

# Appendix: Method

We here describe the three parts of the data material in the FRONT project at the Faculty of Mathematics and Natural Sciences in the University of Oslo: the questionnaire surveys, the action research and the interviews.

## Quantitative Studies: The Questionnaire Surveys

The FRONT project was originally planned as an exploration of initiatives with a limited emphasis on research. It soon became clear, however, that more research on conditions at the faculty was needed. Consequently, the research part of the project was expanded to include two questionnaire surveys. The two surveys consisted of a detailed questionnaire (18 pages, 190 variables,  $N = 843$ ) sent to all employees of the faculty (including PhD students), and a shorter questionnaire sent to a sample of master students ( $N = 213$ ), making a total of 1056 respondents. The project was thus based on a broad combination of methods, including both quantitative and qualitative types of data, as described below. This expansion not only provided a better basis for knowledge, it also became important for the initiatives, since the results were reported back and discussed among employees and management at the faculty in the latter part of the project period, which resulted in greater interest and involvement.

The *employee survey* included questions on career development, experiences from the PhD period, support from supervisors, collaboration with colleagues, ambitions and motivation, publishing, promotion, bullying/harassment, unwanted sexual and racist attention, and evaluation of the culture in the department/unit. It also contained questions on one's interest in the natural sciences from a young age, and on the households of married and cohabiting couples, including which of the

partners' careers had priority. It was designed to delineate the employees' experiences and challenges throughout their careers.

The questionnaire form was developed based on a combination of recent international studies of gender differences in academia (particularly the European Asset and Integer studies: Aldercotte et al., 2016; Drew, 2013), and recent research on gender and equality in Norway (Holter et al., 2009), in Europe (Scambor et al., 2013, 2014) including Poland (Warat et al., 2017), and internationally (Barker et al., 2011). The questions on career, work environment and culture were gender neutral. We were thus able to map the effect of various types of social inequality (background variables), including ethnicity and social class (see Chapter 6).

The *student survey* included questions on the students' attitudes to gender equality, and their experiences of gender balance in their learning environment. The survey was based partly on a previous UiO study of students' learning outcomes (Thun & Holter, 2013), and also included questions on the culture of "gender marking" disciplines (whether programmes or subjects are perceived to be "feminine" or "masculine"). Given that the situation is different for students and employees, the questions in the two surveys differ.

Altogether, the two surveys provide greater breadth and depth of detail in the data material than what has prevailed in studies of academic careers. For example, questions regarding gender balance are connected with work environment, academic culture, gender equality, and other dimensions of social inequality. The surveys cover a total of 269 variables (190 in the employee survey, and 79 in the student survey). This breadth enabled cross-sectional analyses, as well as providing greater detail and depth in many areas, resulting in new information and findings not previously known.

Questions were formulated through collaboration in the FRONT team, the project's resource group, and with the faculty leadership. We wish to emphasize that a shared, open and curious approach characterized this collaboration. The attitude has been to put all facts on the table regardless of whether the problems were big or small. In other words, the researchers on the team were not inhibited because of critical questions and analyses.

The market research firm Ipsos conducted the employee survey in collaboration with FRONT from March to May 2018. The questionnaire, developed and delivered by FRONT, was designed as an online survey to which employees were encouraged to respond through faculty emails, among other things. The survey was sent to academic employees from the PhD level upwards (both temporary and permanent employees), as well as to administrative/technical employees. FRONT also conducted a limited study of former employees at the faculty by sending out the employee survey to 100 persons who completed their PhD at the faculty between 2010 and 2016, but were no longer employed there in 2018. The online version of the form was filtered according to position category, so that the academic employees answered the entire form, including academic career development, whereas the administrative employees answered only part of the form.<sup>1</sup>

The student questionnaire was distributed in paper format to master's students in randomly selected lectures and reading halls in late autumn 2017. The students were studying computer science, biology or physics. Computer science made up the largest group. The response rate among the students was approximately 95 per cent ( $N = 213$ ). Women constituted 44 per cent of the sample, men 55 per cent, and others 1 per cent. The majority were between 22 and 25 years old. Those with Norwegian nationality made up 73 per cent, whereas 27 per cent had a different nationality.

Both the student and the employee surveys motivated many respondents to make comments, which was an option at the end of the form. The comments consist of both praise and criticism of the working and learning environment. There is some skepticism to the surveys, mostly from men, but this is sporadic, and not common in the comments.

The employee questionnaire was answered by 843 people (485 men and 358 women), of whom 705 are currently employed, and 138 are former faculty employees. The latter group consisted primarily of former PhD fellows, in addition to some who had recently retired. It is difficult to state the exact response rate for each position category, as we do not know how many actually received the questionnaire form, and many, particularly on the recruitment level, changed positions around the time when the form was distributed. However, we can obtain a relatively realistic picture

by looking at the number of responses in various position categories and comparing them with data on employees from the Database for Statistics on Higher Education (DBH). As expected, PhD fellows had the lowest response rate, with just over 30 per cent. With little experience in academia, it can be difficult to answer, and in addition, turnover in this group is high. Among the other groups of full-time employees, the response rate was relatively even, from just over 40 per cent for postdoctoral fellows and associate professors, to roughly 45 per cent for full professors, and up to almost 50 per cent for researchers and technical/administrative employees. Given that the questionnaire was extensive, this represents, as far as we are able to judge, a satisfactory response rate compared to similar surveys. The form was formulated only in English (not Norwegian), which may have slightly reduced the response rate. As mentioned, the response rate among students was very high (95 per cent), but this survey was smaller (fewer questions and a smaller sample, 213 students). Moreover, the sample was somewhat random and consisted only of students who had shown up for classes in three essential natural science disciplines (computer technology, biology and physics), or were present in reading halls during the period when the survey was carried out.

As mentioned, the surveys include 1056 respondents in total. An analysis of dropout from the employee survey shows that men responded slightly less often than women (roughly in line with other similar surveys), and that the PhD fellows responded less often than the rest – but apart from this, the survey is relatively representative of the faculty. Typical reasons for not answering were “too little time”, “the form was too long” and the like. One can also imagine that “association to employer” (Ipsos distributed the form, but the faculty leadership sent out a reminder) and “aversion to issues concerning gender and gender equality” also contributed to a lower response rate. However, we do not find any clear indications of this. Nor do we see any clear signs of skewed selection (dropout or skewed distribution) on questions relating to gender equality. The response rate is slightly higher among women than men, which is common for this type of survey.

Data analysis was carried out by the FRONT team (primarily Holter), partly in collaboration with Åsmund Ukkelberg from Ipsos, in order to identify the material’s main patterns. The collaborative method included

a combination of paired and multivariable analysis techniques. The analyses were mainly explorative, focusing on mapping statistical associations, rather than hypothesis testing.<sup>2</sup> However, the data allow sketches and models of possible causal factors, intermediate, and effect factors. This is described in more detail in Chapter 4 on publishing and Chapter 6 on intersectionality. Analyses also included more detailed techniques, such as cross-tabulations and partial correlations.

A chief goal of this work was to produce “robust” results across techniques, in other words associations that are clear and consistently statistically significant. The FRONT team led by Holter used mainly SPSS for the data analyses, in combination with Excel, Open Office Draw, and other programmes.

The next step was to remove spurious or self-evident associations, and test what we were left with, considering the impact of background variables, and other essential variables as they gradually emerged more clearly in the analyses – for example, experiencing academic devaluation and unwanted sexual attention.

The analyses showed a considerably larger gender gap in experiences than the early interviews in the FRONT project showed. “Statistics see what you do not see,” Arnaldo Frigessi claims (in Vogt, 2019). This rule struck a chord in our material. The faculty took part in a sort of X-ray examination in relation to gender balance and gender equality. The surveys provided a new and more critical picture than what we had expected from the first round of interviews. The results were more interesting than we, as researchers, had anticipated.

Figures from the questionnaire surveys in this book represent primarily only statistically significant gender differences with a few exceptions, in which the absence of gender difference is essential. This is commented on in the text, for instance in the figures in Chapter 5, in which variables that do *not* have a significant gender difference are included, because this is an important point in relation to the gender gap. The gap varies and includes only some of the variables. The fact that we find significant gender differences for roughly half to two-thirds of the environmental and cultural variables (depending somewhat on the measurement method) is nevertheless an important finding that applies to the material as a whole.

One methodological objection discussed in several chapters, based on discussions at the faculty, is that women are more critical than men in evaluating the work environment and academic culture, and that this affects our results. It should be emphasized here that nearly all the variables relating to work environment and culture were formulated in a gender-neutral manner. Although dropout may be somewhat conditioned by an interest in gender and gender equality questions, we see a relatively even response rate among different groups. It is also unclear why this should play a significant role in specifically gender-neutral questions about one's work situation. Moreover, we have clear indications that women are *not* more critical than men, for instance in relation to supervisors. This also applies to areas where, based on the objective situation, they could respond more critically than men (satisfaction with salary level). Our interview results indicate the same thing.

With all this in mind, we consider the hypothesis that “particularly critical women” have answered the employee survey to be unlikely, as well as the possibility that “particularly critical men” have dropped out. However, the project did not include a dropout study, with an analysis of those who chose not to answer the questionnaire.

There are important research challenges related to what our results tell us, and what they do not tell us. They say *something* about selection and dropout upwards in academia. Moreover the structural map (in part two of the book), and the development of initiatives (part three) are new. However we have only, to a small degree, included experiences from all the people who drop out from the career ladder. What have they experienced, why did they quit? This is a weakness that may be corrected by better dropout analyses (on different levels) in further research. “The losers” experience things that “the winners” do not see.

It is also clear that both the questionnaire surveys and the interviews may be improved – as is always the case in retrospect. Some variables clearly point to significant differential treatment, such as academic devaluation, unwanted sexual attention, and problems following care leave. These deserve more elaboration and more detailed investigation, in addition to more questions on gender equality. We have reason to believe that the inclusion of more such critical questions and a larger sample,

including dropouts, would sharpen – not dampen – the critical picture that our data provide.

We asked about place, but not time, in relation to important work environment issues, such as harassment. This is a weak point. We do not know for certain, then, how much reporting is characterized by experiences here and now (for example, on the current position level), compared with older or long-term experiences (current and previous position levels).<sup>3</sup> The surveys included many questions, and the questionnaire forms would have been far too long if we were to include sub-questions for each. A clearer follow-up of the most important ones, more “in-depth” both in details and as a process over time, therefore stands out as a topic for further research.

## Method Development in the Chapters

The chapters in the book’s first part are based primarily on the questionnaire surveys in combination with the interview material. Here, we discuss the main results, topic by topic, in relation to gender balance and gender equality. Methodological remarks are included in each chapter. The statistics are mainly bi- and trivariate analyses. The chapters in the latter half of the book’s first part include more multivariable methods and controls for other dimensions of social inequality.

In Chapter 4 “Who is Publishing What? How Gender Influences Publication”, we apply a multivariable analysis. If gender is included along with other variables in the analysis, particularly position level and the number of working hours spent on research, a separate gender factor becomes hardly visible. These are self-reported data, but as far as we can see, they are fairly realistically reported. Statistics indicate that the idea of women publishing less “because they are women” does not hold true.

Chapter 6 “Ethnicity, Racism and Intersectionality”, presents the most important ethnicity-related problems in the material, and compares these with issues related to gender and class. Here, we apply multivariable techniques in order to uncover *intersectionality*, defined as co-variation between different grounds of discrimination.<sup>4</sup> We analyze co-variation between gender, ethnicity and class. The analyses are based on statistical regression analysis and other techniques, as described in the chapter.

The chapters in part two of the book are focused primarily on model construction. The FRONT study's main results are summarized, discussed in relation to other research, and developed into models. Each model utilizes a somewhat dramatic metaphor, which may help their being remembered, and used, by researchers to understand the specific organization and academic culture.

Chapter 7 “The Bøygen Model: The Hypothesis of Accumulated Disadvantage”, elaborates on the empirical data presented in Chapter 5 “Experiences in Academia: A New Survey Study”. The hypothesis that obstacles and inner doubt are connected is verified and presented in a model.

Chapter 8 “The Janus Model: Why Women Experience Disadvantage”, distinguishes between legitimate gender differentiation and illegitimate gender stratification. Stratification takes over from differentiation, as a main tendency upwards on the career ladder. We also discuss more complex connections between these two elements. That gender stratification comes into play is shown empirically, for instance, in Chapter 3 “Sexual Harassment: Not an Isolated Problem”, and in Chapter 5 “Experiences in Academia: A New Survey Study”.

Chapter 9 “The Triview Model: Three Views of a Problem”, presents a model largely based on qualitative empirical evidence from the project (and supported by the surveys), particularly in terms of culture and informal communication.

The quantitative material from the questionnaire survey and the analyses uncovering gender-related patterns enlarged the picture significantly, in relation to early interviews and the qualitative material in the project. It provided an opportunity to develop the models described in the book's second part.

## **Qualitative Studies: Action Research and interviews**

As already mentioned, the FRONT project consisted of various measures to promote gender equality at the faculty, in addition to research. FRONT's strategy has been to combine the implementation



of measures with research, that is, to create initiatives that could be applied in practice, and at the same time generate new knowledge. The research following the initiatives was based on methodological elements from action research. In the introduction to part three of this book, we discuss action research in relation to the initiatives. In addition to methodological elements from action research (such as field diaries from 23 workshops), the research following the measures is based on interviews. Among a total of 93 interviews conducted by the project, 43 were carried out as part of action research. The remaining 50 interviews were conducted with various purposes and somewhat different methods.

In the next section, we start by describing the research following the measures before describing the rest of the interviews.

All the interviewees are anonymized. When quoting Aksel, Wenche, Tobias, etc. in the various chapters of the book, we use fictitious names.

## The Research Following the Measures

### **Chapter 10 “From Biology to Strategy: The Development of a Management Team”**

The initiative analyzed in this chapter was five seminar days for the faculty’s management team, on the topic of gender equality. The management team, a total of 14 people, consisted of the dean’s office and heads of the departments. The initiative started with a two-day seminar. Three months later, the group met again for one seminar day, and a further three months later, the initiative concluded with a two-day seminar.

The analysis in the chapter is based on qualitative material in the form of notes from the five seminar days, and ten individual interviews. During the seminars, the researchers took notes by hand, and when the day was over they reviewed their individual notes and wrote a joint field diary. Flip-over sheets and other material produced by the participants were collected and documented in the field diary.

One year after the seminar series ended, individual interviews with the ten participants who had been present at all seminars were conducted. The

semi-structured interviews lasted one to two hours and were recorded and transcribed.

The two researchers who followed the project played somewhat different roles. One of the researchers met, as the project's coordinator, the participants in connection with other project related activities. This researcher conducted the individual interviews and planned the initiative's activities. The other researcher was only involved in the actual implementation of the seminars.

The analysis itself began with an inductive approach to the material. All the material was reviewed several times to see whether it was possible to identify recurring themes and potential similarities and differences. The coding was based on the informants' own descriptions and concepts. In the next phase, the material was interpreted based on theory of sensemaking.<sup>5</sup> In the analysis, the management team's role was investigated. What can a management team do specifically in order to develop sustainable equality work in the organization, and how should the team develop to be able to do this?

### **Chapter 11 “From Resistance to Change? Processes for Change Within an Organization”**

The initiative analyzed in Chapter 11 is a seminar series for PhD supervisors. The purpose of the five-hour long seminars was to increase the participants' knowledge of gender imbalance in the organization, and to provide them with the opportunity to share experiences and reflections. Each seminar group consisted of 25–30 participants from some of the faculty's nine departments. All the seminars were arranged in the same way: check-in, theoretical input, case discussions in small groups, and a conclusion by the faculty leadership. All employees at the faculty with supervision responsibilities on master or PhD levels were invited to attend the twelve seminars.

The analysis in the chapter is primarily based on qualitative material in the form of notes from the twelve seminars. The qualitative material was collected through participant observation and is documented as a field diary. During the seminars, the researchers took notes by hand, and when the day was over, they reviewed their individual notes and wrote

a joint field diary. The FRONT project's coordinator contributed to all the seminars, and a research assistant was also involved in conducting several seminars.

In this chapter, two of the seminars are described as two scenes. The first scene is based on one of the first seminars, whereas the second scene is based on a seminar held 18 months later. The scenes are written according to a method (used in action research, among other things) which is intentionally subjective, even if it is based on analyses and discussions in the research group, and therefore does not represent the individual researcher alone. It is comparable to notes from fieldwork, a practice memo, or a diary entry. The researcher's encounter with the field is central. The method includes phenomenological analysis and is not an attempt to say anything "objectively" about what is occurring generally. It is limited to a few specific cases, as they were actually experienced without any kind of advance filter. The scenes thus illustrate various aspects of the change work. The participants are different and react differently. Some are skeptical to the FRONT initiatives, whereas others are more positive.

Here the analysis also began with an inductive approach to the material, where notes were reviewed several times to see if it was possible to identify recurring themes as well as potential similarities and differences. In the next phase, the material was interpreted based on a theory of resistance and change.<sup>6</sup>

### **Chapter 12 "From Exception to Norm: The Development of Resilience in a Network"**

The initiative analyzed in this chapter is an organized network of 18 female associate professors and full professors. The two-year long initiative was structured as a forum, in which the two researchers offered theoretical input on various topics chosen by the participants. Dialogue tools were used to shed light on the topics through a structured and effective exchange of experiences. In total, the network participants met on eight occasions. The initiative began with a two-day seminar followed by two all-day seminars and five half-day seminars. The project's coordinator participated in all the seminars, and designed and organized the

initiative. The other researcher contributed to the design and implementation of six of the seminars. During the seminars, the researchers took notes by hand, and when the day was over they reviewed their individual notes and wrote a joint field diary. However, the chapter is first and foremost based on interviews with the participants. All the participants were interviewed before commencement of the initiative. After one year, interviews were conducted with the 14 people who had actively participated in the programme's activities, and in connection with the last seminar a group interview was carried out. The first interview was conducted by the FRONT project's coordinator in collaboration with the project's postdoctoral fellow. The purpose of the semi-structured interviews was to investigate both the female researchers' situation at the faculty, and whether some common needs and wishes could be supported by means of organized measures from the faculty. The FRONT project's coordinator conducted the second interview. Here, the goal was to explore how the participants perceived the implemented initiative. The concluding group interview was conducted by the FRONT project's coordinator and the researcher who participated in the actual implementation of the seminars.

The analysis is characterized by an inductive approach to the material. All the material was reviewed several times to see if it was possible to identify recurring themes, and similarities as well as differences. The coding was based on the informants' own descriptions and concepts. In the next phase, the material was interpreted based on theories on organizations and gender, as well as resilience.<sup>7</sup>

## Other Interviews in the Project

### Ten Interviews Conducted as Expert Dialogues

As several of the project's initiatives were aimed at women from post-doctoral to professor levels, interviews with women on these position levels were also emphasized in the research following the initiatives. In mapping the situation at the faculty, we also conducted ten interviews with men in permanent academic positions, and with men and women on master and PhD levels. The interview method, which we referred to

as “expert dialogues”, was developed by the project during the spring of 2017. The sample and method were exploratory. The informants were contacted as experts in their fields, based on their experience, and invited to a one-hour open dialogue. Holter designed the dialogue form based on his experience as a working life researcher. The conversations began with a question about what they emphasized and experienced in their everyday working life – what is fine, what is not so fine. Then the question of what they think (and do) in relation to gender and gender balance was addressed. The conversations were conducted using a method largely allowing the interviewees to govern the dialogue based on what they are interested in, while at the same time addressing the main issues in the interview guide.<sup>8</sup> All the conversations were recorded and later transcribed. Initially, the agreed time for the dialogues was one hour. Several conversations lasted considerably longer, up to two hours, as the informants had much they wished to convey.

### **Nineteen Interviews as Part of the GENERA Project**

One part of the Horizon 2020 project GENERA involved an analysis of the organizational culture from a gender perspective in departments of physics in 18 European countries, through interviews with women and men in different position categories. The structured interviews were conducted based on an interview guide designed by GENERA’s research group. We participated in GENERA by conducting 10 interviews based on this interview guide. We also carried out another nine interviews at the Department of Physics at UiO using another method, “The Biographical Narrative Interview Method”, in order to obtain more material. All these interviews were carried out by a research assistant from the FRONT project. The interviews were conducted in English, recorded and transcribed.

### **Nine Interviews with Female Postdoctoral Fellows**

The nine interviews with female postdoctoral fellows at the departments of physics, biosciences and informatics were conducted by the FRONT project’s postdoctoral fellow. All the informants had participated in the FRONT project’s ten-day career programme for female postdoctoral

fellows. The semi-structured interviews lasted between one and one and a half hours and were recorded and transcribed.

### **Twelve Interviews in Advance of the FRONT Initiatives**

Prior to the implementation of the FRONT project's initiatives, we conducted interviews with the faculty's vice dean for research, two heads of departments, three postdoctoral fellows who had participated in a career development programme at the Department of Biosciences, and others who were working with research leader development at UiO in various ways. These interviews were conducted by the FRONT project's full-time employee and the project's postdoctoral fellow. The interviews were recorded, and some of them were transcribed. These interviews were not used for research purposes but were conducted to develop the implemented initiatives.

### **Material From FRONT<sub>2</sub>**

The work of the FRONT project has continued in a new project called FRONT<sub>2</sub> (Future Research and Organizational Development in Natural Sciences, Technology and Theology, 2019–2023). The material from FRONT<sub>2</sub> is currently being collected and is not yet fully analyzed, but it is part of the picture in terms of our interpretations and discussions, for example of men and masculinities in this book. The material includes both individual interviews and focus groups.

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## Notes

- 1 Ipsos developed the database and guaranteed anonymity in the material, which was submitted to FRONT (in the student survey, the questionnaire form was anonymous). The research team in FRONT worked with an anonymized version of the database delivered by Ipsos.
- 2 Mainly multivariable analyses with one “response variable” (statistics) or “dependent variable” (sociology). In sociology, the term “multivariate” is often used for multivariable analysis. See also Chapter 6.
- 3 New studies can, for example, provide better detailing of “long-term experience” compared to “fairly isolated experiences”, in the most important problem areas.
- 4 Meaning different types of social stratification, which *may* provide grounds of discrimination. We distinguish between legal discrimination and social stratification in the book and discuss this distinction in Chapter 6.
- 5 Sensemaking theory is described in Chapter 10.
- 6 Theory of resistance and change is described in Chapter 11.
- 7 For a description of the theories see Chapter 12.
- 8 For an early example of the development of interview methods in relation to men see Holter & Aarseth, 1993.