First

I have to explain my motive for writing this pamphlet. I am writing it for individuals who are planning to embark on a doctoral programme. Obviously, others may also read this, but it has been written for students who have started or want to start working on a PhD.

I have supervised 12 students who have all intended to take a PhD. As the students have been very different, I have supervised them in more or less 12 different ways. That being said, I have recognised some recurring elements that I would like to share with you. All the information you find here consists of well-intentioned advice and helpful hints. Luckily, there is no set recipe for taking a PhD. When you read this, however, you will realise that you are not the first to wonder about these matters, and perhaps you will manage to avoid some of the pitfalls my students and I have stumbled into previously.

Being a PhD student can be the most wonderful position at a university. You can focus all your intellectual capacity on one formidable task - your thesis. You will be given the time and opportunity to make a thorough analysis of your hypotheses without the bothersome deadlines and irritating interruptions that are likely to characterise the rest of your career. Your time as a PhD student can be splendid. Enjoy!

I have tried to gather some views on matters of interest to many researchers. I have written this partly to explain why we are all so weird, but also to prepare you for what to expect when you yourself graduate and become a researcher. In other words, I expect everyone who takes a PhD to become a researcher. That is, in fact, as fairly safe assumption in Norway. The odd bit of advice proffered here may therefore also be of interest to researchers in general.

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About doctorates and the run-up to them

Perhaps you wonder what a PhD actually is? Completing a PhD is like completing an apprenticeship in research. Just as carpenters must prove that they are able to build a house in order to become a master carpenter, researchers must submit a thesis to earn a PhD and thus merit the label ‘researcher’. Obviously, it is possible to build something without a craft certificate and to perform research without a PhD, but both qualifications define a standard for the work society has reason to expect these groups to be able to perform.

The most important part of a PhD is your thesis. It is a presentation of the results of the research you have performed during your doctoral studies. Without results, there would be no thesis and without a thesis, there would be no PhD.

Researchers used to work for a very long time, preferably all on their own, when writing their doctoral theses. That is no longer the case. Today’s students are supervised and they follow a regular pattern where the thesis is part of a plan. In addition, the students take ordinary university courses to expand their general knowledge base.

Although today’s students must attend courses and have a supervisor to support them, there is no doubt that a PhD student’s life revolves around his thesis. Theses can be written in a variety of different ways. They can be written as a contiguous text - a monograph - where one particular problem area is analysed at great length. This way of writing a thesis is fairly similar to a master’s thesis, but obviously, a PhD thesis must be more detailed and contain far more comprehensive material. The other extreme is to write scholarly articles on a topic and then put them together to make a thesis. The full range of alternatives between these two extremes is also allowed; i.e. you can write a few articles with a long contiguous text that introduces the articles and binds them together. Or you can write many articles accompanied by a brief introduction to the field.

Each of these pathways has proponents and arguments to support it. However, there is consensus that a PhD must contain new results and demonstrate the candidate’s ability to perform independent research and present his research results.

He or she?

It is a sad fact that the percentage of women in my particular field is extremely low. Accordingly, it is natural for me to refer to research fellows, supervisors and opponents as ‘he’. I realise this is not especially creative, but I feel it is better than ‘he/she’, and using ‘she’ alone is not appropriate in my field. I therefore hope that readers will indulge me and understand that I have no desire whatsoever to signal that this skewed distribution should continue.
Is a doctorate something for you?

In Norway, taking a PhD was traditionally the domain of the privileged few. This is changing. In most technical subjects and in the natural sciences, 10 to 20 per cent of those who take a master’s degree go on to take a PhD. By and large, this is probably because taking a PhD is now based on organised researcher training and because funding opportunities have improved considerably. Practically everyone who takes a PhD in Norway does so on a grant from a university or the Research Council of Norway. This means that PhD students have a full salary during their studies. Some feel the salary is not especially good, but compared with conditions for research fellows in other countries, Norwegian research fellows are very decently paid and have good working conditions.

If you are considering whether to embark on a doctoral programme, you must first and foremost decide what you would like to work with for the rest of your life. If you would like to perform research, for example:

- at a university,
- at a university college,
- at a research institute or
- in the research department of an enterprise,

you will almost certainly be required to have a PhD. Granted, it is still possible to do research at enterprises and institutes without a PhD, but the trend is clearly moving in the direction of requiring a PhD for tenured positions. Further, it appears that PhDs are assigned the most interesting projects. At universities and university colleges, a PhD has long been a requirement for tenure in academic posts.

It is also an advantage to have a PhD if you are interested in working with advanced development projects. These days there are also some positions available in the public administration where a doctorate is considered desirable but is not a formal requirement.

My advice is that if you want to earn a PhD and you want to work with research, you should give it a try. It bodes well if you enjoyed the research part of your master's thesis. First of all, though, you need to be genuinely interested in your subject and like to work long hours. You should not embark on a doctorate if you are not willing to move from your customary environment, or if you don’t have the energy to get an ordinary job.

Step by step

What does it take to earn a PhD? What are the most important steps? Let us assume that you have earned a master's degree and want to go further in the same field or a related field. Let us also assume that you embark on a standard three-year programme. Your first step is to acquire funding. You can do that by:

1. applying for a fellowship at a university,
2. applying for a grant for a Research Council project, or
3. applying for a personal research grant from the Research Council or similar institutions.

You can do this in consultation with a supervisor, or you can apply on your own and then find a supervisor afterwards. The difficulty of getting a grant will depend on your chosen field and how good your results were on your master's degree. I have the impression that those who are determined to succeed will eventually manage to obtain funding. This phase is not the most difficult. Once your funding is in order, unless you have very special requirements, it is not usually difficult to find a supervisor. In some disciplines, research fellows can largely define their own work. Naturally, you cannot count on finding a supervisor who is profoundly interested in precisely your particular field of interest. In such cases, it may be wise to draw up your proposal in collaboration with a potential supervisor to avoid investing a lot of energy in something that will never come to fruition.

Once you have acquired funding and a supervisor, the two of you must draw up a project plan together. Such a plan is a prerequisite for acceptance into a programme. It must set out your theoretical syllabus, and you will need to make a schedule for the work on your thesis. Anyone who has gone through this process knows that the plan for your thesis per se will change repeatedly as you progress. All the same, there is good reason to put a great deal of hard work into it. First, the plan will help give you some ideas about a direction for your thesis. Second, it will clarify your supervisor's expectations of you, and third, working with the plan can very naturally lead to conversations that can clarify the supervisory relationship per se. Be sure that you are satisfied with the plans being made, that you understand what they entail and that the tasks ahead of you look like fun. I would not recommend that you embark on a project that does not appeal to you. A PhD is so demanding that you have to like your topic if you are to succeed.
The first year of your studies may arguably be the most critical. If you can make good headway with your theoretical syllabus and your thesis, there is every reason to look forward to the next two years. During the first year, it is important to delve deeply into your chosen field of study, to establish good routines for contact with your supervisor, and to start addressing specific research-related issues. It may be a good idea to get most of the theory work out of the way so that you can focus on your thesis during your last two years.

Research will clearly be your main focus during the second year. Now you must have specific questions to work on and you should have a clear idea of what it will take to obtain results that merit publication. At the end of the second year, you should be able to submit an abstract to a conference and deliver a paper. To present a paper at a conference, you must submit an abstract. An abstract is a very concise summary of the results you are planning to present. The organisers will read through it and decide whether they feel you should be given an opportunity to deliver your paper.

The third year will focus on research and thesis writing. This applies whether you are writing a monograph or a collection of articles. At you move into your last period as a research fellow, you will have a lengthy consultation with your supervisor to take stock of where you stand, and to determine what is needed to get through the writing process unscathed and reach your goal on time. You should take the initiative for such a meeting and you should press hard to ensure that the requirements are as clear as possible. A year may seem like a long time, but it will pass very quickly as your fellowship period comes to an end. Accordingly, it is a good idea to plan to finish three months ahead of time, to give yourself some leeway as your deadline draws near. The final fine-honing of results and wording often takes time. It is the profoundly important that you be active during this phase. I have seen several students get into a panic as the deadline for submission approaches and they start to wonder whether their work is good enough. Obviously, you bear the ultimate responsibility for what you submit, so you will simply have to rely on your own judgment. Conversely, it should weigh heavily when your supervisor gives you the green light. He does not want a thumbs down from the panel either.

The presentation of your doctoral thesis consists of two segments:
1. a trial lecture, and
2. the defence of your thesis.

Both segments will be assessed by a panel consisting of three members, i.e. two opponents and an internal panellist. Your supervisor will not be a member of the panel, but he will often handle the administrative work of the panel and thereby be part of the whole process.

In the first part of the presentation, you will deliver a lecture on a topic for which you will be given a maximum of 14 days to prepare. The topic will not be in your own field. The goal of this is for you to show that you have gained broad insight into your subject and thus that you can investigate new issues and compile a list of problems and results in a field with which you were not previously familiar. There can be little doubt that this type of examination is highly relevant for the work situations candidates will be encountering later in their careers. Nonetheless, it is reasonable to say that no one fails this examination. At least I have never heard of anyone whose trial lecture was not approved, although naturally the quality can vary. I generally try to set relatively broad topics for the trial lectures, but this question is entirely up to the panel.

It is in part two of your presentation where the fun really begins. The defence starts with the candidate or the first opponent giving an introduction to the thesis. Traditionally, this introduction was given by the candidate, but new regulations state that it is the opponent who should begin. Yet this is a very difficult job to impose on an opponent, so it is common to adapt the situation and divide the work prudently between the opponent and the candidate. Personally, I think it is a good idea to let the opponent give a brief introduction to the field, then...
have the candidate introduce his own findings and put them into perspective in his chosen field.

After this introduction, the first opponent should interpose his comments and pose questions to the candidate. The first opponent will generally have 40-50 minutes available and then the second opponent will have 20-30 minutes. They divide the work beforehand to avoid overlapping.

The discussion between the opponents and the candidate is invariably very exciting. There are family, friends, colleagues and students present in the room. Everyone wishes the candidate well and is delighted if he scores some points on the opponents. Actually, it is rare for things to get heated in connection with these sessions, but they are nonetheless exciting because there is so much at stake for the candidate and supervisor. The opponents also want everything to go well for the candidate; they know he has been working hard on his topic for several years. However, that will by no means prevent them from jumping on everything from serious mistakes to trivial typos and inaccuracies.

When defending your thesis, it is important to remain calm no matter how hectic things get. It is never too late to correct mistakes. You should therefore admit it immediately if you have overlooked something or other. Of course, you are free to launch a counter-attack, but you should be relatively certain of winning before doing so.

If your thesis is a collection of articles, one or more of them may have co-authors. In such case, you must be prepared to respond to all questions related to the articles. You must not hide behind your co-authors, but take full responsibility for everything contained in the articles. It is important to be aware of this when writing an article so that, already then, you become so intimately acquainted with all parts of it that you can give a detailed defence of everything stated there. When presenting your thesis, you will make a poor impression if you constantly quote your supervisor as having said this or that, which you have accepted at face value. That will not project the impression that you are a researcher who is mature enough to earn a doctorate. In other words, stand by what you have written, but admit mistakes when you realise you have made them.

You have a great advantage in that you are unquestionably the one who knows your material best. An opponent is invariably a busy person. Even though he prepares thoroughly, you are the only one who knows absolutely all the details. You must take advantage of this.

When you have faced down the opponents and everyone congratulates you on your doctorate, you will experience a euphoria on a par with what you feel on other great occasions in your life. Speaking from my own experience, I was so convinced that it was my lucky day, that I stopped by a convenience store and bought three lottery tickets. Of course, that turned out to be a total waste!

What is research?

Research is figuring out something that no one else has figured out before. That is research in a nutshell. To perform research, you must therefore check diligently to see what has been done in your field previously. You will learn something about this by taking advanced courses and seminars. But that is far from sufficient. You will have to make a thorough search of the literature, and you will probably drive librarians crazy. You will be sending e-mails all over the place and learning to use every conceivable search engine on the Internet. You will have to surf the websites of the best research groups in the field and, finally, you must attend conferences to network with people. When defending your thesis, you must stare your opponent right in the eye and say that as far as you have been able to ascertain, your results are indeed completely new. If one of the opponents can whip out a reference from a well-known journal which, already in the title, reports that they have resolved your problem, then you are in deep trouble.

Part of research involves publishing your findings so that others are aware that you have actually solved a particular problem and that they can therefore move on to concentrating on other questions for investigation and thus base their further work on your findings.

I’m sure it feels exasperating to think that the whole process revolves around understanding something that no one has understood before you. That is something like setting a world record in the high jump. Everyone understands, of course, that it is increasingly difficult to set new records as the bar is raised higher and higher. While films from 50 years
 ago show athletes who obviously had a lot of room for improvement in terms of both equipment and technology, it is difficult to imagine that this can continue. One assumes there must be some sort of physical limit to how high a person can jump. Similarly, you can, of course wonder whether there is anything left to discover in certain disciplines. That very thought struck me full force the first time I visited the library at the Department of Physics at the University of Oslo. The library housed a tremendous number of journals that describe research results collected over several centuries. Can there really be more left to discover? Regrettably, my career in physics was limited to a single lecture in Physics 101. A list was handed out covering all the laboratory exercises in the course. That was enough to push me in the direction of more theoretical disciplines for the rest of my life. Yet physics is probably like all other disciplines; the more you understand, the more you understand that you don’t understand. Every article you write will give you ideas and raise enough questions for you to write at least three or four new articles. In other words, don’t worry about whether there is more left to learn. There will always be much more to do. Mankind’s quest for knowledge is infinite. Just accept it.

What does publishing involve?

Publishing involves making your results known to the rest of the world. The most common ways of doing this are to:

1. write an article in a journal,
2. write an article in a book,
3. write an article and put it on your own website or on a website used by researchers in your field,
4. present a paper at a conference,
5. make a ‘poster’,
6. write a book.

It is very important for research that results are made public as quickly and efficiently as possible. Further, it is important for individual researchers to get their results published. It is in the light of their publications that every researcher is evaluated in connection with job applications, promotions, funding for research projects, etc.

In some research communities, it is common to consider writing an article in a respected international journal as being more prestigious than alternatives 2-5. In other disciplines, on the other hand, there are very prestigious conferences at which it is extremely difficult to get a paper accepted. Accordingly, it is not entirely easy to make any general statement about what weighs heaviest in the world of academia. In your own field, your supervisor will no doubt be able to tell you more about the most prestigious channels.

At conferences, new results can be announced by delivering a paper or hanging up a poster. A poster is quite simply a large poster on which you announce your discoveries. The poster is hung up in a suitable place at the conference venue. In connection with conferences, books are often published in which speakers at the conference are each invited to write a chapter. Such books are called proceedings.

Writing a whole book on their results is something that few PhD students get to experience. However, the first PhD student I helped supervise did exactly that. Granted, it was more an overview over an entire field than a list of his own findings, but it was nevertheless a feat far out of the ordinary.

When you write an article and submit it to a journal, the editor of the journal forwards it to two or three experts (‘referees’) in the field. They read the article carefully and write a report to the editor. In the light of the reports, the editor decides whether your contribution merits being printed in his venerable journal. The very finest journals set very high standards indeed. Accordingly, they reject almost 80 per cent of the articles submitted, sending them back to their authors with the message that they are not suitable. Otherwise, the most common reaction is that the editor sends a message that if you make some corrections, as recommended in the comments made by the experts, there is hope. Thus you are given a second chance. It is important that you use it well and pay serious attention to what the experts have written. However, that absolutely does not mean that you should feel obligated to accept all their suggestions. You are completely free to say that you disagree and then argue your point of view to the editor. To get the article accepted, you should follow the recommendations made by the experts and the editor insofar as you feel they make sense. Since the editor is almost certainly a busy person, it is a good idea to write a detailed cover letter in which you list what has been done differently in the new version, what you have changed, which suggestions you have chosen to ignore and why you have chosen to ignore them.
Are the experts always right?

I think anyone who has published a number of articles has experienced that experts can make statements of varying quality. When working on my own doctorate, I had serious problems getting one of the articles published. I was very disappointed because, in my opinion, this article was clearly the most important in my thesis. I was certain that it would be accepted immediately. But that was not the case. One of the experts was very negative and had, in my opinion, completely misunderstood everything. We solved the problem by sending it to another journal where our luck was better. However, we learned enough from this incident to realise that it is not enough to have good results, you must also be able to express them so that readers can manage to place your contribution in a larger frame of reference.

The first article

Usually, you co-author your first article with your supervisor. Your supervisor will strive to teach you how to write a scholarly article. Together, you will set up a preliminary outline and discuss a great deal about what you have done and want to include in your article. It is often difficult to determine the degree of detail to be included, but your supervisor will have experience of this based on earlier articles.

Books have been written on how to write articles. Your supervisor will no doubt refer you to some of them and supplement that information with personal experience. The library can almost certainly also help you to find suitable literature on your topic.

There is, however, one aspect I would like to point out as being especially important. Articles are generally based on one or perhaps a few basic ideas. Obviously, they have to be developed and fleshed out over many pages. Your results and reasoning are often far more complicated than the idea from which they were generated. So even if your arguments get cumbersome and lengthy, be sure to put your idea across. It is the idea itself that is your most important contribution. You must first and foremost enable your readers to grasp your idea and understand how it might apply to one of their problems. You must not shy away from presenting a mundane example or two to put your idea across. That is no problem as long as it facilitates understanding. Naturally, your arguments must be watertight and not mundane, but far too many researchers fail to attach enough importance to helping their readers understand the essence or core of the idea that underlies their arguments.

At conferences

When you have collected enough data to make your debut as a presenter, you need to start searching for an appropriate conference. Naturally, you can attend a conference without delivering a paper, but most projects are organised so that at least the research fellows must deliver papers to qualify for travel funds.

In many ways, my first conference was a total disaster. It took place in Lisbon in 1986 and was entitled 'Finite element methods in water resources'. My master's degree supervisor sent me there and told me to present the results I had achieved with a view to fast solvers for linear systems of equations.

The day I was to leave, I was so nervous that I almost drove off the road on my way to the airport. The road was fairly wide, so I know my pulse must have been racing.

Once in Lisbon, this early bird managed to find the registration desk. A man approached, clearly with the intention of welcoming me. Apart from a brief visit to England at the age of 17, where I learned expressions that were clearly more appropriate for the football pitch and pubs than at conferences of my peers, I had never been outside the Nordic countries. I therefore squared my shoulders and extended my hand to shake his, inquiring "How do you do?" He had obviously learned his English from a different textbook than the one we used at my old high school, because he looked straight into my eyes and blinked in confusion. I reiterated the greeting that my teachers had meticulously pounded into my head. He continued to look confused, but had clearly decided that he didn't know how to play this game, so he responded "How are you?", then turned and made a rapid retreat.

Afterwards I realised that "How are you?" was the appropriate thing to say. It is not a query about the person's health, but rather a rhetorical question equivalent to "Hello". The appropriate response would have been "I'm fine. How are you?" Generally speaking, that is the relevant response even if you feel half dead and are not "fine" at all.

As you attend more conferences, you learn to vary these pat responses with phrases like "Nice to meet you" or something similar. Of course, you need not
genuinely be concerned; the phrase is merely a show of courtesy out of respect for the person you meet. And most people are thrilled to be remembered. You will do well to have a phrase such as "Hello, Miss Lewinsky. Nice to see you again." Beware though - you should know the person extremely well if you are planning to offer them a cigar right after shaking hands.

The lecture

I had written my paper at home in Norway. My preparations had been thorough and I had tested the paper on different colleagues at least three times. I had made some spiffy overheads and had a manuscript of everything I wanted to say. During the lecture itself, however, I discovered that I had practiced so many times that I knew the whole thing by heart and could regurgitate it, all of it - 25 minutes of it - verbatim!

After I finished, there were a few minutes for Q&A. I immediately noticed Philip Gresho standing up to take the floor. He was very senior in the field and had written an article on exactly the same topic. He probably intended to show me who was the boss. The conclusion was a given, so my only option was to lay down and roll over. He started by gently asking a few innocent, very proper questions. After a couple such queries, he asked "What is your main research interest?" I responded truthfully by saying "fast solvers for linear systems of equations". The whole room burst out in laughter, and I had not even the faintest idea why. But Gresho laughed too, shaking his head. Once the laughter began to die down, he said "At least you're an honest fellow" and then he sat down. There were no other questions.

During the break, I was granted a long audience with the self-same Mr. Gresho. We drank coffee together and discussed our work. He explained to me that the reason for the laughter was that I was at a conference for engineers. None of the attendees were primarily interested in solving linear systems of equations or other mathematical problems. Everyone knows that solving them is important because they pop up everywhere, but the audience's primary interest was in engineering applications. I realised then that speaking at such conferences requires that you take your point of departure in an engineering application and then show how your solution for linear systems of equations can be used to solve one of their problems, and then to discuss it. Otherwise, your primary focus should be on applying your solutions or you will be considered to be just another theoretical mathematician and thus leave yourself open to ridicule.

Your supervisor

What can you expect of the person who accepts responsibility for supervising you? This is a question that bothers many PhD students, especially when progress is slow and their fellowship is running out. Even though there are no set answers, there are a few points to consider. A supervisor should:

1. introduce you to the most important problems in the field in which you will be working,
2. give you ideas for topics for investigation to get you started in the field in question,
3. discuss the issues you will eventually encounter as you work with the material,
4. teach you to write scholarly articles,
5. be aware of the most important conferences/books/journals in the field in question,
6. know what it takes to write an article in this field,
7. introduce you to their contacts in the field,
8. critique what you write - this also applies if you write a thesis that he does not co-author,
9. give you regular evaluations about how you are doing,
10. encourage you when you need it,
11. criticise you when you need it, and
12. ask you to quit if he feels you are not doing well enough.

The last point may sound brutal. No supervisor finds it easy to suggest that a PhD student find something else to do. But you cannot simply take a job as a research fellow and hold on to it for three years while your thesis writes itself. You will have to work seriously and with determination at all times. If a supervisor sees that this will never work, i.e. that the candidate may lack both talent and work capacity, then he must say as much.

Formally speaking, a supervisor can suggest that a research fellow drops out. However, research fellows have temporary employment contracts and it takes a great deal to breach them. Conversely, there is no doubt that a supervisor is very important when it comes to deciding whether the fellow's
work qualifies for a PhD. If a supervisor goes to the extreme step of asking a student to quit, it is because he considers the progression to be so poor that it is virtually impossible to believe that it will lead to a thesis. Obviously, such a request must by no means come as a surprise to the student. A supervisor must issue repeated warnings before stating that this definitely does not seem to be working and that there is therefore no point in continuing.

The student

As a research fellow, you must:

1. keep your supervisor apprised on a regular basis of what you have accomplished; it is a good idea to write an E-mail every Friday to report what you have done during the past week. This is a good routine for both you and your supervisor and it takes no more than 10 minutes,

2. state whether there are special circumstances that limit your work capacity for a period of time,

3. report your progress honestly – tell what is going well and what is going poorly – your reports to your supervisor should not be limited to the good news,

4. throw yourself one hundred per cent into the discussion of the project – do not allow your supervisor to conclude every discussion – participate and demand to be heard,

5. say so if you think your supervisor’s messages are not clear enough, he spends too little time on academic supervision, etc.

6. say so early on that you are not entirely satisfied, rather than waiting until you are deeply dissatisfied,

7. DO NOT expect miracles – take responsibility and state your mind; speak plainly so that you are certain your supervisor gets your message,

8. work hard – do not fool yourself into believing that you can take a PhD at the same time as you are involved in everything else between heaven and earth. You simply cannot manage that; your thesis is to be the last thing you think of before you fall sleep and the first thing you think of when you wake up. This situation is one of total immersion and it will not escape your nearest and dearest. They should understand that it may be tough at times,

9. find relevant articles, conferences and websites that contain information about your topic and forward this information to your supervisor,

10. be helpful to your supervisor; it is in your best interest that he reads the articles you find, so give him a copy. It is in your best interest that he be at the same conferences, so give him the relevant information,

11. acknowledge that he is busier than you are. You should therefore help ensure that the time he spends on your project is time well spent; copying articles, for example, is not time well spent.

12. find another supervisor if you are not making progress and you feel it is ascribable to poor academic supervision.

To the last point, I must hasten to add that this is a dramatic step to take and that you ought to wait as long as possible to take it. It need by no means be so dramatic in many cases. You can simply start working with another supervisor and thus facilitate a gradual transition from one supervisor to another without implementing a formal change. But let’s be honest – some supervisor/student relationships flounder because the chemistry between them is lousy. If the problem is that deep, it is probably a good idea to switch supervisors – also formally.

There is one exception to point 8, i.e. women who give birth while they are research fellows. They are heroines and should be treated accordingly. They combine two activities, each of which is independently enough to knock out an average person. For female PhD students, it might be a good idea to talk with such a heroine before they themselves embark on such a seemingly impossible journey. Male students should not fail to make their partner aware that "No, I will not be working any less".

"You decide – I do"

In October 1998, one of my best post-graduate fellows, Xing Cai, defended his thesis. He is Chinese and when he first began studying, he spoke in very short, concise phrases. After a lengthy student/supervisor meeting, we saw that there were two different paths open to us. I asked Xing to tell me which path he felt we should choose. Xing said: "You decide – I do". That is not how one takes a PhD. Granted, early on, your supervisor must make some choices on your behalf, but as soon as a research fellow understands what is going on, he must make his own decisions. The supervisor's role is to ensure that the various options discussed are clear, what
the consequences will be, how much time they will take, etc., but the fellow must feel a strong sense of ownership to the path chosen. I remember that my supervisor and I almost always ended up with two alternatives. He advocated the one and I the other; the conclusion was usually that we chose separate paths to see which one of us succeeded first. I suspect that not all supervisors have time to participate that intensively in all projects, but it was great fun.

Xing was a fast learner, and today he is a very independent researcher who will not put up with muddled directions and prefers to forge his own path through unknown terrain.

Collaboration between fellows

Thus far, we have presented the entire process as a relationship between one student and one supervisor, but the picture is often more complex. First of all, it is common to have more than one supervisor. This is especially desirable if the fellow has a thesis that touches on several subject areas that need to be covered by two or more supervisors. Second, it is common for research fellows to cooperate closely and thus to a certain extent to supervise each other.

It is obviously positive that a student gets supervision from several quarters, and establishing close relations with other research fellows can bear fruit for years. But there are a couple of factors you need to watch out for. If you have multiple supervisors, you can be fairly certain that they will give you different messages and that it will be frustrating for you. If they are from totally different research groups with completely different traditions for doctorates, this can be a problem. The most common solution to such problems is to have joint meetings. You should not accept always meeting them separately. You should call a joint meeting and present them with examples of how you have experienced getting different advice. You should not be afraid to create a bit of discussion and possibly raise the temperature of the discussion slightly. It is essential for you that your different supervisors understand which path you intend to take and why.

If you start cooperating closely with another research fellow, both of you should make your respective supervisors aware of this and you should tell them what you are contributing to the joint project. Your supervisor will need this information to be able to judge whether he feels you have contributed enough to defend your thesis.

The First Commandment

states "Thou shalt have no other gods before me". My point is not to start a religious debate here, but rather to direct attention to the sad fact that this commandment appears to be the prevailing principle in certain research groups. Such groups are usually characterised by a strong leader and by the entire group having a fairly uncritical attitude to that leader. In extreme cases, discussions in such groups are characterised by the participants vying to best articulate the 'master's' opinions. Once the master has indicated a point of view, well-formulated equivalents will emanate from his disciples. However, if the chief has not expressed an opinion, the game instantly becomes far more complex. The disciples' job is then to guess, based on experience from previous discussions, what conclusion the master will eventually arrive at. Obviously, this calls for intelligence and a certain portion of courage since the disciples may guess incorrectly. Accordingly, the debate in such groups will pick up momentum once 'the master' has spoken. At that point, all the subordinates can once again gush platitudes.

Of course, such a master has been a highly talented researcher at some point. Had that not been the case, he would never have attained such a position. In the slightly longer term, however, such a culture based on ingratiations is the beginning of the end for a research group. A good brain has to be challenged and a good researcher must be criticised. For that reason, newcomers to the world of research do their supervisors a disservice when they play up to them. They do not need that. They need a challenge. They do not need young researchers with old thoughts; they need new colleagues with new and challenging thoughts.

For that reason, you should never automatically accept an assertion simply because it originates with your supervisor. Nothing is true simply because someone or other has said or written it. To the extent an assertion is true, it is so because it has been rigorously tested or because it has been argued so well that you cannot find any grounds for doubt. It is irrelevant who puts forward the argument. The standards that apply to the integrity of a line of reasoning never disappear. No one is so big or so famous that they can spew out half-documented assertions without expecting to field critical questions. On that account, you must always, without exception, be critical to everything you hear and read. Obviously, you must also let yourself be convinced, but not until you have accepted the arguments in your own mind.
Of course, this can be taken too far. You can complain about everything between heaven and earth, but it will not be very fruitful. Any supervisor will tire of listening and he will give you as little attention as possible. In particular, early on in a doctoral programme, it is a good idea to accept your supervisor's recommendations based on his experience and because you may be having difficulties following along. But you must not let this become a permanent condition. You must eventually show yourself to be an independent researcher with a platform for your own ideas.

Full-time or part-time?

There are many different ways to fund doctoral fellowships. Most are based on grants from the Research Council of Norway or from a university.

Research Council fellows usually have no other obligations than their studies per se, while university fellows usually have teaching responsibilities that account for 25 per cent of their time. Due to the teaching, university fellowships are for four years, while Research Council fellowships last for three years. Some Research Council fellowships are linked to a particular research institute so the fellow is affiliated with that institute during his studies. The research institute may want the fellow to work a certain percentage of his time for the institute parallel to his studies. The work is generally related to contract research for the institute's customers.

Universities like to have four-year research fellows with teaching responsibilities because they can reduce the teaching loads of the other staff members. Similarly, research institutes use research fellows to reduce the load on their researchers. Clearly, it can be an advantage for research fellows to get some teaching experience or experience with contract research. However, we often see that duties related to teaching or contract research demand too much attention and lead to a total derailment of doctoral studies. There may be several reasons for this:

1. Pressures from the local community are greater for tasks for which the community bears a common responsibility. The tasks are specific and simply must be done. When things are busy, thesis work can readily be pushed aside.

2. If the thesis is progressing slowly, it is easy to focus more on teaching/contract research because the going may be a bit easier. It is only human to prefer doing what you feel you manage best, meaning the focus on your thesis may be less than it should be.

3. Expectations of research fellows' work capacity in terms of teaching and contract research are often overly high. There are often established norms for how much work any given operation will take, but those norms are usually adapted to seasoned researchers. An experienced lecturer may spend only 20 per cent of his work capacity on a given course, but a comparable course may possibly call for 50 per cent of a novice's time.

My advice to you as a research fellow is therefore:

1. Choose a three-year fellowship that focuses exclusively on doctoral studies if you possibly can.

2. If you must accept other responsibilities, be very careful when signing the agreement. Talk to research fellows who are ahead of you and listen to their advice. Stay away from research communities known for drowning research fellows with extra work. Regrettably, such groups exist at universities and research institutes alike.

3. Be sure your supervisor understands your obligations, and enlist his support to assess their scope.

4. Resist being monopolised by employers or students, that is, stay focused on your thesis. You will be evaluated on the basis of your thesis and that is what you are there to write. Everything, absolutely everything else, has lower priority.

5. Do not succumb to the temptation to take paid employment while you study. If you are going to accept such work, it must be at the end of your studies when you are in full control and certain to reach your goal. Please note, though, that many have fallen into that trap. They think everything is ready but then some new problem pops up all the same. The best thing is to wait to take such work until after your thesis has actually been sent to the printer's.
The Research Council

As a fledgling researcher, you will soon encounter the Research Council. Perhaps the Research Council will fund your project, or possibly you will meet it when you apply for funds to attend a conference during your studies. Regardless of how your first meeting with the Research Council is, you will have heard a great deal about that organisation from more seasoned scientists in the canteen or the break room. There is not a lot scientists agree on, but believing that research councils are populated by incompetent idiots whose sole intention is to bury you in a landslide of cumbersome administrative routines and who are neither interested in research nor able to distinguish good from mediocre, seems to be a popularly held opinion among scientists the world over. It is actually quite interesting to hear scientists, who as far as I know have never headed a single research project, massacre research councils’ hopeless bureaucratic routines.

I feel all of that is vastly oversimplified. For many years, I have reported on as much as MNOK 8 per year. I have never spent more than one day writing a mid-year report and I have never received a single complaint. For that reason, I would recommend that you, as a fledgling researcher, form your own opinion of the Research Council of Norway. Approach their routines, forms and guidelines with an open mind. They are by no means as bad as they may appear at first glance. They have obviously put considerable effort into streamlining applications to make it easier to process them. This may mean that some of the questions seem slightly irrelevant to your application, but don’t worry about that. Just plough through the torrent of words, complete the form and send it in.

A large part of the bureaucracy the Research Council presents to applicants and project managers is ascribable to the fact that they themselves must report on how they spend money. They need good arguments to convince the appropriating authorities that it is important to support research. Also bear in mind that there are many applicants for funding - many more than there is funding available for, so you need them more than they need you.

There is one mitigating characteristic of the Research Council’s work that I particularly appreciate. They are interested in new ideas and they accept that those new ideas must come from researchers. I submitted my very first funding application when I was employed by the Centre for Industrial Research. Along with several others, I was involved in a highly ambitious project proposal. We asked the Research Council to fund a three-year programme expected to cost roughly MNOK 30. That was a tremendous allocation at the time. After the funding was granted, many asked me who had signalled us that we should apply for funding for this purpose. The question suggested that people believed such a major initiative had to have come from inside the Research Council. That was and is wrong. It is not the Research Council’s task to come up with smart ideas for research projects. It is your job or, more generally, a job for researchers. It is the Research Council’s job to choose among the proposals they receive. To this end, they ally themselves with well-qualified international experts who make recommendations about which proposals merit support. My advice is therefore that if you are going to apply for funding from the Research Council, you must first and foremost have a good idea of what you intend to do. They fund good ideas. It is not enough to be a good, preferably well-known researcher, you must also take the trouble to express what you actually plan to do and why you intend to do precisely that.

Nor do I believe the Research Council can manage to identify all good ideas; they have almost certainly rejected many applications that have in retrospect proven to have been worthy of support. All the same, I believe they generally do a good job.