How women can get ahead in academia

Dr. Monika Clausen

The first time I was asked to hold a career workshop about women in science, my reaction was somewhat sceptical: "What difference does it make whether an aspiring scientist is female or male?", I asked myself. "Don't all young researchers face more or less the same career challenges?" It did not take much to change my opinion. All that was needed was a quick glance at the figures on gender distribution at the various levels of the academic hierarchy. The picture that emerged is the same in almost every academic discipline: The proportion of women drops significantly toward the top of the academic career ladder, even in disciplines with a very high number of female students. This phenomenon is also known as the leaky pipeline. One particular piece of information struck me as exceptionally depressing and remained struck in my mind: by 2000, 523 people had won a Nobel prize for major achievements in the four scientific fields of physics, chemistry, medicine, and economics. Only 11 of them were women.

The figures called for an explanation. To find answers, I turned to the sociology of science. I was really surprised to see how many books and articles were published on academic career-building strategies and stumbling blocks for female scientists. The three most illuminating points that struck me were first, the lasting influence of the candidate's parental milieu on their academic career; second, the gender-specific difficulties encountered in acquiring the academic habitus; and third, the cumulative nature of discouragement: many women reported that it was not a single discouraging event but the sum of many small incidents that undermined their confidence in their academic abilities and ultimately led them to give up an academic career.

As a PhD student and even as a postdoc, I had not spent a single second reflecting on any of these issues. In retrospect, the reflections that were triggered by my reading were nothing less than an awakening. For the first time, I looked at my academic career through the gender lens. Recalling my professional biography, I asked myself of every key event: Did my gender have anything to do with the way things turned out?

Dr. Monika Clausen & Netzwerkpartner GmbH
Technopark Zürich ◻ Telefon +41 43 244 52 62
www.clausen-netzwerkpartner.ch ◻ mail@clausen-netzwerkpartner.ch

How theory and life come together

To illustrate the somewhat abstract issues of academic career planning, I begin by recounting some biographical data, which I compiled from episodes entrusted to me for anonymized use.

Thanks to her excellent grades and a turning point in Germany's educational policy, Julia became the first child in her family to attend university. In the 1980s, the Federal Training Assistance Act (BaföG) made university education affordable to the general population, and Julia joined the crowd that entered the German universities.

Knowing very little about the diversity of study areas and the variable quality of universities, her first challenge was the selection process. Since she enjoyed biology during her school time, she enrolled for this field in a midsize university. Although more women are registered than men in biology today, it shares a remarkable gender imbalance with all the science, technology, engineering, and mathematics (STEM) subjects. Despite the fact that for decades great efforts have been made to increase the number of female students in STEM subjects, women still prefer humanities and study fields where they are not outnumbered by male students. Unconsciously, Julia chose a field with great potential. She managed her education well, facing all the challenges typical of higher education like most of her peers. In addition, the flood of students triggered by the BaföG initiative further intensified competition for obligatory lab times, places in popular courses, and of course, facetime with the professors. During her studies, Julia's fascination with science grew constantly and led her to pursue a PhD. Thanks to the financial support from various foundations, she undertook part of her doctoral studies at a renowned research institution abroad. The academic environment she encountered there was both challenging and stimulating. At times, the lab microcosmos made her recall Darwin's description of the survival of the fittest. In particular, there was fierce competition for facetime with the supervisor. On the positive side, Julia experienced a great sense of companionship among the researchers in her lab, an infectious eagerness to expand the boundaries of scientific knowledge, and a culture of scientific freedom that she found deeply inspiring. At the same time, Julia realized that female researchers were often not taken as seriously as their male peers. For instance, she noticed that women had much less speaking time in meetings, that they did not receive the same amount of attention from the supervisor, and that they were not invited to conferences as often as their male peers. Julia also noticed that many of the female scientists were single, whereas their male peers were typically married to

women who followed and supported their husbands on their academic career paths. Furthermore, she met very successful women in science who had adopted many behavioural traits considered stereotypically masculine – a phenomenon referred to as social-man behaviour. By the end of her stay abroad, Julia had for the first time acquired a more realistic idea of what it actually means to be a professional scientist. Coming from this internationally recognized institution, she easily found a postdoc position in an unrelated research field where she invested all her energy in doing science and, as she realized later, way too little time in developing the skills required for research management.

While women tend to perform slightly better than men during their studies, the proportion of female students drops with every hierarchically higher function, resulting in the massive underrepresentation of females in professorial positions. To put these findings into perspective, it is helpful to realize that the success rate of being appointed as professor was less than 3% already a decade ago. This figure indicates the high competition aspirants face and the consequent need for more distinctiveness and transparency in the academic career planning process. Anyhow, Julia did what most women in science do, and despite having a paper in one of the top journals, she ultimately decided to leave academia.

Difficulties in academic career planning

The academic career is a classic up-or-out system that is built on performance and recognition. The performance indicators are publishing, publishing, and publishing, presentations at conferences, and successful fundraising. Everybody knows that a solid research field prospect must include up-to-date knowledge of state-of-the-art methods, professional use of correct scientific language, and acceptance in the scientific community. The community decides who is granted recognition, and this influences who publishes in what journal, who can participate in international collaborations, who is asked to stay or to apply for open positions, and who receives the most financial support.

What else influences the everyday life of a scientist? First, scientists are commonly expected to work an extraordinary number of hours. Second, many scientists are forced to work under precarious employment conditions. This includes low salaries, short-term employment contracts, and a constant employment insecurity that stems from the up-or-out structure of academia. Third, to acquire the experience and professional network that is required for a full professorship, aspiring scientists are forced to become

vagabonds during a phase of their lives in which their non-academic peers typically settle down and start a family. Fourth, the journey to a full professorship consists of a constant and strenuous fight for scientific reputation. Like monetary capital, reputational capital is not automatically acquired through work, meaning that aspiring scientists not only need to perform well but also have to be good at finding sponsors willing to accredit their work. Fifth, access to sponsors and career-building know-how is very unevenly distributed among aspiring researchers. It often depends on non-meritocratic factors such as family background, choice of institution, choice of supervisor, and peer group knowledge.

The literature discusses many obstacles to women, including stereotypes, biases, tokenism, selection and promotion processes, reference power, rule makers, and being accepted by the group. I would like to focus briefly on three elements which are striking for me and which receive too little attention. The first of these concerns upbringing and affinity with STEM subjects. In "Doing gender", H. Solgar nicely describes the positive influence that early access to crafting, tools, role models, peer groups, and encouraging feedback has on women when choosing STEM subjects and when developing technological self-confidence. Being educated in subjects that require a solid understanding of technology also has a long-term effect on employability in general. In these professions, the risk of automatization is much lower. It almost seems naturally that men prefer those technological oriented jobs assuring their employability in the future. Therefore, the power that parents have to influence stereotyping during their children and particular their daughter's upbringing is enormous. Mindset plays an important role again during family planning. The myth that an academic career does not go together well with having a family persists and is probably the most frequently discussed reason for dropping out of academia. In addition, the mobility demand and the time commitment by an academic career discourages women. The statement "He was neither husband nor father nor citizen but chemist" might best express the prevailing mindset. Doing science is not a profession but a lifestyle. Labs are full of postdocs who spend most of their time working, including evenings, weekends, and holidays. This resolution of working and private time is probably another reason for the disproportionally high number of women leaving academia.

The second most often overseen elements in career planning are the understanding of the rules of the game and the professional habit and behaviour that sets the standards. Since science has for centuries been a white-male-dominated domain, many rules are implicit, and this implicit knowledge is by nature difficult to share. One social

scientist uses the analogy of a ball game to explain this phenomenon. The playground is full of players who know the rules and who therefore understand the game. Out on the sidelines are people who would also like to play, but since they do not know the game, they have a hard time understanding the strategy, recognizing the playmakers, and identifying chances to enter. The required knowledge is passed on to preferred successors through informal networks and sources that the current captains provide. In such exchanges, the similarity principle becomes important. This principle states that people naturally interact more easily with others of the same kind and of similar background, and that consequently everybody who comes with different ideas, wants to establish new rules, or behaves differently is perceived as an intruder. This is a particularly difficult to handle finding because young female scientists have a hard time to admit and to formulate their feelings whereas advanced female scientists have forgotten about these hurdles. They often discourage the female followers with destructive statements like that success is only a matter of will power or choosing the right partner. As long as less than 30% of posts are occupied by women, these mechanisms continue to manifest what has been termed the token effect. The underrepresentation of women (and other groups such as people of colour and the elderly) results in too few role models presenting different possible lifestyles. The effect is reinforced; any behaviour is linked to gender, which confirms stereotypes, and those women who make it to the top have to handle an overload of committee work to meet organizations' equal opportunity commitments.

The last obstacle that females can overcome is self-sabotage. Stop waiting to be discovered and actively say what you want. Start approaching senior positions early instead of seeking perfectionism in doing the same tasks. Stop volunteering for support and group well-being functions. Take the lead, and start to enjoy natural competition. Stop underselling yourself in your résumé and in interviews. Ask for as much as possible, and don't accept the current situation as given but push for change. Women-specific training, group or individual coaching, mentoring, and sharing both success stories and biographies of dropouts are all helpful in eliminating career planning blind spots and helping to develop self-awareness and self-confidence.

The first steps towards active career planning

Very young PhD students are enthusiastic when starting their careers. They see themselves becoming professors, doing wonderful science, and returning knowledge to

society. This optimistic perspective has often darkened somewhat by the end of the PhD. Few students of either gender want to continue in academia. During their PhD time, they have faced academic reality with all its ups and downs. They have realized what it takes to do innovative science, to be published, to deal with disappointments, and all the other things that happen during this period of professional acclimatization. By the end of their PhD, many students have changed their mindsets and started to look for careers in industry. They hope there to gain a more stable environment, less competition, better salaries, and a greater range of career opportunities.

The career-planning workshops I give are designed for those young scientists who decided for an academic career, and they start with a discussion about fundamental career elements. Why did they decide to pursue a doctorate or postdoc? What makes them to be a great scientist? Which part of their work do they like the most? How do they spend their free time? This reflection on motivation, interest, aspiration, and commitment is followed by a peer-group exercise. We benchmark the current status of the group members by comparing dimensions such as scientific performance, including the novelty of research ideas, and networking activities, including visibility in the scientific community. Differences in productivity, target orientation, and self-organisation become apparent. At this point, participants realize two important career-planning issues: that they have to manage their own professional development and that academic education depends strongly on the opportunities given by supervisors. When comparing learning opportunities, some students report that they have already had opportunities to gain experience writing grant proposals, teaching, and presenting at conferences, while others are mainly busy with data production. People in the midst of their PhDs or postdocs are often so focused on their daily work that they do not recognize their own strengths and accomplishments, newly acquired skills, and personal growth. They focus too often on deficiencies and challenges to be managed. It is wonderful to see their smiling faces when the students realize which competences they have acquired, and the progress they have made. But sustainable career planning requires much more than this.

How to get ahead as a female scientist

The academic career is and will probably remain a particularly difficult professional pathway especially for females. Aside from the points mentioned above, what else can they do to boost their career? Motivated women scientists should think about the following points.

Organizational knowledge: People often focus on their near environment such as their research group or institute and ignore the importance of understanding the institution overall so that all the decision-making bodies seem to be places of mystery. Even at the level of advanced postdocs, organizational knowledge seems to be of no interest to either gender. Achieving such an understanding is not merely a matter of memorizing the organigram, the mission statement, the committees' set-up, and the principal's name but also of understanding financial planning processes, knowing about training and support offers, and seeing the career support potentials in committee work.

Committee experience: Being part of a committee is a key step toward understanding how a university functions, it helps to build an intra-organizational network, and it increases visibility. Individuals who have worked on committees feel more competent when it comes to career decisions, in particular those who have been involved in appointment committees. Taking part in an appointment committee is a powerful and privileged way to access application-relevant information, and to become familiar with selection criteria and expectations in résumés.

Impressive self-presentation: The résumé represents an exhaustive list of achievements and activities and illustrates the universalism of the profession. People's self-sabotage when presenting their scientific talents and managerial competencies is immense. Of course, hosting institutions, scientific achievements, papers, and references are all well-known general success indicators. In addition, people often have to show field specific information, such as technical expertise or patents. But despite these particularities, information about memberships, financials, guidance, review experience, committee involvements, and transfer skills courses should also be presented. Looking at the résumés of female researchers, it is often apparent either that they have forgotten to include important information or that they have put no energy into acquiring these competences yet. At the end of the day the key message in the résumé must show the readiness to go for the next higher position as an independent scientist. I still recall how one of my former workshop participants realized in her eighth postdoc year that her résumé revealed too many gaps to make her eligible for a professorship. During her entire academic career, she had focused on producing data and did not care about anything else.

Developed and demanded skills: With every career step, the number of management tasks increase, requiring skills people have often had no chance to develop. Management duties are more than budgeting, administration, and supervision. Important tasks include

hiring the best co-workers, supporting people in their personal growth and development, guiding a team and fostering team-building events, handling conflicts, and managing communicationally challenging moments. Today, people without any kind of training sometimes take up a leading role. Even already advanced scientists have big blind spots when it comes to overseeing all the managerial tasks that will come and the lack the required skills for people management.

Networking activities: The willingness to go to the best places is a natural part of a scientist's biography. Mobility is a must. The need to network, to pro-actively advertise findings at conferences, and again to work on one's visibility should be a pleasure. Young scientists in particular don't like and believe they don't know how to network. Too often, they think in terms of sympathy and not of mutual benefits. They hesitate to contact people, to enter the spotlight, and to risk refusal. The tendency to avoid networking activities becomes apparent when people are asked about their time investments for networking and the number of newly initiated connections. The expectations and hopes placed on networking are high and of course crucial for career planning, but the actions taken are often insufficient. For an academic career, networking is not a choice; it is needed to build international collaborations, to know the trend in a research field, to be in touch with gatekeepers and ambassadors, and to be recognized.

Vision formulation: Knowing long-term research and private life goals feels like a relief. Decisions have been made, targets set, energy can be bundled, and career alternatives can be dropped. In particular, it helps in creating scientific uniqueness. Claiming a field makes a person an attractive candidate in the job hunt. Too often people get stuck in planning processes instead of working on the long-term goals. But the big picture is required to convince funding agencies, appointment committees, collaborators, and the people themselves.

The phrase "a face – a name – a scientific field" succinctly expresses the idea of long-term brand building and what it takes to become a leading scientist. It sums up the link between the person and his/her scientific uniqueness.

Conclusion

Despite the fact that the discrepancy between female and male career success in academia became apparent as early as the 1970s, not much has changed. The acknowledgement of inequality led to the installation of equal opportunities offices and opened up new research areas about gender preferences, leading to a broad range of

publications. Unfortunately, these findings, which describe the patterns, causes, and effects of female dropout, rarely make it to the people who are in the career-planning process. It stays too often within the gender research community. Many action plans have been designed, and substantial progress has been made in such measures as installing day-care centres, taking motherhood and parental leaves into account when measuring scientific productivity, establishing female-specific grants, scholarships, and protected time programs, offering diverse forms of mentorship, and many more activities to support women. However, the actual numbers of advanced female researchers still have not changed much over the years. If the answers to change this were straightforward, action would have been taken long time ago. It seems as if R. Leemann's findings about the accumulation of little inequities and discouragements are the best explanation for the observations. Actions needed for sustainable career planning include reflecting more on the attractiveness of the job of a professor, raising awareness of upcoming tasks, and understanding achievements and hurdles, even the ones that go unnoticed. I hope that some ideas from the article can help to save further losses from the leaky pipeline. For more facts about female hurdles please read "Women's Empowerment: Luxus oder Notwendigkeit?" published on my homepage.

Worthwhile reading

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Implicit bias in academia https://www.leru.org/files/implicit-bias-in-academia-full-paper.pdf