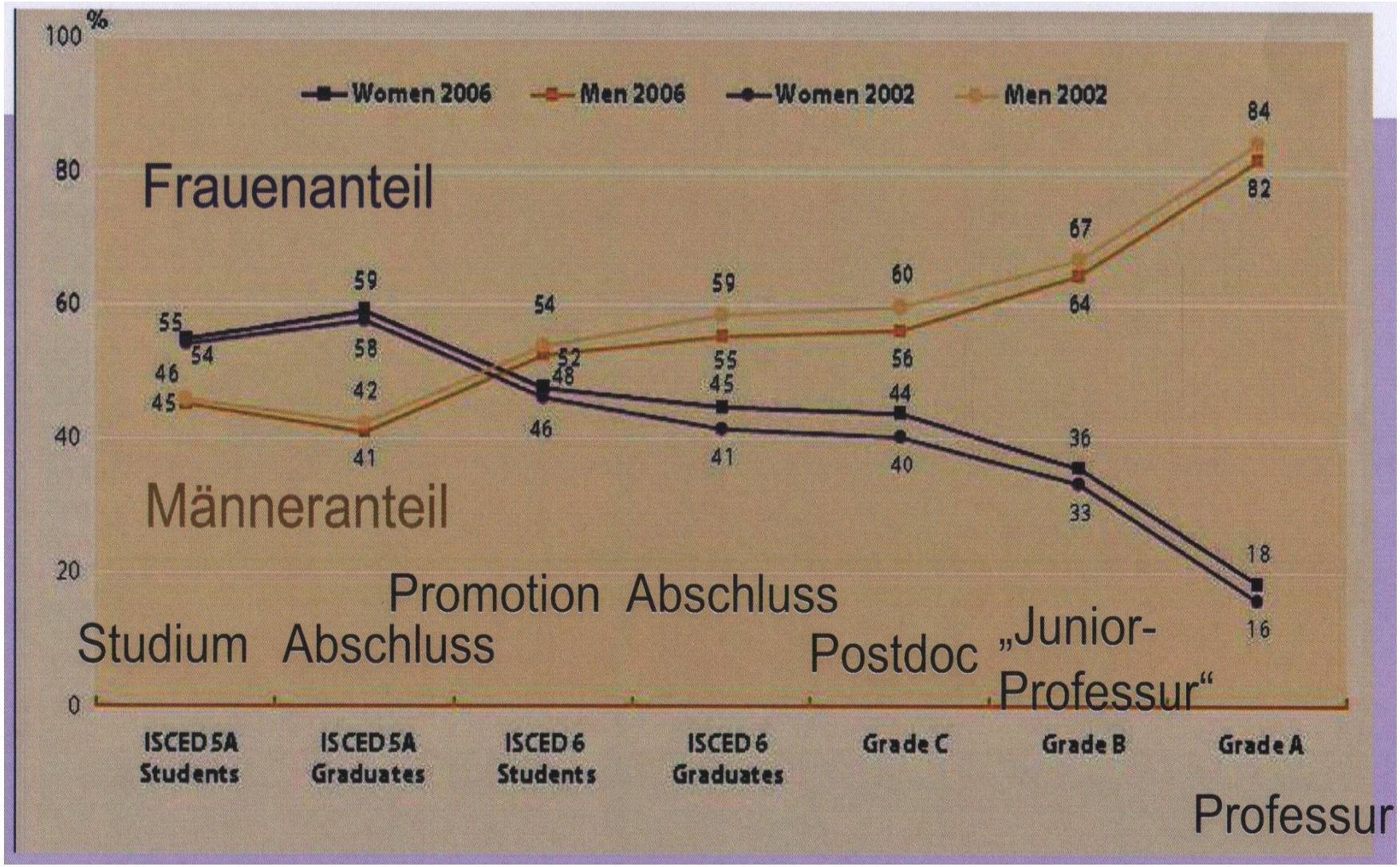
# Women in Humanities and Social Sciences



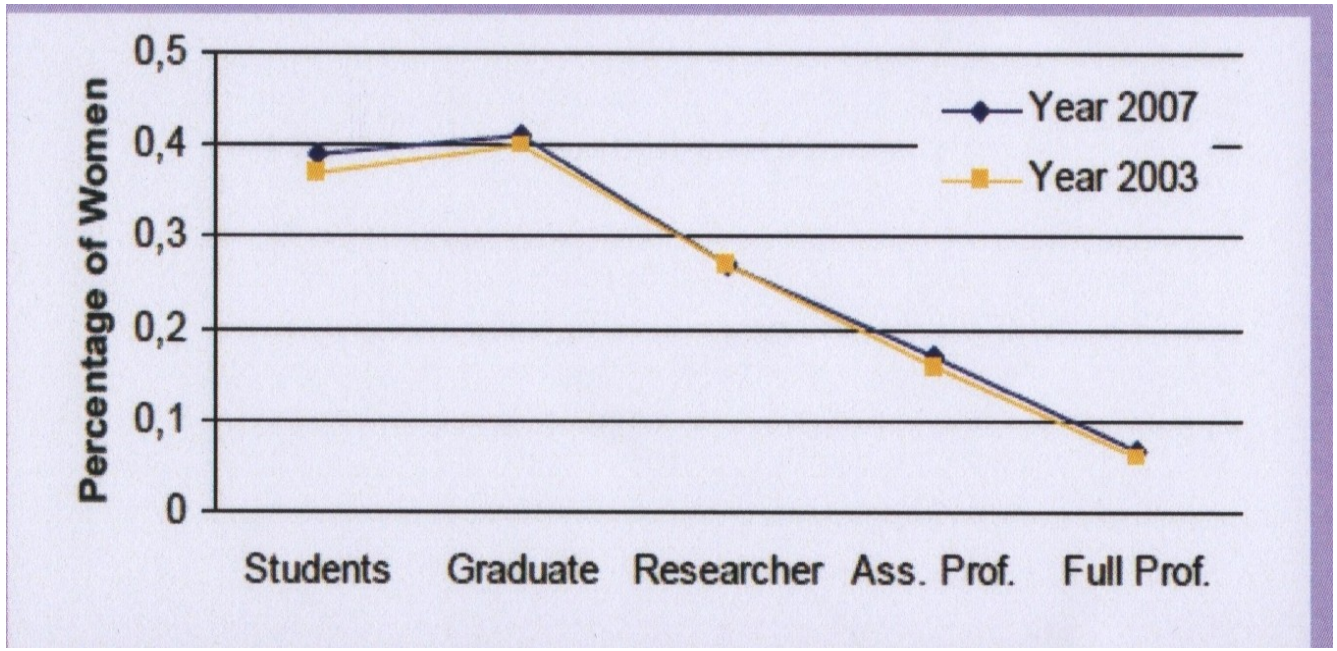

Source: DPG

**TABLE 1.** Percentage of Women Physicists in Turkish Universities, 2001, 2005, and 2008.

| Academic Rank | 2001 | 2005 | 2008 |
|---|---|---|---|
| Full professor | 11 | 15 | 16 |
| Associate professor | 12 | 20 | 17 |
| Assistant professor | 12 | 20 | 27 |
| Research assistant | 24 | 34 | 43 |

**TURKY**

**ITALY**



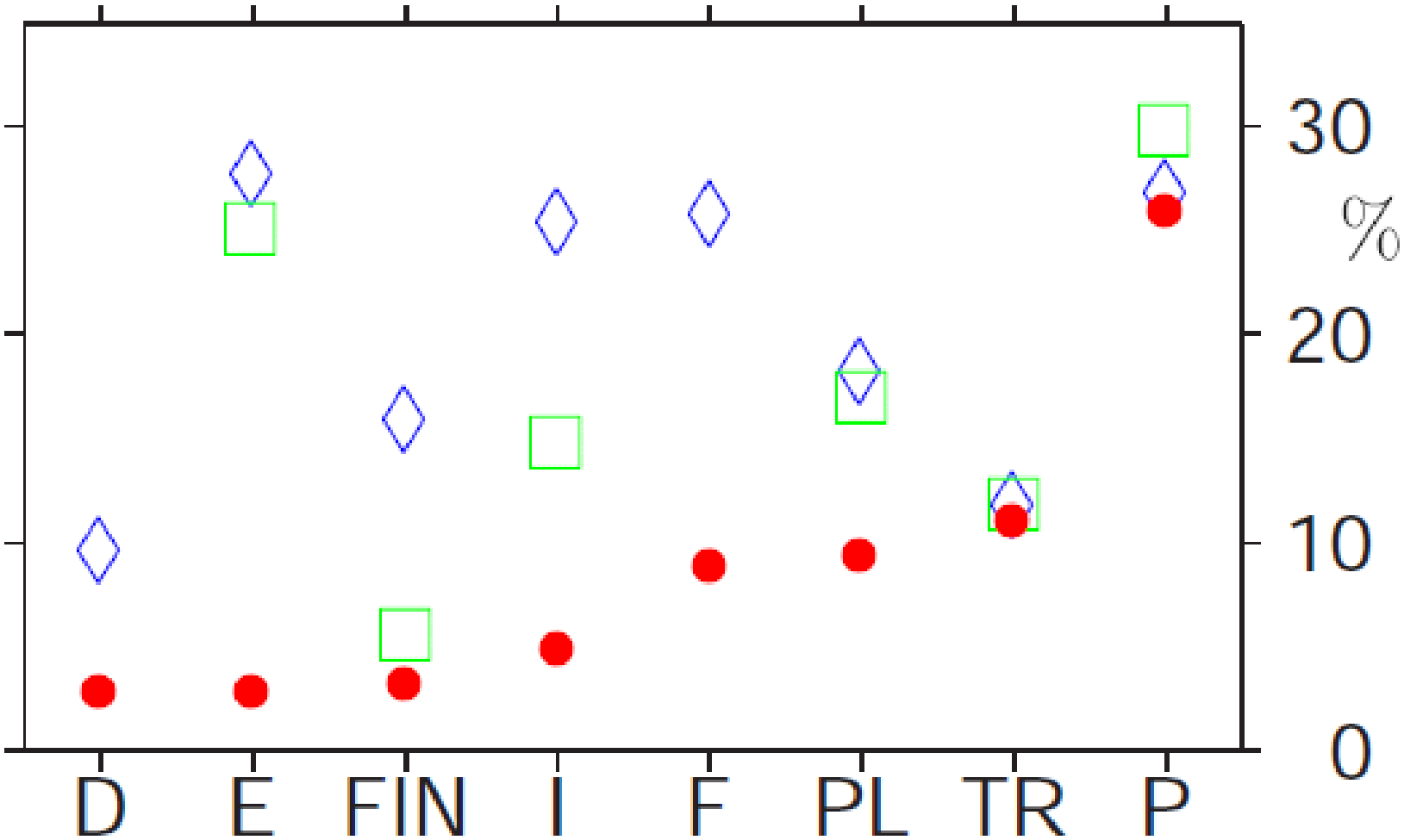

Source: IUPAP country reports 2008

# Women in Science – Other countries

| | Female Physics Professors | Female professors (all) |
|---|---|---|
| Portugal | 26% | 17% |
| Turky | 11% | 22% |
| Germany | 3% | 10% |
| | | |

Source: IUPAP country reports 2008

# Women in Science – Other countries




• Assistant professor, • Associate professor, • Full professor

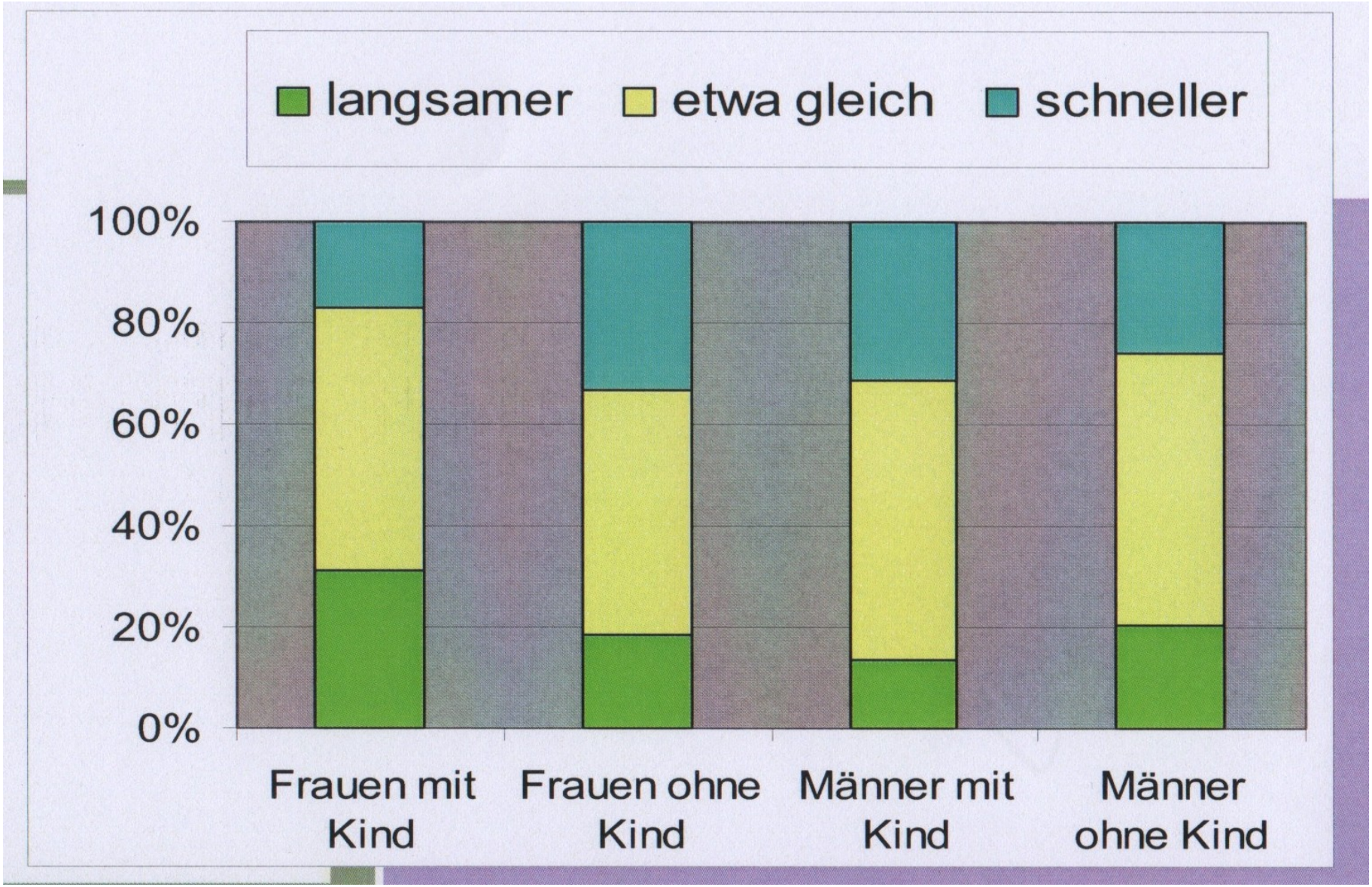
Source: IUPAP 2002

# Women in Physics – Civil Status

| | Male | Female | Male > 45 y | Female > 45 y |
|---|---|---|---|---|
| married or with partner | 70.9% | 63.1% | 84.3% | 60.9% |
| single | 29.2% | 36.9% | 15.7% | 39.1% |
| with physicist partner | 9% | 54.6% | | |
| with non-working partner | 25% | ~ 0% | | |
| with children | 50.9% | 29.4% | | |

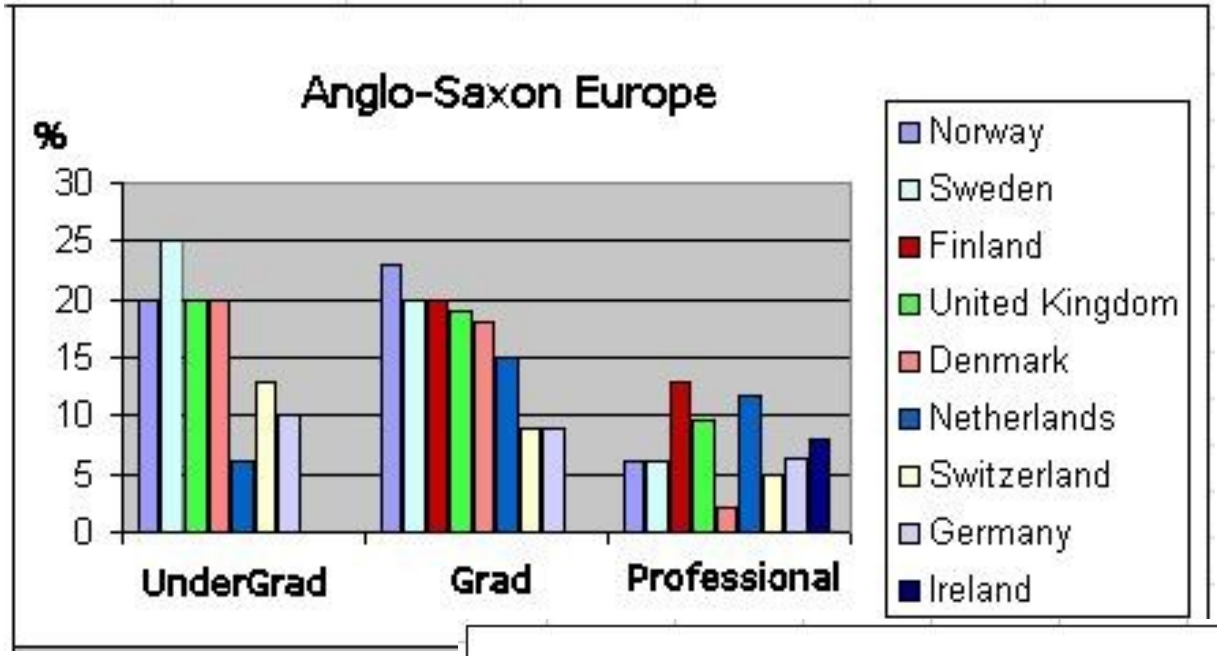
Source: B. Könekamp, B. Krais, M. Erlemann und C. Kausch, Physik J. 1 (2002) 22–27

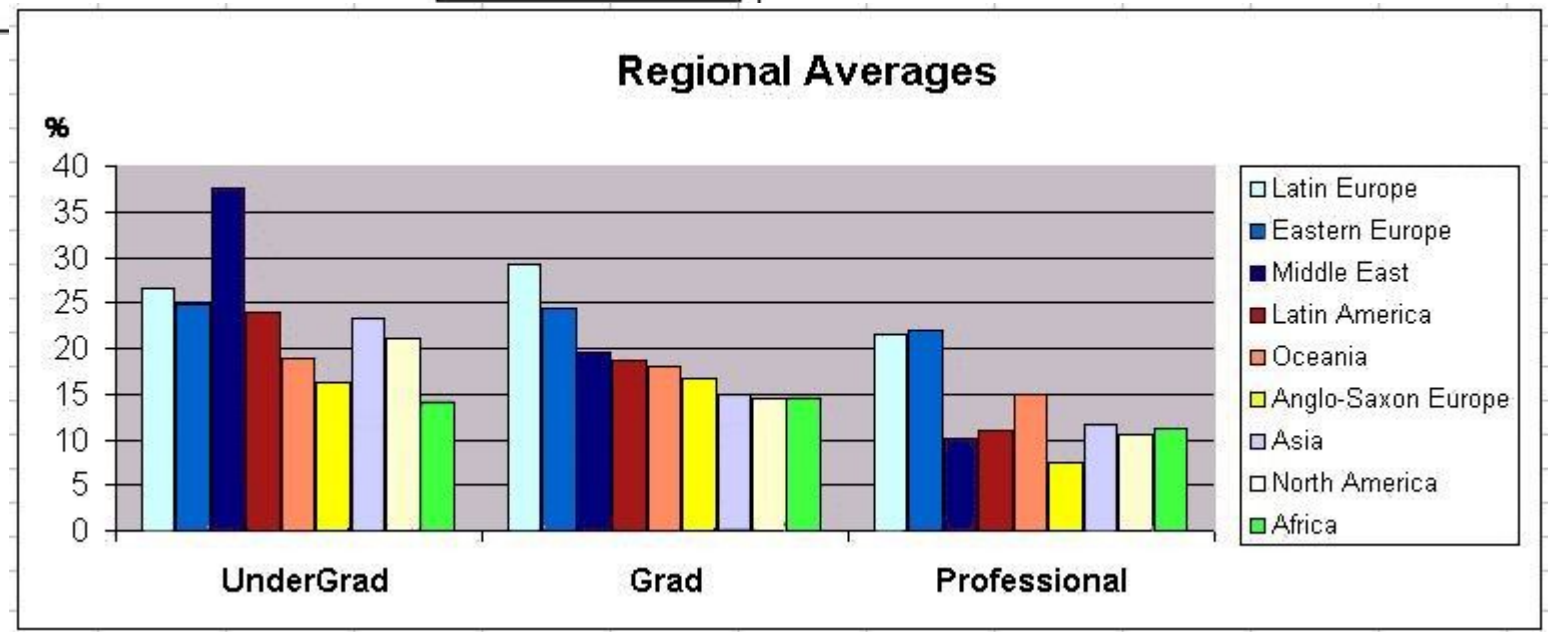
# Women in Science – Family and Children




Source: IUPAP 2010

# Women in Physics






Source: IUPAP 1990-2002

# Gender bias???

# Science faculty's subtle gender biases favor male students

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**Despite efforts to recruit and retain more women, a stark gender disparity persists within academic science. Abundant research has demonstrated gender bias in many demographic groups, but has yet to experimentally investigate whether science faculty exhibit a bias against female students that could contribute to the gender disparity in academic science. In a randomized double-blind study ($n$ = 127), science faculty from research-intensive universities rated the application materials of a student—who was randomly assigned either a male or female name—for a laboratory manager position. Faculty participants rated the male applicant as significantly more competent and hireable than the (identical) female applicant. These participants also selected a higher starting salary and offered more career mentoring to the male applicant. The gender of the faculty participants did not affect responses, such that female and male faculty were equally likely to exhibit bias against the female student. Mediation analyses indicated that the female student was less likely to be hired because she was viewed as less competent. We also assessed faculty participants' preexisting subtle bias against women using a standard instrument and found that preexisting subtle bias against women played a moderating role, such that subtle bias against women was associated with less support for the female student, but was unrelated to reactions to the male student. These results suggest that interventions addressing faculty gender bias might advance the goal of increasing the participation of women in science.**

diversity | lifestyle choices | science education | science workforce

A 2012 report from the President's Council of Advisors on Science and Technology indicates that training scientists and engineers at current rates will result in a deficit of 1,000,000 workers to meet United States workforce demands over the next decade (1). To help close this formidable gap, the report calls for the increased training and retention of women, who are starkly underrepresented within many fields of science, especially among the professoriate (2–4). Although the proportion of science degrees granted to women has increased (5), there is a persistent disparity between the number of women receiving PhDs and those hired as junior faculty (1–4). This gap suggests that the problem will not resolve itself solely by more generations of women moving through the academic pipeline but that instead, women's advancement within academic science may be actively impeded.

With evidence suggesting that biological sex differences in inherent aptitude for math and science are small or nonexistent (6–8), the efforts of many researchers and academic leaders to identify causes of the science gender disparity have focused instead on the life choices that may compete with women's pursuit of the most demanding positions. Some research suggests that these lifestyle choices (whether free or constrained) likely contribute to the gender imbalance (9–11), but because the majority of these studies are correlational, whether lifestyle factors are solely or primarily responsible remains unclear. Still, some researchers have argued that women's preference for nonscience disciplines and their tendency to take on a disproportionate amount of child- and family-care are the primary causes of the gender disparity in science (9–11), and that it "is not caused by discrimination in these domains" (10). This assertion has received substantial attention and generated significant debate among the scientific community, leading some to conclude that gender discrimination indeed does not exist nor contribute to the gender disparity within academic science (e.g., refs. 12 and 13).

Despite this controversy, experimental research testing for the presence and magnitude of gender discrimination in the biological and physical sciences has yet to be conducted. Although acknowledging that various lifestyle choices likely contribute to the gender imbalance in science (9–11), the present research is unique in investigating whether faculty gender bias exists within academic biological and physical sciences, and whether it might exert an independent effect on the gender disparity as students progress through the pipeline to careers in science. Specifically, the present experiment examined whether, given an equally qualified male and female student, science faculty members would show preferential evaluation and treatment of the male student to work in their laboratory. Although the correlational and related laboratory studies discussed below suggest that such bias is likely (contrary to previous arguments) (9–11), we know of no previous experiments that have tested for faculty bias against female students within academic science.

If faculty express gender biases, we are not suggesting that these biases are intentional or stem from a conscious desire to impede the progress of women in science. Past studies indicate that people's behavior is shaped by implicit or unintended biases, stemming from repeated exposure to pervasive cultural stereotypes (14) that portray women as less competent but simultaneously emphasize their warmth and likeability compared with men (15). Despite significant decreases in overt sexism over the last few decades (particularly among highly educated people) (16), these subtle gender biases are often still held by even the most egalitarian individuals (17), and are exhibited by both men and women (18). Given this body of work, we expected that female faculty would be just as likely as male faculty to express an unintended bias against female undergraduate science students. The fact that these prevalent biases often remain undetected highlights the need for an experimental investigation to determine whether they may be present within academic science and, if so, raise awareness of their potential impact.

Whether these gender biases operate in academic sciences remains an open question. On the one hand, although considerable research demonstrates gender bias in a variety of other domains (19–23), science faculty members may not exhibit this

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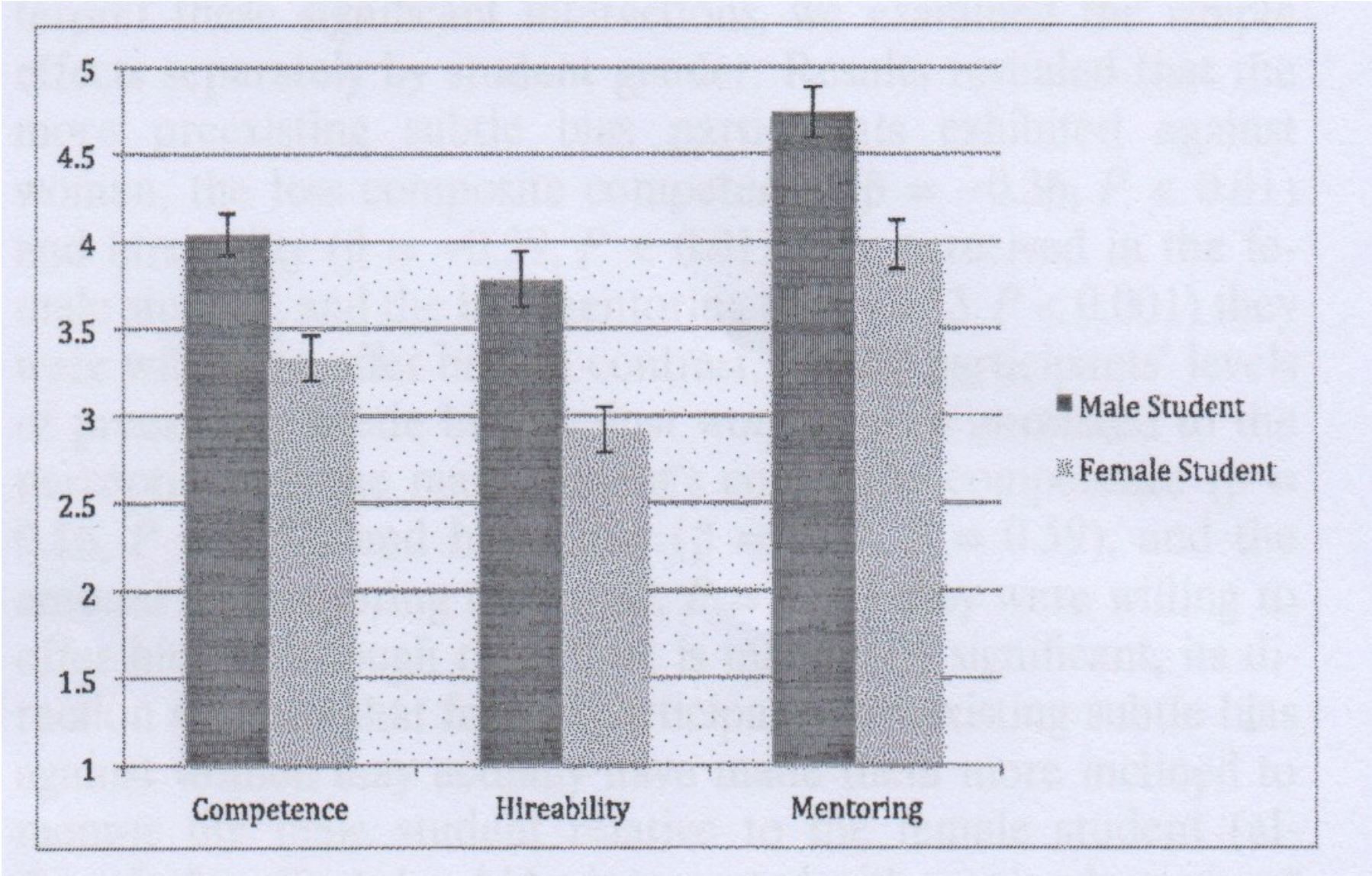
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4.5
4
3.5
3
2.5
2
1.5
1
Competence
Hireability
Mentoring
Male Student
Female Student