Gendering Science:
Slovenian Surveys and
Studies in the EU Paradigms

Mirjana Ule | Renata Šribar |
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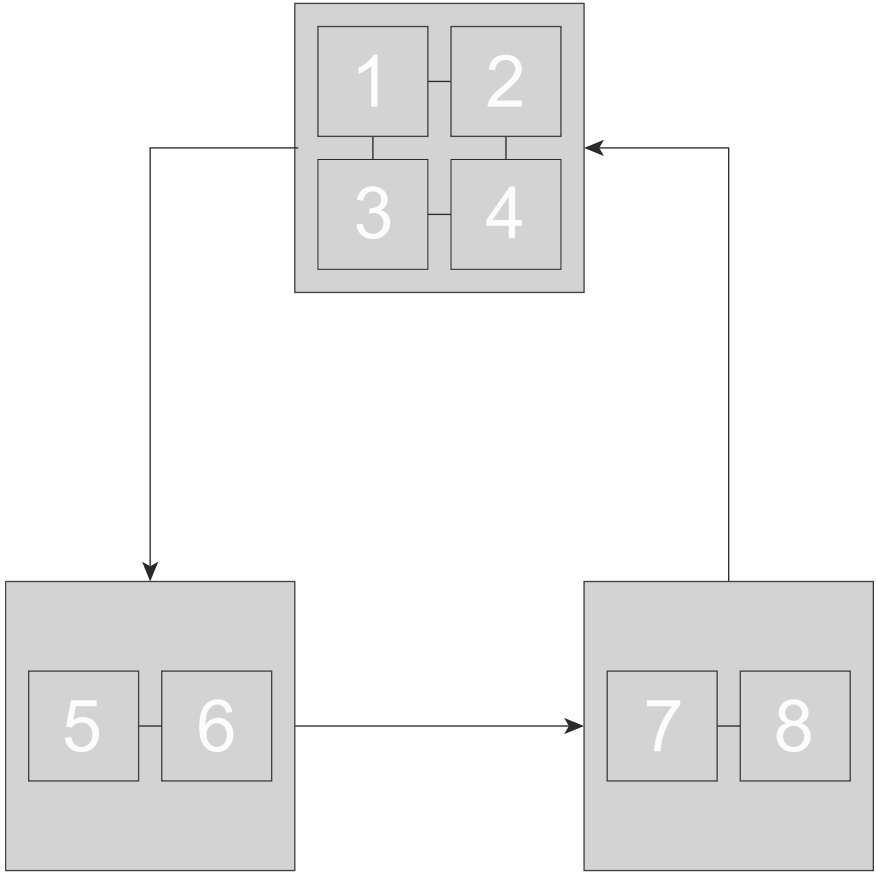
Introduction: For the Matrix of Science Unloaded



The syntagm women in science is a conceptually multiplied and relational issue: it implies or ignores contemporary gender and transgender theory, and the positionality/corporeality approach to the inquiry into gendered scientific statuses and opportunities that depend on the general conditions of science as a societal sector. On the other hand, the applied intersectionality or comparative (F/M/intersex?/other?, global/local, national/EU) methods cannot be taken for granted, *i.e.* without further problematisation. It has become obvious that, with the aim of obtaining a widely understandable picture, we are almost obliged to follow the mainstream conceptual and methodological path to some degree and at the expense of the feminist epistemic knowledge many of us hold. The above-mentioned problematics and the thematic *topoi* are tackled in the present monograph. We hope that with the approaches arising from the indicated complex standpoints the various interests in the cross-section of the EU scientific field and the de-homogenised societal group of women scientists will be satisfied.
Why there are such obvious differences between men and women working in science is a question that has come to the fore of discussions in Europe, the EU and Slovenia only in the last period. More accurately, in the 1990s there was a rise in interest in the position of women in science in Europe, especially the gender (im)balance in academic and scientific careers. While access to science in schools and universities has been improved for both women and men, access to scientific careers is still difficult for women. Even though in Slovenia in 2010 the shares of both genders at the level of postgraduate studies were nearly equal (the share of women was 51%), and the share of women at the PhD level was still 46%, the share of women researchers had fallen to 31%, while the share of women at the highest career level (full professors) had dropped further to a modest 20% according to the statistical publication of the European Commission *She Figures 2012*. This scissor diagram is not only typical for Slovenia but for all 28 EU member states. For example, in EU-27 member states in 2010 the average share of women postgraduate students was 46%, the average share of women with a PhD was 44%, the average share of women researchers was 37%, and the average share of women at the highest career level was 20%.
To compare the influence of women in science in the EU and in Slovenia, in 2010 the average share of women in EU-27 member states on boards with an influence over research funding was 36%, but in Slovenia it was just 23%. This means that the knowledge and skills of women are not being harnessed as they should be. Contemporarily, the slow rise in the share of women at all career levels can be noted, but to boost this process we need targeted policies and encouragement measures, as well as a reconsideration of the epistemic background to EU strategic issues in the scientific area. Proactive support for a gender balance in science and technology would mean easier access to a broader spectrum of

human scientific agency, knowledge, and the related societal development. As regards the production and marketing level, different views and experiences play a considerable role in the conceptualisation of goods and services not only as commercially but also as environmentally important and otherwise adapted to the expectations of the society which is composed by many segmented groups of people who are ever more aware of particular and universal interests. Consequentially, a gender balance is also a question of "science excellence" as a facilitator of the further development of civilisation, although it is important how we conceptualise this excellence. When evaluated through the lenses of the common good, the different knowledges which are a fundament of the HSS and STEM sciences simply lead to better decisions in science. One Slovenian research study on the topic entitled "The creative environment and the excellence of young researchers" (published by Uroš Matelič, Franc Mali and Anuška Ferligoj in 2007) revealed that different knowledges and differentiated membership of the research team have an important impact on the generation of outstanding scientific ideas.

Last but not least, more gender-balanced science and technology would contribute to social progress. Securing equal rights for women and men in science is also a question of a just society. Hence, the central thesis of the monograph, which in one way or another is present in all the contributions in this book, is that ensuring the conditions for gender equality in scientific work is one of the key components of the internal democratisation of science. In turn, scientific communities should develop their own internal democracy in order to be able to maintain their mission and contribute to increasing social justice in society.

When we ask ourselves about the position women hold in science today, we cannot ignore the fact that women have historically been excluded from scientific activities and that even today the entry of women into academic and scientific activity is taking place in social circumstances in which the long-standing gender inequalities in science are only slowly disintegrating. If gender equality is measured by how many women are currently enrolled in university-level education in the EU and Slovenia, or by how many of them graduates, then the gender comparison is favourable. However, more detailed analyses reveal that the problem of equal statuses and equal opportunities is not resolved, and has only been transferred to the other areas of science management. Gender differences in science, at least as it has been proven in Slovenia and many other countries in the EU, occur in the places of power, decision-making, prestige and honour. In academic professions, women are mostly lecturers and work with students a lot. If they acquire functions, they are given those that are paid less and are not as prestigious. Men occupy those positions where decisions on the distribution of resources, employment, recruiting, and research directions are made.

Science is also generally a highly hierarchical structure, in universities or institutes alike. Such systems, as a rule, establish the subordinate position of women in a complex way according to the different axes of societal divisions. Gender inequality generates biases in defining scientific problems, mainstreaming certain methodologies and themes, and the interpretation of results, that is, it generates specific types of cognitive errors in both science, and wholesome scientific development. The exclusion of women from science means losing the potential that todays world, European and Slovenian science simply can no longer afford.
More inclusive and egalitarian research communities are more decisive as regards the demand that scientific authorities respect and support individuals and their substantive scientific contributions and cognitive competencies irrespective of gender, status, ethnicity and political and ideological beliefs etc.
While analysing systemic/structural, epistemic and methodological problems in actual mainstream considerations of the status and opportunities of women in science, we are actually asking and examining where the obstacles are that do not allow women to participate fully in the work of scientific communities. With such questioning of gender equality in science, we are tackling many blind spots in the established views on science. We are also asking how we should fight gender inequalities and discriminatory practices in science and we find out that this is indeed very difficult. Namely, fighting against prejudice in science is something entirely different than, for instance, in politics or economics. In science we encounter the belief that there is no bias or prejudice, only scientific theories developed by science itself.
As already indicated, special attention in the monograph is paid to analysing the impact of the current financial and economic crisis – in particular, the disproportionate austerity measures in the field of higher education and research activities – on the disproportionately larger share of women employed in precarious occupations.
Another accent in the context of critical analyses of the thus exposed circumstances of the options for women in science, especially those which are deconstructing mainstream EU strategies and categories, is placed on basic strategic concepts and arguments.
The present monograph is a revised edition of the book entitled *Women in Science, Women for Science: Perspectives of Women in Science in Slovenia and the Factors of Change*, published in 2013 by the Commission for Women in Science, an expert body within the Slovenian Ministry for Education, Science, and Sport, together with FDV Publishing at the Faculty of Social Sciences, University of Ljubljana. The revision was thorough, including complex changes to certain texts and the addition of some new data to illustrate the situation in EU member states in the others; besides, two contributions were removed from the contents, and another

one was added in the final part of the monograph ("History of Women and Science Policy in the EU and Slovenia"). Basically, and hopefully, the described changes have transformed the character of our work into an intellectual product worthy of attention at the EU level. There is another implication of our effort to go South, East, West and North to the EUs borders: we believe a critical stance should be one of the agents of change in EU scientific area strategies. Are we vain, pretentious and naive? No, we are simply intellectually and emotionally sick of science with regard to working opportunities being someone else's piece of cake: that is good for them, but the lack of working opportunities is not only poisoning us – different groups of women and certain other groups with a similar position in EU science – but also the world we are co-constructing.

The following abstracts are organised in a sequence reflecting a thematic grouping from another angle that is used in the book. In any case, the introductory study written by the first editor Mirjana Ule explains the meaning of the syntagm internal organisation of science. The author sees it as the testing apparatus for the ability of the authorities and scientific environments to engage in reflections on and the deconstruction of discriminatory practices based on the multiplicity of societal divisions and their intersections. The quantitative results of the survey research studies on the statuses and options of women in science point to a slippery terrain which is the basic platform for the realisation of our intellectual capacities and pedagogical talents. In this context, it is important to accentuate the unequal treatment of women scientists in evaluations of research project proposals, as has often been proven. Another important finding has been brought up by the Slovenian research carried out by the Commission for Women in Science on the working conditions in science and technology: only 7% of the women respondents believed they had not been discriminated against as regards the aforementioned perspective, yet 40% were sure that the discrimination in providing adequate working conditions is based on the gender division.

Quantitative indicators of the opportunities of the Slovenian women scientists in relation to EU comparable data on the women scientists in the EU are presented by Urška Arsenjuk and Polona Novak, while their co-author Mojca Urek softens the quantitative exposition with some qualitative (auto)biographical narratives. The series of quantitative results of the survey research studies are homogenous regarding the basic fact of gender discrimination, which is shown by the unequal representation of women towards the top of the career ladder, their lower income, the lack of affirmative attitudes or gender-biased opinions and assessments of women's work (also shown by the results of the gender-disaggregated survey of awards in Slovenian science), and by the ignorant attitude towards womens candidatures for positions of financial and administrative power in science. In the study gender is treated at the intersection with other social divisions, namely

those of age, professional rankings, scientific disciplines, and sectors. The added value of this analytical-interpretative contribution lies in the proposal for special measures as part of positive actions, and in descriptions of best practices.

While the previous two texts mostly consist of quantitative proof of the weak statuses and opportunities of women in science, the study by Mirjana Ule and Lev Kreft analyses the socio-cultural conditions of contemporary science. As their starting point, the two authors chose the notion of neoliberalism which they consider by comparing its similarities and differences with regard to classic liberalism. Neoliberalism is hereby regarded as a unique phenomenon in its global destructiveness in the name of capital and in the related terminal exhaustion of different resources. The idea of liberty has been substituted by the need for freedom, *i.e.* for free capacities to be exploited in the unscrupulous competitiveness in different markets. This is a hyper radicalisation of Marx and Engels interpretation that personal dignity has an exchange value of its own. Later on, the presented analysis problematises in depth the assessments of the research projects with quantitative indicators, and thematises the switch from patriarchal science to the managerial imperative in science. On the individual level, science has ceased to be a professional area where one hopes for stimulating working relations, but has, on the contrary, become utterly unconstructive and depressing. From the gender perspective, it is obvious that direct patriarchy has transformed into indirect patriarchy. The mentality of competitiveness which is a product of the traditional socialisation of men is perfectly adapted to the actual conditions and opportunities of scientific work.

The epistemology of science of the feminist provenance has produced a far-reaching turn, which has had a great impact on scientific knowledge. It was caused by feminist thinkers introduction of gender as a basic epistemic category related to the once undisputable cognitive totalities. The contribution of Valerija Vendramin explains the feminist epistemic subversion of some massively used and popular concepts and terms: she presents a critical reconceptualisation of scientific objectivity and arguments against the universal validity of scientific findings. Moreover, the author defines the concept of scientific research perspective which opposes the self-evident relevance of the scientific gaze; and, finally, she relates the feminist reflection on the situatedness of the scientific process to the meaning of the phrase scientific responsibility which is the ethical element of feminist epistemology. Inherent is the gap between the mainstream conceptualisation of scientific accountability as the momentum of science as a production, and scientific responsibility related to science which is basically a thinking process.

Another theoretical reflection, in this case joined with ethnography on women scientists, focuses on the mode of intersubjectivity of women in science problematic societal relations. Renata Šribar forms her line of argument and research approach according to some antagonistic categorical pairs: knowledge/ignorance, utterable/unutterable, speech/silence. The hypothesis on the schematic nature of these contradictions is argued via the responses to a semi-structured questionnaire addressed to a group of Slovenian and Italian women scientists. It is shown that the subversive power of speech can mostly be reached in its evidently performative dimension when the enunciator is a woman of a certain rank in science. It is the position of liminality and feminist excessive subjectivation which marks senior women scientists as the optional instance of radical change of the existing management of science.

Statistics arising from research carried out by Slovenian women physicists, and the results of the research, which was carried out within the framework of the Commission for Women in Science, are presented in the chapter by Maja Remškar. She considers the situation of women scientists in general, and specifically in the natural sciences and technology. She convincingly demonstrates that, despite the modern belief in the contemporary privileges of the STEM field, women of science there are no better off; on the contrary, because of the special working conditions and discriminatory traditional notions of what is a women's work area their working conditions and options are even worse. The subjective yet cognitively legitimate autobiographical starting point integrates the private, non-scientific view of the socio-historical and socio-cultural causes of discrimination of women in science, and thereby some proposed specific solutions are added.

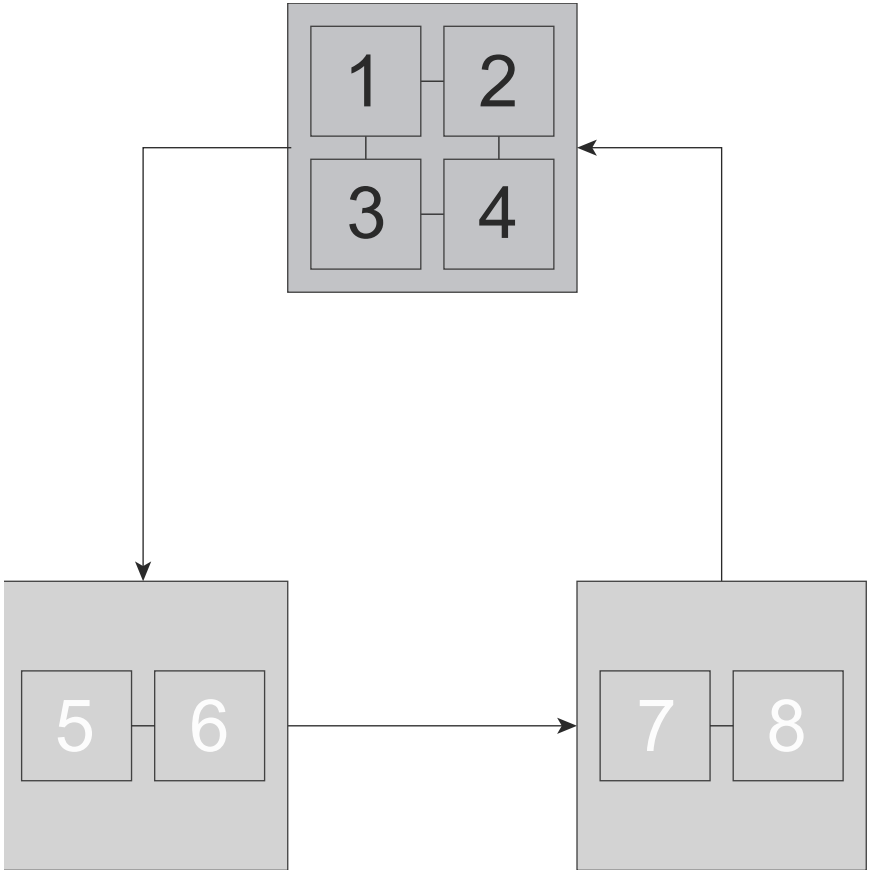
Nadja Furlan in a critical-analytical inquiry into Christianity from the aspect of religious feminism (Christian feminist theology) defines constructivism according to gender and illustrates with examples from the Bible the integration of the Christian religious positionings of women and the gendering of women in patriarchy. (Here the latter has the meaning of the pervading societal system based on the fundamental division by gender and is not related to capitalism). At the same time, she highlights the impact of religion on other public areas, and its specific forms of oppression of women, which also lead to various paradoxes such as the glorification of women's roles and simultaneous derecognition of their wider significance, and even the denial of any value of women. The author emphasises the phenomenon of women's passivity (as implied by the negation of their speech and voice). The echo of such a Christian, and specifically Catholic formation of women is felt today in the differentiated and hierarchical perception of (gendered) voice. The authors contribution has to be read in the context of the declared Christian cultural tradition of the EU, which is

obviously reflected in science as one of the ideological sources of gender bias. As a counterpart to the reflection on Christianity and gender there is a short factual contribution by Andrea Umek Venturini on the "Women and Science policy in the EU and Slovenia". It implicitely shows the impact of the women's emancipation movements, and the implementation of some basic concepts from the history and contemporaneity of the feminist theoretical thought. This stocktaking contribution on the past decades shows a long journey for women in science in EU and Slovenia.

The concluding part of the monograph with appendixes consists of a glossary of terms related to gender equality and feminist theories, with some accents on the relation between women and science. As indicated by the title, it includes both EU mainstream concepts and syntagms, as well as the basic conceptual apparatus embedded in different contemporary courses of gender studies, the sociology of genders, queer studies, and feminist theory/epistemology. Some critical comments accompanying the "gender mainstreaming" terminology remind us that the strategic discourse of EU authorities and those in respective countries select, ignore or transform the knowledge and scientific thesis and arguments which sidestep the ideologies behind "scientific excellence", "female scientists" and the "sex"/gender dichotomy. Finally, there is a Manifesto which articulates the fundamental demands of women scientists in Slovenia and is addressed to Slovenian governmental establishments and bodies. While it is nationally specific, it may have a comparative value for estimating the state of affairs in other countries. This might also be a function of the monograph as a whole.

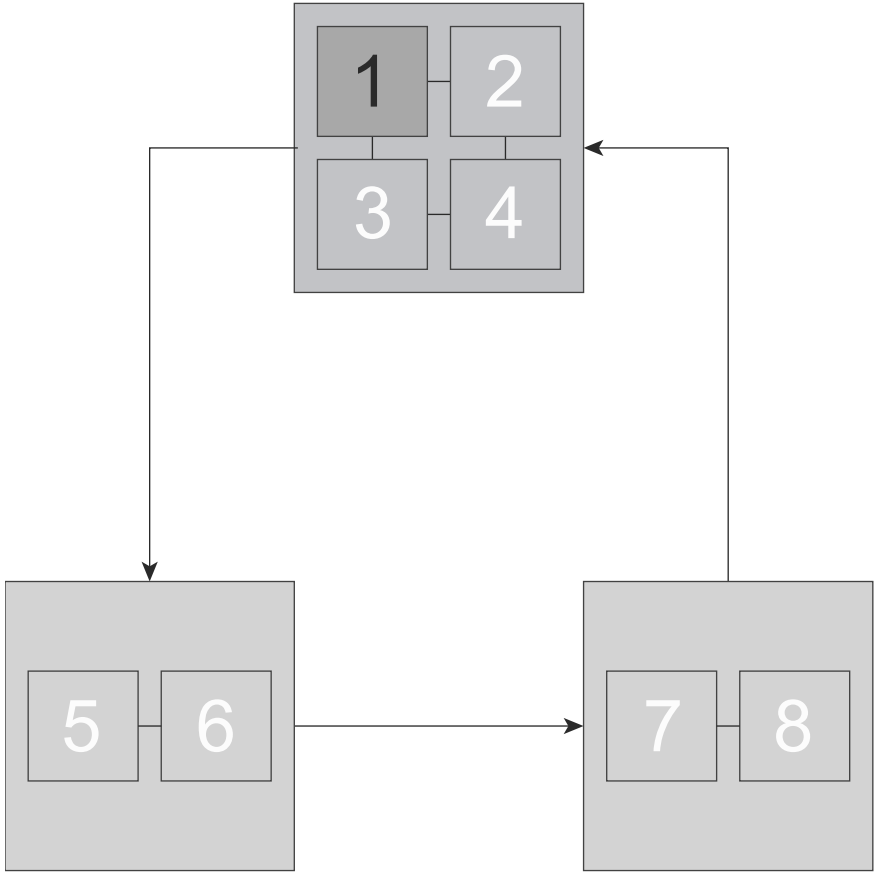
Mirjana Ule | Renata Šribar | Andreja Umek Venturini

Part I
From Evidences to Transparencies of Construing Science



1 Gender Inequalities in Science

Mirjana Ule



Introduction

Are men and women scientists allowed to have children? This issue was one of the questions dealt with by participants of the Euroscience Open Forum in Stockholm in 2004. The answer obtained from the empirical questions posed to them was: "Men scientists 'yes', without hesitations and without risk to their own careers: women scientists, in principle also 'yes', but with a high risk for their career and especially at their own risk" (OECD, 2006).

Like all other areas of intellectual activity, science depends on historical circumstances, ideological beliefs and prevailing norms. Dominant discourses, valuations and perceptions related to gender differences in a certain society and culture influence scientific studies and scientific practice. Feminist analysis of scientific discourses and practices helps to understand why women have not participated fully in the work of the scientific community and why, even today, they feel unwelcome in many places (Longino, 2001). The same analysis has also identified and articulated the reasons that it is useful for science if more people and more different perspectives are involved in the scientific community. It turns out that scientific research becomes more objective when unquestioned prejudices and biased evaluations are put in the spotlight. The same is true for the covert political and economic pressures on scientists.

Women and men scientists are engaged participants in research. Like artists, they use reason and intuition. The fact that scientific knowledge is 'socially embedded' within certain contexts has to be subjected to intellectual reflection and critique, which both increase the scientific objectivity and empirical adequacy. The purpose of this chapter, and all the others, is precisely that: to subject the dominant relations in science in Slovenia to reflection and critique.

The Importance of the Internal Democratisation of Science for the Development of Science and Social Justice in Society

Since most of the best students are women, I do not know about what discrimination we are talking about. We have no problems between the two genders, but it is true that women are a minority in the academic environment (A statement by a participant in a survey on working conditions in science in 2011).

The creation of conditions for gender equality in scientific work is a key component of the internal democratisation of science. In particular, feminist authors point out that scientific communities and institutions must develop their own internal democracy in order to be able to maintain their mission and

contribute to greater social justice in society (Potter, 2006; Anderson, 2010).[1] It is peculiar that the issue of equal conditions and opportunities for both genders in science only began to be more seriously questioned in recent decades, even though science, at least since the Enlightenment onwards, has represented one of the main drivers of emancipatory movements of humanity.

The Enlightenment rightly exposed the significance of the independent and bias-free use of reason in all areas of life, especially in science. 'Natural reason' should be without racial, religious, social or gender prejudices. However, the Enlighteners were burdened by many of their own prejudices. One of them was the belief that women are incapable of or much less able to apply reason. This belief has quietly and imperceptibly fused with the methodological practices and expectations of 'good' science that dominate the scientific community even today. It is a fissure between beliefs in the bias-free use of natural reason and the actual prejudices that lead us in the management of science (Giere, 1998). It is precisely the prejudices about gender that are firmly entrenched.

By questioning gender equality in science, we are reaching deeper than simply into the organisation of scientific and research activities, scientific and academic institutions. We begin to tackle many blind spots in the established views on science. One of them is ignoring the social context of scientific research as well as the teaching and application of science, thus creating the impression of a research subject who autonomously and without any a priori bias tackles the subject of their research. In doing so, they follow only what is posed by the research problem, and not some other interests.

Another blind spot significantly affecting the unequal position of women in science is the assumption that the scientific view contains a tendency for scientific objectivity. Objectivity should be manifested in a sharp dichotomy between the subject and the object of research, in emotional- and value-neutrality of research and the possibility of controlling and managing research objects. Scientific objectivity understood in this way should prevent bias, ideological bondage and any particular (non-scientific) interests of scientists (Anderson, 2010). However, when scientists are trying to perfect value-neutrality, they prevent themselves from recognising the ways in which the various ideological perceptions have covertly influenced their research (Longino, 2001). With such a comprehension of objectivity, we exclude any other views on science, discourage marginalised groups from participating in scientific research and take away their scientific authority (Anderson, 2010).

1 These are guidelines and contradictory discourse to the majority discourse in the current management of science (for more on this, see the chapter Kreft, Ule: The critique of neoliberal scientific excellence).

Theorists of science have found that different social interests often significantly affect the management of science and scientific practice, but this influence is rarely direct (Longino, 2001; Potter, 2006). Social interests create a social climate in which certain procedures and practices are taken for granted and at least temporarily protected against criticism. The expert public had for a long time understood the organisation of scientific work as a completed process of a cognitive emancipation of people from different biases, especially a lack of knowledge, where there are no elements and relations of the 'outside' society, such as national, religious, racial, gender and other inequalities.

The inclusion of women and other members of marginalised groups in the scientific community and work is a cognitive benefit for science and not merely a sign of greater social justice. More inclusive and egalitarian research communities are cognitively more successful and more open to different interpretations and evaluations. Scientific knowledge is more objective if the scientific community grants scientific authority to individual women and men with regard to their substantive scientific contributions and cognitive competencies irrespective of gender, status, ethnicity and political and ideological beliefs etc.

Key barriers preventing the more even participation of women in science identified by the analysis of scientific policies are, on a personal level, gender stereotypes regarding occupations that are 'appropriate' or 'inappropriate' for women, and prejudices about lower women's cognitive abilities. On the institutional level, significant barriers are science policies and organisational factors in scientific institutions, such as: an unfavourable hierarchy in science and the practices of recruitment and promotion to scientific titles and jobs, the criteria for the selection and distribution of research funds, the social climate in scientific environments, gender-biased evaluation methods of research achievements and projects, for example, a greater emphasis on scientific results than on teaching, biased evaluation criteria of scientific excellence and research performance (OECD, 2006).

Social interests, especially the interests of the holders of economic and political power, are also often an invisible assumption of scientific work. On a broader societal level, an important barrier is the conditions in which women or members of other marginalised groups feel more or less encouraged to become involved in science and pursue scientific careers or to participate in committees that decide on promotion to titles, the division of research funds, granting of awards and honours etc. (OECD, 2006).

The discrimination of women is usually not isolated. It is associated with other forms of discrimination and is a sort of a 'litmus test' that shows how much the management of science is (non)discriminatory. In the management of science, we have to distinguish between discrimination, which has a foothold in the

material basis, for example, in the more difficult conditions of employment, or in precarious forms of employment for a fixed period, and covert forms of discrimination such as the biased criteria for advancement to academic titles or biased evaluation or peer-review procedures. The first form of discrimination is often dealt with in the context of laws on equal employment opportunities, and is easier to recognise and fight against it. On the other hand, the second form of discrimination often takes away from women the courage to insist on the scientific work and is hard to resist. It is much more difficult to identify and demonstrate it and often includes a complex interaction between the various prejudices (OECD, 2006).

Characteristics of the Career Promotion of Women in Science in the EU and Slovenia

After a decade of actively eliminating identifiable barriers to the promotion of women in science in the EU, statistical data show that significant progress has been made in achieving equal opportunities in access to higher education. In the EU member states, 60% of all graduates are women. The significant increase in women at all levels of education in the last 20 years in both the EU and Slovenia is also visible at the level of doctoral studies. In the EU in 2010, 46% of new doctors of science (PhDs) were women, the same in Slovenia. Even more, in nine EU member states the share of women among new PhDs exceeds 50%, in Portugal, for example, the share is 62%. Everywhere in the EU, the rise in female PhDs is the lowest in engineering and the highest in the social and medical sciences (European Commission, 2013).

TABLE 1.1 **Share of women PhDs in scientific disciplines in the EU and Slovenia in 2010**

	Education	Humanities	Social sciences, economics, law	Natural sciences	Engineering	Agronomics, veterinary science	Medicine
EU-27	64%	54%	49%	40%	26%	52%	56%
SLO	82%	68%	47%	50%	15%	65%	47%

Source: European Commission, 2013

Further statistical analyses of career promotion in science by gender reveal significant gender segregation at the EU level as well as in Slovenia (European Commission, 2013). Gender segregation means that women and men are differently represented in different sectors and activities. Horizontal segregation

means the underrepresentation of women in certain fields of science and occupational categories and the concentration of women in other fields. Vertical segregation means the underrepresentation of women in top scientific positions (better paid positions, senior and managerial positions, stable careers).

TABLE 1.2 **Share of men and women in typical academic careers in the EU in 2002 and 2010**

		Graduates	Doctors	Assistant professors	Associate professors	Full professors
2002	Men	42%	59%	60%	68%	85%
	Women	58%	41%	40%	32%	15%
2010	Men	41%	54%	56%	63%	80%
	Women	59%	46%	44%	37%	20%

Source: European Commission, 2013

Although the above table shows an increase in the share of women in academic careers in the last ten years, this improvement is weak and slow, and cannot hide the fact that in the absence of proactive policies decades will be needed to achieve a better gender structure at all levels of vertical mobility in science. This is evident, for example, in the case of biotechnology. The share of female PhDs in the field of biotechnology is already 50%, but the share of female full professors remains at 7%. A ten-year comparison shows the persistence of a hierarchical gender gap in senior career positions, in the positions of associate and full professors. In academic institutions in Slovenia there are 51% of female assistants, 46% of assistant professors, and only 31% of associate professors, while the share of female full professors is just 20% (European Commission, 2013).

While women have made significant progress in participation in pedagogical and scientific-research work, this progress has been much slower in career promotion in science (Mladenić, 2007). Data for both the EU and Slovenia reveal meaningful facts about the share of full professors in specific fields of science. Although the share of female graduates in the humanities and social sciences is high, this is not reflected in the share of female full professors. In the humanities, there are only 28.7%, and in the social sciences 18.8%. Also very telling is the extremely low share of female full professors in the natural sciences in Slovenia. Although the share of female PhDs in the natural sciences has already reached 50%, the proportion of female full professors in the last decade is only 7.5% (European Commission, 2013). In the natural sciences, therefore, vertical segregation is very strong.

The Glass Ceiling Index (GCI) synthetically illustrates the difficulties faced by women in achieving the highest hierarchical positions (European Commission,

2012). The GCI measures the relative opportunities of women in comparison with men to reach the highest positions. It compares the share of women in position A (full professors) in relation to all employed women in academia. It therefore indicates women's opportunities to climb up the hierarchy. When the index equals 1, that means there are no differences in vertical mobility opportunities in the academic sphere between men and women. When the GCI is below 1, that means women are overrepresented among full professors and, when the GCI is higher than 1, that shows the effect of the 'glass ceiling', meaning that women are underrepresented in the highest positions. Thus, the higher the index (above 1), the greater is the effect of the glass ceiling and the more difficult is women's transition to higher positions. In 2010, in no country was the index equal to or lower than 1. The average index in the EU was 1.8 in 2010, while in Slovenia it was slightly higher at 1.9. The index was the lowest in Norway, Sweden and Iceland (European Commission, 2012).

The problem of vertical segregation is that the underrepresentation of women in the highest positions (among full professors) hinders the possibility of women to reach the highest managerial positions, namely, the decision-making positions. The small share of women in positions of power and decision-making along with the predominance of men in these positions lead to bias in the decision-making on and management of science policy, in the selection of research subjects and creation of rules and criteria (for promotion etc.).

Young women in academia have no female role models with whom they can identify themselves or to support them in their career promotion. The underrepresentation of women in the highest positions in the scientific sphere is therefore a barrier for the entry of women to scientific careers. This is called the 'discriminatory snowball effect' (European Commission, 2012). That the discriminatory snowball effect has far-reaching effects is shown by the data on the share of women in leading positions in academic institutions in 2010 in the EU. In Slovenia, there was just 8% of female heads of academic institutions (female rectors or deans, directors of research institutions). The situation was not much better in the other EU countries. In Denmark, for example, their share was also 8%, in Germany and Italy only 7%, in France 13%, in Austria 19%, in Norway 25%, and only Sweden had 43% of women in the leading positions in academic institutions. The situation was similar for scientific boards and managing committees. At the EU level, the presence of women on scientific boards and managing committees was 36%, while in Slovenia only 23%. Most women on scientific boards and managing committees were seen in Sweden, 49%, in Norway there were 46%, in Finland 45%, and in Iceland 40% (European Commission, 2012).

The 'glass ceiling' metaphor that is used in expert and scientific literature to denote a vertical segregation refers to the presence of visible or invisible barriers

that limit the presence of women in the highest career positions (Kanjuo Mrčela, 2000). This phenomenon is complementary to the phenomenon of the *'sticky floor'*, which describes the constraints keeping women in the lower positions of organisational pyramids. The 'sticky floor' phenomenon in the scientific hierarchy in Slovenia appears, for example, in the transition from the status of assistant professors to the status of associate and full professors. We have no other argument than to attribute this difference to covert forms of discrimination, where the criteria for promotion are more in favour of men, leaving women 'stuck' in the lower positions. Further, there is probably no need to mention that career criteria take into account the traditional female roles (greater responsibility for children, housework, caring for parents etc.).

The third metaphor is that of a *'leaky pipeline'*. It illustrates the steady and above-average 'leaking' of quality female minds in the process of study and scientific qualification in certain fields and levels of study, research and professional work (Blickenstaff, 2005). This leaking already begins at the end of upper secondary school when young people choose to study and girls are often discouraged from studying natural science and technology, and later during studies, also in postgraduate and post-doctoral studies and continues during the creation of an academic or research career.

What Do Women and Men Scientists Think about the Inequalities in Science in Slovenia?

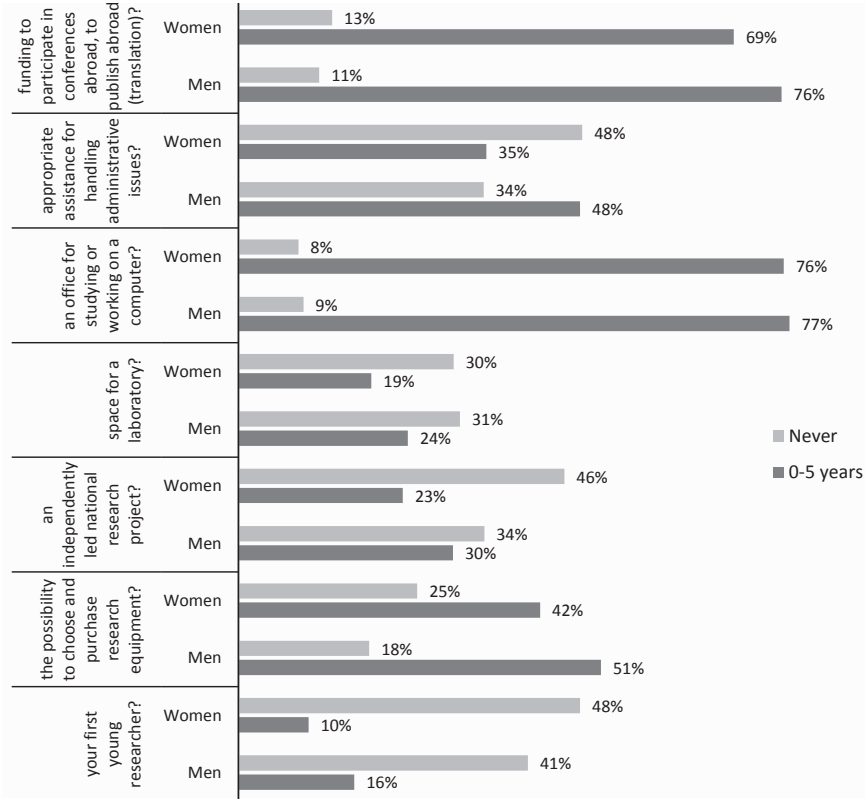
In order to review the situation of the scientific culture in Slovenian academic environments and the barriers to the promotion of women in scientific research work, the Commission for Women in Science at the Ministry of Education, Science and Sport of the Republic of Slovenia carried out research on the differences in working conditions in science in Slovenia. The research was conducted by using a survey questionnaire which was sent by e-mail to 4,551 doctors of science. Contact details were obtained from the SICRIS (Slovenian Current Research Information System) database. The survey was partially or fully answered by 1,100 respondents. Among the respondents there was 43% of male and 57% female doctors of science.[2] Analysis of the representation of scientific disciplines showed that all scientific disciplines were represented in the survey and also that the gender structure according to the scientific disciplines was adequately represented (Ule *et al.,* 2011). In this research, we mainly focused on the working conditions for

2 The survey was carried out by a research group of Mirjana Ule, Nejc Berzelak and Andreja Živoder at the Centre for Social Psychology at the Faculty of Social Sciences. Period of the empirical fieldwork: 17. January – 1. February 2011.

scientific work, the management and governance of scientific careers, and the barriers and discriminatory mechanisms in creating careers in science.

Scientific and working careers in general became important when education and personal motivation were no longer sufficient for the planning of one's career and when the planning and managing of scientific careers became more dependent on external factors like structural opportunities and institutional arrangements than on personal motivation. The dependence of a scientific career on random factors, such as the goodwill of the respective political authorities and the changing criteria of scientific performance, makes a career in science very uncertain, and scientists more dependent on the respective scientific policy interventions (Fink Hafner, 2009). This career is even more uncertain for those groups who, despite personal motivation for scientific work, do not have privileged access to intellectual capital.

FIGURE 1.1 **How many years after your PhD did you receive…**



Source: Commission for Women in Science, 2011. Differences in working conditions in Slovenia.

Figure 1.1 shows how the careers of doctors of science included in the research have been developing; when they got the first young researcher and how many, what are their chances for purchasing the research equipment, for independent leading of the national project, what kind of work spaces they have, what kind of administrative help they get, how much funds do they have for international cooperation, etc. The graph shows the shares of those respondents, who have received the above mentioned in the first five years of their work, and the shares of those, who so far have not received anything of the above.

What stands out is the fact that 34% of men and 45% of women have not yet received an independently led national project (Pr = 0.006). Also meaningful is the finding that 34% of men and 48% women have no help in handling administrative issues (Pr = 0.004). In both cases, the gender differences are statistically significant; female scientists have less help and fewer projects.

The responses to an open survey question concerning the proposals the respondents have to improve the working conditions are similar – answers relating to the burden of administrative issues stand out, such as:

- *A reduction of the routine, namely non-scientific work in the workplace that already now exceeds the paid working time would mean that I would not be forced to do scientific work only in my free time.*
- *A reduction of administrative burdens, better organised, stable conditionsfor both pedagogical and research work (e.g., appropriate funding for quality work, stable employment conditions, stable conditions in tenders for research projects).*
- *I am not satisfied with the fact that I am burdened by tremendous administrative work, that I receive applications for projects (including nonconceptual parts) and that I spend a lot of my free-time (whatever that means - more than 8 hours per day) studying and writing.*
- *I wish to be provided with the basic technical and spatial conditions (e.g. a computer, an office), smaller burden of operational and administrative work.*
- *Due to the funding system we are forced to work on many small projects at the same time. The result cannot be such as to provide a certain concrete, tangible added value.*

In response to the question of whether *they completed their post-doctoral study abroad and why not*, 25% of female doctors replied that they could not attend the post-doctoral training abroad for family reasons, *while* only 8% of male doctors stated the same reason (Pr = 0.000). The reasons given especially by women:

- *Several reasons: health, family, home obligations.*
- *Immediately after the PhD I took on responsible work at the Institute, in addition, I had two small children who were born while earning the master's degree and doctorate.*
- *I am the mother of three children.*

- *I was devoting too little time to my small children when writing the doctoral thesis while working, so I did not want to continue depriving them of my time because they will grow up too soon.*
- *I had no opportunity because I was incessantly searching for or maintaining my work commitments, adapting to new contents and obligations in the workplace.*
- *After the PhD I relatively quickly got a job for a definite period in Slovenia, which at that moment was financially more secure for me.*
- *Following the PhD I had no possibilities – neither for employment nor to participate in a project or group.*
- *After the PhD I did not get a job at the Faculty and therefore neither a possibility for post-doctoral training.*
- *Finding a job for basic social security after receiving a doctorate of science in Slovenia.*

The answer to the question of why going abroad for women scientists is made more difficult by family reasons becomes more understandable if we look at the data about who mainly performs housework in the family.

TABLE 1.3 **Who mainly does the housework in your household?**

	Men	Women	Total
Myself	11.8%	42.9%	29.9%
Partner	23.8%	1.1%	10.6%
My partner and I share the housework equally	57.4%	43.6%	49.4%
Parents, relatives	2.0%	2.3%	2.2%
I live alone	2.5%	3.9%	3.3%
External assistance	0.7%	2.8%	2.0%
Someone else	2.0%	3.4%	2.8%

Source: Commission for Women in Science, 2011. Differences in working conditions in Slovenia.

Although up to 57% of male and 43% of female doctors state that they equally share the housework with their partner, also 43% of female doctors (just 12% of male doctors) perform the housework by themselves. It is also interesting that 24% of men and only 1% of women state that mainly their partner performs the housework. A negligible share of female and male doctors relies on external assistance in the household.

In addition to the family and household workload, responses about work that exceeds one's working time show that also in science women perform just as much or even more work than their statutory work obligations. In response to the question of whether they *are required to perform their scientific work beyond*