

How Cultures in Science and Research (Re)Produce Gender (In)Equality

Gender (In)Equality in Academic Career Promotion of Doctoral Students

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1 Introduction

Since the beginning of organised gender politics in German science institutions and academia in the 1980s, many measures have been introduced to advance gender changes. In German academia, however, it took a long time to place the issue of gender equality on the political and organisational agenda of the stakeholders in science politics. However, initially it was not democratic factors that opened the minds of political science elites and rectors to this topic, but rather economic reasons. Now, in times when ‘excellence’ is one of the leading ideas for developing universities to compete in the global knowledge market, gender equality would seem to be important for the future of the (German) university and German research organisations. This is also true in terms of winning ‘all talents for an academic career’ (Bundesministerium für Bildung und Forschung 2008: 3, translation by the author). Accordingly, producing and enforcing gender equality is an integral part of the science political reform agenda.

But what role do gender and gender equality play in the everyday organisational and professional practices of the professors who supervise and promote the next generation of academics? What do these professors say about the role of gender and gender equality in the professional careers of their doctoral candidates? And how do these professors describe their professional practices in terms of putting gender equality into action while supervising and promoting doctoral candidates? In this article I will present the findings from an empirical study conducted on the supervision and promotion of doctoral students in German science and academia. Particular attention will be given to the question of how female and male professors from different disciplines, fields of expertise and (academic) ages explain the so-called leaky pipeline and how gender is inscribed

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in the views of professors, who in this study are regarded as gatekeepers. The empirical background for this article consists of qualitative interviews that were conducted in a research project on academic careers in political science and chemistry in the transition from the dissertation phase to the postdoctoral phase.²

I will start with some reflections on the so-called leaky pipeline in science and academia by giving some statistical data on the overall proportion of women and men according to the qualifications awarded at German universities. The figures make it clear that proportionally more women than men leave academia after finishing their doctorate. Therefore this transition is examined with particular attention in section 2. I will then comment on the gatekeeper role played by professors and, in particular, the importance of gatekeeping for women's academic career development in the postdoctoral phase. In this chapter I will also define what I mean by the supervision and promotion of the next generation of academics (section 3). The methodology of the qualitative study is then introduced in section 4. In the following sections of the article I will present some results on the practices of supervision (section 5) and promotion (section 6) that emerged from the interviews with the gatekeepers. Both chapters show that the interviewees do not present their daily practice as being influenced by gender. Subsequently, five explanations for the so-called leaky pipeline are discussed that may be extrapolated from the interviews with the professors (section 7). The article concludes with a short discussion of the results (section 8), as well as a short section on the question of what women can learn from my research for their career development in the sciences (section 9).

2 A crucial point in academic careers: the transition from doctorate to postdoctoral phase

Science and academia are institutions that are expected by those in politics to actively promote the production of gender equality. Nevertheless, universities and research organisations still contribute to the production and reproduction of inequalities. This is also the case with academic careers. In German universities and research organisations, the doctorate is the formal starting point for an aca-

2 This project, which is under my leadership, is called 'Statuspassage Promotion: Betreuung und Förderung am Beispiel der Fächer Politikwissenschaft und Chemie' (The doctorate as status passage: Supervision and promotion with examples from political science and chemistry). The study has between January 2011 and December 2012 been funded by the German Federal Ministry of Education and Research and the European Social Fund for Germany.

democratic career. In recent years, the gender gap in the overall proportion of women and men, according to status group and qualifications at German universities, receiving doctorates has decreased: In 2011, 44.9% of doctoral degrees were earned by women (Federal Statistical Office 2013), so that the numbers of men and women are nearly equal. On attaining a doctoral degree academics reach a crucial point in their careers: The degree is the start of a professional career in the labour market outside academia and also for starting an academic career at German universities and research organisations. Thus, during the doctoral phase courses are set for the further professional development of highly qualified people.

Research results and experiences up to now make it clear that, in the short to medium term, the problem of gender inequality in academic careers will not be solved merely by increasing the proportion of female doctoral students and doctorates attained by women. The reasons for this are as follows: First, there are still large gender differences between the disciplines and only very small changes concerning gender equality are occurring in most of the disciplines. Second, in the next career step in German academia, the postdoctoral lecturing qualification referred to as ‘habilitation’, very little change has happened in terms of gender equality and male dominance seems to be more or less stable: In 2011, 25.5% of postdoctoral lecturing qualifications were earned by women and 19.9% of professorships were held by women (Federal Statistical Office 2013). Between the doctorate and the postdoctoral lecturing qualification, proportionally more women than men get lost on the academic career path in German universities. This loss of women is a common phenomenon in most academic systems around the world and is described as the ‘leaky pipeline’ (Berryman 1983; Xie/Shaman 2003). However, one needs to reflect on this metaphor because it suggests that there is a career ‘pipeline’ in academia. For the German science system this idea of a ‘pipeline’ is not true: There is nothing like a career ‘pipeline’ with organised transitions from one career stage to the other and no idea that all well-qualified people in German academia should become professors.

Research results show that a mixture of self- and external selection is responsible for the loss of women on their way to top positions in science and academia. This selection process is a result of the interplay between individual, institutional and structural factors (e.g. Kahlert 2013b). One crucial point for leaving the scientific career path for women seems to be the dissertation phase or, to be more exact, the transition from the dissertation to the postdoctoral phase (Allmendinger et al. 1999; Beaufays 2003; Vogel/Hinz 2004). This is the time in

the life course of an academic as a professional in the German science system when they have to decide whether to follow an academic career or not. This decision is important because, apart from professorships, there are no permanent positions in the German system, and in order to obtain a professorship one has to successfully complete the postdoctoral phase with postdoctoral lecturing qualifications (or an equivalent qualification).

The transition period from the dissertation to the postdoctoral phase is usually also the period in the life course when a professional has to decide about starting a family or not. One might suppose that the question of starting a family is a factor that influences the decision for or against an academic career after the dissertation; however, it could be the result of prejudice and gendered stereotypes of life courses and the gendered division of labour. Recent empirical studies show that the proportion of female childless doctoral students and postdoctoral candidates in Germany is proportionally higher than in other professional milieus (Metz-Göckel/Möller/Auferkorte-Michaelis 2009; Lind 2010). This indicates that it is difficult to reconcile the qualification phase of an academic career with the change of lifestyle required by becoming and being mothers.

Apart from these more or less lifestyle-orientated reasons for or against an academic career, one should also look at the influences of scientific and academic organisations on individual career planning and career (im)possibilities. Although Joan Acker does not relate her work on organisational sociology to the particular organisational type of university and research, her approach to work organisations as ‘gendered organizations’ (Acker 1990) and especially to the idea of ‘inequality regimes’ (Acker 2006) may be useful for addressing these issues. Acker assumes that all organisations have inequality regimes. She understands these to be loosely coupled practices, processes, activities and meanings, which result from class, gender and race and which keep the inequalities alive. Inequalities in organisations are thereby defined ‘as systematic disparities between participants in power and control over goals, resources, and outcomes; workplace decisions such as how to organize work; opportunities for promotion and interesting work; security in employment and benefits; pay and other monetary rewards; respect; and pleasures in work and work relations’ (Acker 2006: 443). Thus, inequality regimes also structure professional careers. With regard to the supervision and promotion of the next generation of academics one can argue that the professional tasks of professors are also structured according to inequality regimes and arrangements and structure these as well.

Boris Schmidt and Astrid Richter (2008) consider the supervision of doctoral students to be part of professors' leadership activities. According to Schmidt and Richter, these activities can have emotional effects which in turn affect the work results of doctoral students. Supervision is a key to the successful process and closure of a dissertation, integration into networks and access to further scientific qualifications for the next generation of academics. However, the supervisors perform this function selectively and with varying intensity.

The sex of the doctoral students is one selection criterion (Kahlert 2013b: 179-186, 290-306). Accordingly, it is not surprising that in terms of research results, supervision causes greater dissatisfaction for female doctoral students during the dissertation phase than male doctoral students. The way supervision during the dissertation phase influences the academic career progress of doctoral students is barely considered. Research by Elizabeth Prommer et al. (2006) presents an exception. Based on a study conducted in Germany, Austria and Switzerland with all young academics from the field of communication science, the authors linked interviewees' satisfaction with their professors' supervision to their career planning. The results show that those young academics who did not feel they were adequately supervised also were less likely to plan a career as a professor (Prommer et al. 2006: 82). This result is particularly interesting because, according to the study, women in particular are not satisfied with their supervision: Their main criticisms included that fact that they were not introduced to important people in the scientific community and that they did not feel accepted. In addition, with regard to career planning and networking they complained about a lack of support by their male supervisors (Prommer et al. 2006: 80-82).

Why proportionally more women than men leave the science system after obtaining their doctorate is an issue that has still not been addressed by the German system of sciences and the humanities. Moreover, no comparison has yet been made between the sexes and the disciplines in terms of the processes of career orientation and career planning in this status passage. My research on this topic deals with the perspectives of the next generation of academics as well as their ideas and the social practices they apply in running their professional careers (Kahlert 2012). Additionally, the research analysed the perspectives of both male and female professors on the careers of the next generation of academics and considered their professional practices in supervising and promoting doctoral students. Professors can promote the development of doctoral students' professional identity, open up career paths for them, especially in science and aca-

demia, and integrate them into the scientific community. Professors are also important agents of gender equality for the academic career path, especially in the transition from the doctoral phase to the postdoctoral phase – even if this may not be clear to them or may influence their professional activities. The following sections of this article pay attention to these aspects.

3 Professors as gatekeepers: supervision and promotion of the next generation of academics

Compared to professional careers in different types of organisation, one of the characteristics of an academic career lies in the fact that such a career is organised by cooptation. One does not reach the next step on the career ladder when one has fulfilled special requirements and/or qualifications; these requirements and qualifications are merely necessary preconditions for the chance to be coopted. The cooptation process may be described as jumping from one career stage to the next and depends on already established academics. They are the ones who select the academics that are considered to be qualified or fit for the career stage concerned. According to Harriet Zuckerman and Robert K. Merton (1973: 522), these established academics may be regarded as *gatekeepers*.

The gatekeeper role 'is basic to the systems of evaluation and the allocation of roles and resources in science. (...) Various distributed within the organizations and institutions of science, it involves continuing or intermittent assessment of the performance of scientists at every stage of their career, from the phase of youthful novice to that of ancient veteran and providing or denying access to opportunities' (Zuckerman/Merton 1973: 521-522). Gatekeepers regulate scientific manpower. With regard to the input and distribution of personnel, firstly, they evaluate the promise and limitations of aspirants to new positions, thus affecting both the mobility of individual scientists and, in general, the distribution of personnel throughout the system. Secondly, with regard to the allocation of facilities and rewards, gatekeepers operate largely through broad- or narrow-spectrum 'panels of peers', which recommend and determine the distribution of fellowships, research grants and honorific awards. And thirdly, with regard to the outputs of the variously allocated resources, the gatekeeper role is organised principally into the sub-roles of referees, charged with gauging the validity and worth of manuscripts submitted for publication, and of editors and editorial staff, who make the final determination of what will be published and delivered.

In the context of my research, that is, the career orientation and the career development of the next generation of academics, the gatekeepers decide about the entry and advancement of highly qualified people in the science system. In this respect the supervision and promotion of doctoral candidates are part of the gatekeeper role. Gatekeepers influence the career opportunities and the mobility of postgraduates and postdoctoral candidates and by doing so they also regulate the gender proportion of academic personnel. In order to evaluate the role of gatekeepers from a gender perspective, it is important to discuss who selects, who can be and who is selected, what rules shape the selection process and what criteria are taken into account. Liisa Husu (2004) supposes that at least hidden, but maybe also even unreflected, mental models and attitudes of gatekeepers with respect to the sex of the candidates could play a role in the selection process. According to this one can argue that also the supervision and promotion of the next generation of academics are influenced by gender. Therefore, the analysis of gatekeepers' gender concepts may shed light on the attitudes of gatekeepers with regard to gender (in)equality in science and academia and also the impact they have on putting equal opportunities into action. Thus, it is astonishing that very few and mostly older empirical studies (Anger 1960; Holzbecher 1997; Graf 2011) have been concerned with these questions.

But what is meant by supervision and promotion in this study? The differentiation between these concepts is useful for a methodological investigation of professors' professional activities and the experiences of the next generation of academics with regard to their career paths (Kahlert et al. 2011).

Supervision is understood as support activities by professors and, as the case may be, other persons of relevance for supervision, for example academic assistants and academic leaders of research groups. Supervision is directed at the completion of the dissertation. Accordingly, four aspects of supervision can be differentiated:

- *Ideational-personal supervision* means the process of supervision, the (leadership) style(s) of the supervisor(s) and the forming of a professional relationship between the doctoral student and the supervisor.
- *Technical-functional supervision* consists of the discussion and/or approval of the theme and the synopsis, the exchange of basic knowledge, support in terms of technical-functional and methodological issues, new impulses and the handling of equipment and software.
- *Structural-ideational supervision* includes the structuring and the framework of the dissertation process. It comprises discussions and colloquiums, advisory services according to the form of the dissertation (monograph or

cumulative), joint participation in conferences or lectures, and support for obtaining stipends and certificates for the dissertation. This category is shaped by support activities which provide doctoral students with benefits in addition to a successful closure to the dissertation. These are an integral part of the doctoral education of each doctoral student and for example include integration into the scientific community.

- *Structural-material supervision* covers financial support with respect to participation in conferences, seminars and excursions, insofar as the participation is considered an integral part of the dissertation or common sense. In addition, this aspect of supervision involves offers of stipends or jobs, as well as forms of support that cover the doctoral students' living expenses.

In contrast, *promotion* means support activities for the doctoral students in a broader sense. These support activities exceed the direct success of the dissertation and serve to integrate the doctoral students in the scientific community. They may also be helpful for career advancement but are not an integral part of the doctoral education or common sense. As in the case of supervision, four aspects of promotion are differentiated:

- *Ideational-personal promotion* means motivation and career counselling with regard to a scientific career, for example mobility and publishing, as well as the transmission of implicit knowledge by supervisors. This knowledge mainly includes tips and hints.
- *Technical-functional promotion* involves presentations that assist in the achievement of key competences and the information about these offers. Participation in these presentations and the achievement of the specific competence(s) are of benefit to an academic career, for example academic writing, presenting, university didactics and leadership seminars.
- *Structural-ideational promotion* includes aspects related to professors' activities with respect to the scientific careers of doctoral students. This refers mainly to the active integration of the next generation of academics in the scientific community, for example joint publications, joint participation in conferences and/or lectures, references, joint research proposals, assistance with networking and contact arrangements. Structural-ideational promotion therefore exceeds ideational-personal promotion, which only contains encouragement, tips, hints and counselling.
- *Structural-material promotion* covers the financial resources that the next generation needs to continue their scientific career after having finished the doctorate; for example the financing of travel costs to participate in conferences or to give lectures, further education or job offers.

4 Methodology of the study

The empirical background to this article consists of 17 qualitative interviews with male and female professors from various fields of political science and chemistry in the German system of science and academia. In the comparative context of the study the interviewees were selected by means of theoretical sampling. Besides discipline and gender, selection criteria were orientated to diversity in order to maximise perspectives. The sample of interviewees is composed of four female and five male professors from political science and of four female and four male professors from chemistry.³ All interviewees represent different disciplinary areas. They work at different German universities in both the Old and the New Laender, are of different academic ages and possess different experiences in supervising and promoting the next generation of academics. Also, the interviewees are differentiated with respect to payment levels and lifestyles (partnership, marriage, single, with or without children).

The interviews focused on the attitudes and experiences of the interviewees with respect to the supervision and promotion of the next generation of academics and therefore they also pay attention to issues of gender. How do gatekeepers of both disciplines organise the supervision and promotion of doctoral students during the dissertation phase and in the transition to the postdoctoral phase? How do they perceive their professional practices according to the development of career orientations and career aims and with regard to the development of the professional identity of doctoral students and postdocs? What do the interviewees see as starting points for improving gender equality? What factors moderate their practices when promoting and coopting the next generation of academics during the dissertation phase and the postdoctoral phase? What role does (the gatekeepers' and the doctoral students') gender play in the process?

In the beginning of the interviews an interest in the production and implementation of gender equality was expressed. This topic was also considered during the interviews by making provision for questions in the last part of the interview guidelines. For example, one question aimed at generating explanations for the decreasing number of women in the postdoctoral phase and in the professoriate. Another question aimed at eliciting suggestions for improving gender equality in science and academia. The interviewees were also asked to

3 The original plan was to interview four professors per discipline and sex. However, during the study I was given the opportunity to interview a fifth professor from political science and this interview was also integrated into the study.

reflect as far as possible on their own experiences as a man or woman in science and academia. In the interview guidelines and instructions the request to reflect questions relating to gender and gender equality was challenged by the methodological problem of taking gender as a social scientific and social structural category into account without affirming gender differences. De facto this resulted in questions directly related to gender and gender equality being asked predominantly in the section of the interview that was planned for these aspects. Apart from that the gatekeepers were reluctant to emphasise gender-related aspects. This could mean that the interviewees do not consciously ascribe any importance to the sex of their doctoral students in their professional practice. One could also assume that in the light of political pressure in science to produce gender equality, the gatekeepers did not want to arouse suspicion that they do not participate in the production of gender equality.

I conducted all 17 interviews, which lasted between 65 and 150 minutes. They were digitally recorded and afterwards transcribed according to special rules. The interpretation of all the interviews is based on qualitative content analysis (cf. Mayring 2008).⁴ Because of limited space I will not go further into methodological details here; rather, I will concentrate on some of the results that can be extrapolated from the empirical material.

5 Supervision of doctoral students

The interviewees described the supervision of doctoral students generally as time-consuming and intense. Accordingly, most doctoral students require a large expenditure of time and intensity. All the gatekeepers reflected on the tension between the amount of supervision and the amount of autonomy doctoral students need. The professors resolve this tension in different ways. The scope of supervision seems to extend from tight leadership with clearly structured time-frames and tasks – this model seems to prevail in chemistry – to supervision on demand with flexible structuring of time and open tasks – this model seems to prevail in political science.

With respect to *ideational-personal supervision* the process of supervision consists of three phases: a time-consuming and intense phase in the beginning, a long phase with rather loose supervision in the middle, and an intense phase at the end of the dissertation. Several gatekeepers also hinted at unplanned personal

4 The academic assistants Nadine Frei, Danny Otto and Sabrina Rutter supported this work.

crises during the process of writing the dissertation, which also challenged the supervisors.

The supervision on demand mainly takes place in unstructured and irregular one-on-one interviews. These interviews also serve as conversations on informal issues. Therefore, those doctoral students who do not or do not very often request such interviews may lose out on important information. Additionally, this type of supervisor only recognises the doctoral students' problems if they are obvious to the doctoral candidate and if he or she has the courage to speak about the problems to his or her supervisor.

In this context, the extent to which the supervisors are present in the workplace is important. In chemistry, the professors have a culture of regular attendance. Therefore doctoral students have many opportunities to make use of their supervisor's 'open door' policy. In political science, however, the professors' presence at the university is more erratic. Therefore it is unlikely that doctoral candidates will meet their supervisors by chance.

Only the male political scientists emphasised their function as counsellors and initiators of dissertations and placed the students' autonomy in the foreground. In contrast, a few of the female gatekeepers from both disciplines characterised their manner of supervision as 'caring' and identified differences between the behaviour of male and female supervisors. Both male and female interviewees explicitly mentioned the need to encourage women to start a dissertation and to give them specific counselling.

In the interviews, ideational-personal supervision was closely linked with aspects of *technical-functional supervision*. In political science, the doctoral students usually work on their own research questions. Therefore, the starting phase of the dissertation demands an intense technical-functional discussion on the theme and the synopsis. In the middle of the dissertation process the doctoral students may have technical-functional crises, and in the end they ask again for intensified technical-functional feedback. In chemistry, on the other hand, the themes for dissertations often emerge from the professors' research projects. Therefore there is no need to concentrate the technical-functional supervision on finding and delineating a theme or dealing with a crisis with the material. Instead, technical-functional supervision in chemistry deals with advice on the construction of experiments, discussion on preliminary results, and advice on writing up the results.

The interviewees discussed *structural-ideational supervision* in depth. With respect to the structuring of supervision, remarkable differences were found

between both disciplines. These differences emerge from the essentially different construction of the dissertation in political science and chemistry. In chemistry, the dissertation is structured mainly by the work that is done in the laboratory. Not only is the time structure of the dissertation process and the supervision connected with it to a large extent given, but also the exchange with colleagues and the supervisor(s). This structuration of the dissertation is reinforced by the different institutional settings, for example regular research group seminars and colloquiums, where the supervisors organise the technical-functional exchange. The supervisors usually expect the doctoral candidates to be present in these settings and to contribute regularly to the organised exchanges, for example by presenting (preliminary) results. In contrast, in political science, supervision if any, is mainly structural-ideational with colloquiums being arranged at different intervals, for example once a month or once a semester. These include very different groups of students, for example undergraduate students, master's students and/or diploma students, doctoral students and academic assistants of the chair or department. According to the gatekeepers, participation is less binding and there is less active collaboration than in chemistry.

The gatekeepers emphasised gender-related aspects for both disciplines in structural-ideational supervision. These aspects relate to family formation and the reconciliation of family and dissertation. For example, in political science some interviewees organise workshops for their doctoral students that deal with these themes. In chemistry, the gatekeepers mentioned that laws for the protection of pregnant and breastfeeding working women do not allow them to work in the laboratory. In this regard several gatekeepers addressed the practice of supporting those women in their research group with 'laboratory assistants and so on'. In such cases the female chemists do not have to interrupt the research for their dissertation. At the same time the interviewees hinted at the fact that they sometimes have problems with the third-party funding organisations because the supportive work in the laboratory for pregnant and/or breastfeeding scientists has to be paid for separately in order to keep the research project running.

Structural-material supervision was always mentioned in the interviews. In this respect the gatekeepers referred to the allocation of jobs and stipends for writing the dissertation, which is normal in chemistry and an exception in political science. The gatekeepers also placed financial support for participation in conferences and advanced training, which is necessary for the progress of the dissertation, on the record. The costs linked to the dissertation are financed by the chair's or the department's budget resources or by third-party funds, if the

supervisors consider these costs necessary. In political science these costs are only financed by the chair or the department now and then and normally in connection with jobs for the doctoral candidates, which are paid from budget resources or third-party funds. These examples make clear how the differences in resources (jobs, money) between disciplines and the particular possibilities for applying for and obtaining third-party funds influence the supervision.

According to the gatekeepers, the gender of the doctoral student and of themselves does not usually play any role in the supervision. The only exception they make concerns the question of becoming and being pregnant and having children. This exception is related to women only on the basis of their (traditional) societal role in bringing up children. Although the interviews show that the gatekeepers make individual differences when supervising doctoral students, they describe their practice of supervision according to scientific standards consistently as more or less gender-neutral.

6 Promoting the next generation of academics

Although the remarks on the supervision of doctoral students took up a lot of space in the interviews, they contain little information about the promotion of the next generation of academics during the dissertation phase and in the transition to the postdoctoral phase.

With regard to *ideational-personal promotion*, most of the gatekeepers mentioned the doctoral candidates' career planning. In this context they consider the decision for or against an academic career and the high requirements, as well as the accompanying problems. Especially those doctoral students who want to stay in science and academia are encouraged to participate in conferences and to write publications.

When the doctoral candidates want to leave university after having completed their doctorate, the gatekeepers send them for career counselling at various places and organisations. This is because the supervisors maintain that they do not feel competent to counsel or promote this group of alumni and that they do not feel to be responsible for their careers but they also question the quality of career counselling for academics with a doctoral degree. It might also be that the gatekeepers do not have much interest in those doctors who leave science and academia. This is because the supervisors make it clear that, for them, their networking and their own reputation in the scientific community is (more) im-

portant. Accordingly, their professional activities are also directed at supervising and promoting the next generation towards these interests.

Additionally, some of the professors hinted that they did not want to be involved in their doctoral students' career planning, because career planning is considered to be a 'private affair'. However, in the interviews, the gatekeepers were vague about the line between private affairs and tips or enquiries by the supervisors or discussion about career planning with the candidates and the point at which the gatekeepers find it inconvenient or even convenient to intervene in the private affair of career planning.

Some male and female interviewees spoke about the need to encourage female doctoral students explicitly to continue with a scientific career after having finished their doctorate and to give them special counselling. However, they did not state whose task this should be.

Technical-functional promotion did not play much of a role in the interviews. Only few professors seem to advise their doctoral students to accept offers of continuative technical-functional qualifications and/or to earn key competences. In the interviews with chemists one finds hints that the doctoral students participate in seminars on scientific writing because they do not always learn enough about this during their studies. Apart from that one tends to find the attitude that the doctoral students either have all the necessary qualifications or that they earn them during supervision and/or in the research group.

Examples of *structural-ideational promotion*, such as mutual participation in conferences (where doctoral students or postgraduates are introduced to important people in the field), joint publications, the organisation of joint conferences and/or joint teaching or joint references and telephone calls to colleagues to recommend candidates, were seldom mentioned in the interviews. Surprisingly, only political scientists discussed the purposeful building of networks with the participation of the supervisor(s). This was not mentioned in the interviews with the chemists. This may be because chemists have the possibility of networking in any case because they work organised with research groups. Beyond that, the supervisors probably do not see the need or maybe they do not have the need to structure the building of networks.

The fact that the gatekeepers were so reluctant to tackle structural-ideational promotion may be because the scientific market for people with doctoral degrees is small and only a few have the chance to stay in science or academia after having completed their doctorate. It could also be that these forms of structural-ideational promotion are not spoken about, maybe because the gatekeepers are

not aware of them as part of promotion or because these forms of promotion are only selectively practised. Some interviewees estimated their influence or their possibilities to affect the scientific careers of their doctoral students as being very limited. This is because the gatekeepers describe academic careers as 'filled with imponderables' and strongly connected with 'luck', especially in the case of a call to a professorship at a university. According to the gatekeepers, a scientific career is the result of the individual activities of the candidates and not also the result of professors' professional leadership with adequate social practices that promote the next generation of academics. An understanding of the gatekeeper role can only be found in a very few of the interviews with professors in this study.

The interviewees were also reluctant to discuss *structural-material promotion*. Only in political science some of the male professors pointed to the promotion of female academics explicitly by offering them a job for the lecturing postdoctoral qualifications and for sharpening their scientific profiles. Two gatekeepers reported that in the meantime some of their former long-time female academic assistants had become professors. In contrast, some of the female interviewees from political science emphasised that their facilities are too small to promote postdoctoral candidates by offering them a budget-funded full-time job. Therefore, they are only able to offer doctoral candidates part-time jobs.

With regard to the structural-material promotion of postdoctoral candidates and assistant professorships all chemists were reluctant to comment. They referred to the fact that in chemistry people with a doctoral degree generally go abroad to work as postdocs and afterwards do not normally come back to the research group where they studied and/or wrote their dissertations. Furthermore, the gatekeepers emphasised that postdoctoral candidates are expected to bring with them their own research funding and research project if they want to affiliate with a professor's research group. In the interviews these arguments were not linked to gender.

Some female professors from chemistry see the need, not least in the light of their own experiences, to promote female chemists after their dissertations explicitly to stipend or job programmes. However, neither male nor female gatekeepers from chemistry have experience in promoting female chemists after the dissertation. The reason given for this is that they did not have any postdoctoral candidate(s) who seemed fit to be promoted or who asked to be promoted. It would seem that the interviewees from chemistry had had female postdoctoral candidates who had left the research group very quickly. In some cases the pro-

fessors explained this as being for private reasons, including starting a family as well as other reasons that were not elaborated on. In other cases they did not give any explanation for this.

To conclude: Beyond the supervision of doctoral candidates the interviewees seem to practise a generally very selective and casual promotion of the next generation of academics. This selective, casual promotion consists of publications, participation in conferences and lectures or sometimes also job offers for postdoctoral candidates. From the interviews it is not possible to work out any specific or systematic patterns of promotion for the next generation of academics. The only point that becomes clear from the interviews refers to the material resources of the universities, departments and single chairs. That, for example, active integration of the next generation in academic networks, encouragement or tips for running a scientific career can be, or indeed is, part of a professor's role, was only very seldom and then only mentioned in passing in the interviews.

7 Gender constructions and gender (in)equality in the gatekeepers' views

One part of the interviews attempted to elicit the gatekeepers' views on the reasons why proportionally more women than men leave academia after having finished their doctorates and why there are so few women in top academic positions in Germany. The answers deal with, firstly, family formation and the gendered division of labour in private life, secondly, asymmetric gender relations in private partnerships, thirdly, gendered career planning and necessary investments in academic careers, fourthly, working conditions and the academic work ethic and, last but not least, with psychosocial factors and professional competence (Kahlert 2013a).

The summary of the gatekeepers' explanations for the loss of female academics on the way to top academic positions shows very clearly that most of the answers to the question 'Why so few?' deal with gender differences in the life courses and life plans of the next generation of academics. The gatekeepers' gender concepts are generally orientated to heterosexual partnerships and a family model that consists of a male breadwinner and a female care worker. The issue of children is identified as one of the main problems in women's academic careers after the doctorate and can result in a clash of the different social requirements in the female life course. One might expect that the gatekeepers would mention the problem of reconciling scientific qualifications and family formation

or care work. However, worthy of note, but not entirely astonishing, is the fact that this problem is assumed to be mainly a woman's problem.

The gatekeepers do not challenge the fact that women study and may be able to obtain a doctoral degree and that they want or are able to work. However, most of the interviewees see the career possibilities of women with a doctoral degree after having finished the doctorate being immediately influenced by the biological opportunity to become pregnant and by the biological limit of the fertile phase. In the case of experimental chemistry the gatekeepers also mentioned the employment laws that protect pregnant and breastfeeding women by preventing them from working in laboratories.

Some interviewees also mention changes in the familial division of labour between men and women and observed changes on the side of young men and fathers. A female gatekeeper emphasised that by now there are 'modern men, who want to notice a bit more than in former times'. In the light of existing asymmetric gender relations most gatekeepers also foresee the emergence of problems in partnerships if highly qualified women make use of their academic capital in the labour market to run a permanent and ambitious career or even want to start a scientific career and thereby are more successful than their partners.

However, the gatekeepers' explanations of women's career planning are contradictory: In part they mirror the male breadwinner model that makes it possible for women's life planning to give only lower-ranking priority to their professional careers. In contrast, other interviewees stated that women take their professional careers so seriously that becoming and being a professor is not attractive because it goes hand in hand with a high workload, a large amount of insecurity during the qualification process and low income potential. Other gatekeepers stated that women do not get the idea to plan an academic career because they are not supposed to be able to imagine becoming a professor. So, on the one hand, the gatekeepers are able to imagine that women are becoming professors and planning their careers accordingly, while on the other, the gatekeepers deny that women want to pursue such a career plan.

A fourth set of explanations deals with the working conditions and the work ethic in science and academia. These are described in terms of the disadvantages of a professorship and the career path one has to take until one gets a call to become a professor. The gatekeepers regarded a professorship in the German system of science and academia as having many disadvantages: laws for limited employment until one becomes a professor, heavy workloads and expectations to

be permanently available. Of course, these disadvantages count for both women and men in academia, but the gatekeepers maintain that these aspects are more problematic for women than for men, because women are also believed to be responsible for care work. At the same time some gatekeepers reflect on different structures of opportunities and chances for women and men in science and academia. According to most of them women are disadvantaged with respect to protection and career advancement because of old boys' networks.

The gatekeepers also outlined different gender concepts relating to psychosocial factors and professional competences. According to these gender concepts, women have high self-reflexivity but also low self-confidence, they lack ambition and the willingness to risk and, in the case of theoretical chemistry, also knowledge. By contrast, men are regarded mirror-inverted. These polar constructed gender concepts make clear that the gatekeepers only partially appreciate gender differences. Gender differences are mainly presented as deficits. Thereby all interviewees explain the gender differences in behaviour and professional competences in terms of primary and secondary socialisation, and not nature.

It is striking that the gatekeepers relate the reasons for gender inequality in science mainly to conditions and influences that lie outside academia. First of all they indicate the gender relations in partnerships and families, as well as socialisation, as reasons why women drop out of the way to top scientific positions. It thereby becomes obvious that the interviewees are often (still?) bound to the modernised male breadwinner model, although they do make it clear that this model is changing and is being replaced by the practice of double careers in partnerships and families. It is also striking that most gatekeepers cannot imagine a (consciously planned) life without children. Accordingly, childlessness is portrayed as the price one has to pay for an academic career and not as the planned result of individual life plans.

Some interviewees presented their own possibilities for producing gender equality in science and academia as limited to the recruitment of personnel for positions to write a dissertation or prepare for postdoctoral lecturing qualifications or for professorships and for the encouragement of the next generation of female academics to have a scientific career. Other gatekeepers do not see themselves as agents of active gender equality. In their view, gender equality depends first of all on changes in societal frameworks, for example the availability and allocation of flexible and high quality childcare facilities, the individual attitudes of men/(potential) partners towards the employment of highly qualified women

and the processes of education and qualification through which women have to pass before they enter university. Therefore, both organisational scope and individual possibilities to produce gender equality in science and academia are considered to be limited or unavailable. If science and academia were to contribute to gender equality, then these gatekeepers maintained that this was the responsibility of ‘the university’ or ‘the rectorate’ and/or the equal opportunity officer or, more generally, ‘politics’.

8 Discussion and conclusions

The analysis of the supervision and promotion of the next generation of academics does not give many hints as to the inequality regime of gender in academic careers. The picture created by the gatekeepers’ gender constructions and their ideas on gender equality would suppose that male and female professors unconsciously treat male and female doctoral students and postdoctoral candidates differently, although this cannot be proved by this study for methodological reasons. The concept of gender relations as held by the interviewees still consists of a male breadwinner and a female homemaker and care worker. Although the female homemaker and caregiver may also be (willing to be) employed and willing to make a career for herself, according to the gatekeepers she also partly withdraws her ambivalent career ambitions because of the problems related to reconciling a career with the power asymmetry in the partnership. Some professors explicitly hinted at the fact that women’s further academic education is nowadays seen as ‘normal’ up to the dissertation. Implicitly, this also means that the aspirations of (some) women to take a top position in science and academia and therefore to stay in the university is (still?) not regarded as ‘normal’. One can assume that this internalised gender concept also has an impact on the different gender practices involved in supervising and promoting the next generation of male and female academics; however, this maybe unintended because the professors do not seem to be aware of their practices.

Compared to older German studies on the professorial views of female students and professors (Anger 1960), both stability and change are apparent in the gender constructions of the interviewees in this study. Compared with older studies the gatekeepers do not use naturalising arguments to explain why women are not interested in science or why they are not able to work in academia. Instead, the interviewees seem to be well informed about the influence of socialisa-

tion on career planning and career courses. Also, as in older studies, the gatekeepers see the main reasons for gender inequality in science and academia first of all in terms of conditions and influences *outside* academia. Accordingly, the gender relations in private partnerships and families and socialisation processes outside science and academia are used to explain women's career practices. Even when the gatekeepers do explain the loss of women in academia by referring to aspects that are internal to science or academic organisations, these apparently are not areas that fall within the interviewees' influence: Employment laws, laws of employment protection and the payment structure in academia are determined by legislation, and the heavy workload in the sciences seems to be caused by global competition in the scientific knowledge market and the scientific dynamics of knowledge production rather than by the professional practices of the gatekeepers.

Thus, individual possibilities to influence the academic career system and the careers of the next generation of academics are introduced as being highly limited. Very few gatekeepers in the study regard it as their job to influence the careers of younger academics in terms of their practices in hiring, supervising and promoting the personnel for postdoctoral positions and professorships and for encouraging female (post)doctoral candidates to start and proceed with an academic career. The other interviewees also do not regard themselves as agents of career promotion and/or gender equality. It seems as if they have not developed a gatekeeper consciousness. Although most of the interviewees seem to be more or less informed about the need and concrete measures to promote gender equality in academia, they introduce themselves as being seldom the ones who could put gender equality into action. If they see possibilities in putting gender equality in science and academia into action, it is in terms of abstract institutions that should take responsibility for this and work on gender change. This attitude could be the result of the underdeveloped gatekeeper consciousness mentioned previously. It could also be caused by the gatekeepers' idea of an academic career as being constructed by the candidates themselves and being influenced by luck and not by career strategies and promotion. However, it could also be an expression of resistance to (more) gender equality in science and academia. As such, it makes clear that the inequality regime of gender is still present in science and academia.

9 Lessons to learn for women in sciences

Last but not least I would like to discuss what women can learn from this research for their career development in the sciences. The results of the interviews with the male and female gatekeepers make clear that four aspects with direct gender relevance come to the fore when considering the ‘gender issue’.

The first aspect deals with female scientists as potential mothers who may become pregnant or who are breastfeeding. In chemistry these mothers are not allowed to work in laboratories for some time. Closely linked to this, and with relevance for both chemistry and political science, is the image of female academics as still being responsible for care work at home. So, in the views of professors, women as mothers experience conflict between home and scientific work that hinders them from having a career in science or academia. Even if female academics become pregnant and are able to combine science and family they have to be aware that many of the gatekeepers do not think that both life spheres can be easily reconciled by women and that a woman’s place is still at home.

Secondly, the gatekeepers mentioned that women in academia need special treatment and encouragement when furthering their academic qualifications, including the dissertation and postdoctoral lecturing qualifications. However, very few interviewees admitted to encouraging female academics to take up a career in science. This illustrates that women should not wait to be encouraged if they want an academic career but should take their careers into their own hands. As the interviews show, very few professors promote doctoral students and postdoctoral candidates in their academic careers. For women this means that they should look for support from other people and institutions, for example mentoring programmes, professional coaches and professional career counselling. Additionally, they should not wait for job offers or other opportunities, but be active in seeking these out for themselves.

The third aspect deals with the gatekeepers’ dominant gender concept. The research makes it clear that most of the professors who were interviewed have a traditional gender concept in their minds. This seems to influence their behaviour and attitudes towards women in academia. Even if there are female professors, and their numbers are growing slowly, gatekeepers do not see female professors as being ‘normal’ in daily practice in science and academia.

Finally, there are strong hints within the research that gatekeepers suffer from a lack of gatekeeping consciousness. Many male and female professors are

not aware that they are indeed gatekeepers and should behave as gatekeepers. This seems to be especially true in issues related to gender equality. In this regard, there are very few differences between male and female professors. This means, for example, that there may be male professors who have a gatekeeping consciousness and are also willing to support female academics and work for gender equality, while there may also be female professors who do not. In other words, the stereotype of the gender-blind male professor who does not support female academics and the gender-reflexive female professor who is always working on behalf of gender equality has not been proved by the data. It is therefore important that women in the sciences should also be aware of their gender concepts.

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