



Vetenskapsrådet



## GOOD RESEARCH PRACTICE – WHAT IS IT?



Views, guidelines and examples

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**Bengt Gustafsson, Göran Hermerén and Bo Petersson**

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# PREFACE

Under its terms of reference, one of the functions of the Swedish Research Council is to “take initiatives to ensure that ethical issues receive attention in research and to disseminate information on such issues”.

Ethics is not about statutory rules and regulations. Although certain ethical questions do have to be formally regulated, ethics is primarily a matter of developing, encouraging and keeping alive an awareness and a discussion about appropriate standards of conduct. Given the long-term significance of research and its place in society, ethical issues are of particular importance in this field. It is therefore vital to encourage a debate on ethics, and to provide basic material for such a debate.

This publication is designed to do just that. It is not a rule book or a manual – although it does contain frequent references to rules and guidelines. Primarily it is intended as a contribution to a debate, providing a basis for reflection and discussion. It is the work of three experienced researchers, Professors Bengt Gustafsson, Göran Hermerén and Bo Petersson. The authors have discussed their ideas and thinking on an ongoing basis as members of the Ethics Committee of the Swedish Research Council.

Some readers may well feel that much of what is written in this publication is self-evident. And that is of course true – the ethical guidelines set out here are not something new, produced in isolation; to be effective, they need to rest on values that are widely embraced in our culture. It thus follows that such guidelines, and the ways in which they are to be applied in different fields and different situations, have to be constantly discussed and tested; they must be developed as research and society develop.

A succession of highly publicized conflicts over questions of research ethics in recent years have also helped to underscore the necessity of guidelines. History shows, however, that it is not enough simply to issue guidelines. We also have to keep them alive by discussing them, referring to them in education and training, and continuously revising them. There needs to be an ongoing debate about how they are to be applied, and that debate must have consequences for our practical actions.

We therefore welcome this publication, and hope that it will be read, discussed and used in education and training, in the development of local procedures and in a wide range of other contexts in which ethical aspects of research are important.

Stockholm, January 2005

**Bengt Westerberg**

*Chair*

*Board of the Swedish Research Council*

**Pär Omling**

*Director General*

*Swedish Research Council*



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# 1 INTRODUCTION

*Good Research Practice – What Is It?* is aimed at researchers in every field of inquiry, and in particular at postgraduate students and their supervisors. Its authors, Bengt Gustafsson, Göran Hermerén and Bo Petersson (who has also acted as editor), are or used to be members of the Swedish Research Council's Ethics Committee, at whose meetings fruitful discussions of earlier versions of the text have taken place.

The overall aim of this publication is to discuss what can be considered to constitute good research practice. Society at large has a significant interest in such a discussion taking place, and among researchers themselves there is a clearly expressed need for deliberation on these issues, for one thing because research and the environments in which it is conducted are constantly changing. Once primarily the work of individual scholars, research is now often undertaken by groups of investigators, or by several groups working on a collaborative basis. The funding required for research was often automatically available to those holding research posts, whereas nowadays it is provided for specific projects, often from external sources. This raises new questions regarding researchers' responsibilities and the factors they need to take into account.

In this report, we present material at a number of different levels. On the one hand we describe existing systems of rules, on the other we wish to encourage a more basic discussion about the ethical principles that are applied in research. Another aim is to offer a starting point and basis for the discussion and development of good local procedures. Last but not least, we wish to engage in a more personal discussion about the standards of conduct that apply, or should apply, among researchers and between researchers and others.

Good research practice should promote high-quality research and, partly with that end in view, both foster good relations among researchers and between researchers and the general public, and counteract and prevent research misconduct. Researchers should not, however, shy away from such conflicts as may arise when their results challenge widely held ideas.

Good research practice is not a matter of slavishly following a tradition, for example in terms of method or basic perspective, or doing what others do, or always sticking to safe, conventional ground. On the contrary, one characteristic of good research practice is that the researcher helps to generate new results, which often means departing from or questioning ingrained ways of thinking or working.

Faced with a choice between a concise, outline survey and a more detailed account, we have by and large opted for the former. Readers wishing to go into the subject in greater depth will therefore need to supplement this report with other literature. One starting point for our work has been the Swedish Research Council's *Riktlinjer för god medicinsk forskning* ("Guidelines on good medical research", originally published by the former Swedish Medical Research Council, MFR). A number of wordings have been borrowed from that publication. Other basic material has been provided by various international documents in this field, some of which are presented in chapter 9.

*Good Research Practice – What Is It?* is not a treatise in the theory of science, nor does it represent a clearly defined position in that regard. Since it is written for researchers working at all levels and in all fields of inquiry, this is unavoidable. In the bibliography, however, we include a number of works on the theory and philosophy of science, for those wishing to pursue such issues further.

The focus of attention in this volume is on the conduct of the researcher in relation to the standards normally directly associated with science. Other aspects of the researcher's work, such as ethical issues relating to the interests of human subjects, are touched on to only a limited extent. In section 2.8 below, we attempt to distinguish between "research ethics" and what could be termed "the professional ethics of the researcher". The present publication is chiefly concerned with the latter. It discusses what rights and obligations those working in research in various ways can reasonably be considered to have.

From a brief perusal of the recommendations set out in the following chapters it becomes clear that much of what is said there can be summed up in a number of general rules, all of which correspond to broader rules for life:

- 1 Tell the truth about your research
- 2 Openly report your methods and results
- 3 Openly disclose any commercial interests and other ties
- 4 Consciously examine and present the basic assumptions underlying your studies
- 5 Do not steal research results from others (e.g. from younger colleagues)
- 6 Conduct your research in an orderly manner (e.g. by maintaining documentation and retaining data)
- 7 Do not conduct your research in a way that could harm other people (e.g. subjects)
- 8 Be fair in your assessment of other people's research

These requirements can be summed up in words like *Honesty* (1, 5), *Openness* (2–4), *Orderliness* (6), *Consideration* (7) and *Impartiality* (8). Although

the rules enumerated here may seem general and applicable to all areas of research, and perhaps appear self-evident, their relative importance is not self-evident, least of all when conflicts arise between them. Furthermore, the significance we attach to them may depend on our view of science. Many, for example, work within the positivist tradition, which still holds a very strong position in the natural sciences and medicine, and which sees science as an ongoing accumulation of knowledge from one generation to the next. With this view of research results as something of great enduring value (provided that principles of reproducibility etc. are adhered to), the requirements of honesty and orderliness are natural in any endeavour to promote the growth of knowledge. As the recommendations in these pages make clear, the requirement of honesty is in fact considerably more stringent in research than it is in everyday life. White lies, say to protect a friend and colleague who happens to have been wrong about a scientific issue, are scarcely acceptable. And order as such is particularly important, as the accumulation of knowledge is viewed as a process that continues for generation after generation and involves the integration of reliable results from different studies into an ever growing body of knowledge. Such an attitude need not entail a naive belief that all researchers produce objective truth. Precisely to be able to distinguish solid results, which can be built on, from shaky ones, the principles of honesty, openness and orderliness carry particular weight in this tradition.

If in the spirit of Thomas Kuhn, on the other hand, we believe that science develops through major revolutionary advances, or “paradigm shifts”, involving dramatic changes in fundamental outlooks, methods of measurement, unwritten rules and values, and our concern is to pave the way for such advances, then we can put particular emphasis on a critical scrutiny of our own basic assumptions, and on a criticism of the foundations of other people’s work. In practice, this is not easy. Kuhn argues, for example, that researchers’ basic assumptions and outlooks are largely unconscious or, for other reasons, not easily questioned by the researchers themselves. But that does not mean that conscious testing of those assumptions is not worthwhile. The same is true if we regard research essentially as a cultural phenomenon, with cultural rules and outlooks more or less unconsciously pervading both research itself and its results.

Many, by contrast, share Karl Popper’s view that scientific advances admittedly occur through rational and ordered processes, but are threatened by irrationality and elitism, with the result that science can easily become an instrument of power. With such a view, particular stress may need to be put on the requirements of openness and impartiality. Research is in danger of being subordinated to or incorporated into the power structures of so-

ciety, and could draw even its own practitioners into an illegitimate exercise of power. This is where the principle of consideration becomes important: research, like politics, business and other activities in society, must be subordinated to respect for human rights. What is more, research and researchers have important roles to play in society, and it is thus reasonable to place additional demands on the researcher. The question is how restrictive those demands should be.

In the present publication we have attempted to formulate a number of practical demands which we ourselves consider reasonable, and which we believe researchers should be able to accept without it posing too great a threat to the freedom of their work. It is our conviction that it is in the long-term interests of the research community, too, to respect the requirements and expectations placed on it in a democratic society.

The structure of this report is as follows. In *chapter 2* we discuss the overall meaning of the concept of good research practice. The following chapters deal with the main task of the researcher: to do research. These sections follow the development of a research project from planning (*chapter 3*), via implementation (*chapter 4*) to publication (*chapter 5*), and we attempt to formulate what good research practice requires in these contexts. *Chapter 6* addresses the question of research collaboration, and examines good research practice in relation to other individuals or groups interacting with the researcher. This chapter also looks at different interests which affect research and which may for example influence its direction. *Chapter 7* considers other roles of the researcher, and the ethical standards that apply when he or she undertakes, for example, the role of supervisor, teacher, communicator, or member of a committee or board. *Chapter 8* discusses the concept of research misconduct. It also examines how instances of misconduct are to be handled in practical terms, and how we can seek to prevent them. *Chapter 9* provides a brief outline of a number of documents – codes, guidelines and legislation – which are of relevance to research, and with which the researcher should be familiar. The report ends with a bibliography.

To give more tangible substance to our account, we have supplemented it with a number of examples from the day-to-day life of the researcher. These examples are fictitious, but nevertheless realistic. One reason for including them is to show that, in practice, professional ethics in the field of research can entail difficult choices between different courses of action. The question is how the researcher is to act in a complex reality, in which conflicting principles have to be considered.

The focus of this account is on the individual researcher and research group. We appreciate that the ethically challenging situations that may confront a researcher often have structural rather than personal causes. Indeed,

they may be entirely a result of conditions in the wider society, far beyond the researcher's own control. But, even in such cases, researchers may be forced to choose a course of action and will thus have to assume responsibility. In such situations, they may need support. Hopefully, this publication can help to provide that, above all by encouraging a discussion in the research community about how ethical dilemmas can be handled.

The faculties of universities and colleges have a particular responsibility to ensure that good training is made available for postgraduate students on different aspects of good research practice and research ethics. It is our hope that seminars and courses on the subject will be held at the country's higher education establishments, and that this publication will be of use as recommended reading in that context. Our report is also intended to serve as a basis for discussion when an allegation of misconduct or a deviation from good research practice needs to be addressed.





## 2 GOOD RESEARCH PRACTICE – SOME BASIC REQUIREMENTS

### 2.1 The value of research

The scope of research is vast. It extends from the smallest component parts of matter to the overall structure of the universe. It takes in the diversity of biological life, and humans as biological, culturally creative and social beings. It concerns past, present – and future.

Scholarly research is an important facet of the life of our society. The value of new knowledge is emphasized in many different contexts. What is it that gives research its value? One answer is that its value is dependent on the benefits and advantages which the new knowledge produced can bring for individuals and society. Many technical innovations that have made our lives simpler and physically less demanding spring from research in the natural sciences. The results of medical research have been a major factor in reducing premature mortality, alleviating suffering and enhancing individual quality of life. Diseases that were fatal only a few decades ago can now be treated and cured. Knowledge about the human mind, historical processes and other cultures helps us to understand various aspects of modern-day society and to handle problems arising there. And so the list could go on. Indeed, research is often undertaken with the direct aim of finding an application or solving a specific practical problem.

But scientific research and knowledge are of value not only as an *instrument*, i.e. a means of achieving something else by which we set store. The knowledge gained is also of value *in its own right*, regardless of how it might conceivably be used. We humans wish to see connections and arrive at explanations and understanding, even when we are not specifically looking for a use or application. Often this is put forward as an argument for basic research. Later, the results may also turn out to be of value in promoting things that we perceive to be useful and beneficial to society. Because of the very nature of research, however, we cannot know in advance exactly where its results may lead. In many cases, our desire to know and to understand is sufficient justification for engaging in it.

A third reason for undertaking research emphasizes the *process*, rather than the results. A search for new truths and outlooks can be of value in itself, for individuals or for a culture or society, even if clear-cut results are never achieved.

## 2.2 Demands on the researcher

Research, then, holds an important position in modern society, and much is expected of it. But that also turns the spotlight on the researchers, the people who are to provide the new knowledge desired. Researchers have a responsibility towards society, which in many cases also funds and commissions their work, and towards other researchers – and are seen as representing the values for which research stands. Society – both the general public and other researchers – must be able to rely on their having done their best to arrive at valid and relevant results. There is also an expectation that research and those who conduct it will be free from outside influences and manipulation, and that individual researchers will not pursue their own private interests or those of other parties, especially not in an undisclosed or unconscious manner. A first step in that direction is for the researcher to try to understand what his or her own ties and motives actually are.

The standards of conduct which a researcher is expected to observe are linked to the role of the researcher, as it is understood today, and are inherent in the actual research process. And yet they are rooted in the ordinary ethical standards and values of society. One example touched on above is the requirement of honesty. If a researcher fails to live up to this, it may mean that what he or she is doing can no longer be called research (at least not by contemporary society), and will be regarded as something else.

Modern-day research requires high standards of both quality and integrity on the part of the researcher. Carefully considered ethical attitudes and conduct are therefore called for in the various roles which the researcher assumes.

## 2.3 Research areas, disciplines and environments

Good research practice is something that can be required of research of every kind. It is applicable to every discipline and field of research, both in the natural sciences, engineering and medicine and in the social sciences and humanities.

Different research areas and disciplines can be defined in terms of the different types of questions they seek to answer, the different methods they employ, the different theories on which they rest, or the different kinds of data which are available and can be collected. We can also distinguish between research that is exploratory and creates hypotheses and research that tests hypotheses. In addition, research may be concerned with describing,

analysing or interpreting a body of material. Some questions can be answered by means of quantitative studies, while others are best addressed on the basis of qualitative studies and methods.

The environments in which research is conducted and researchers are trained can also vary widely in character and thus give rise to many types of ethical problems. In the social sciences and humanities, research is often a single-handed venture. In engineering, natural sciences and medicine, on the other hand, research teams and groups are common. Sometimes research can also be undertaken by larger consortia. Within a team or group, individual responsibilities may at times be unclear; here, collaboration is required, entailing various responsibilities towards the other members. At the same time, individual group members need to have a right to data of their own and to pursue lines of inquiry of their own. One research environment may be organized according to a strict hierarchy and hedged around with rules. Another, representing the opposite extreme, may be bohemian, chaotic and more or less unregulated. Obviously, various intermediate forms will also be found.

## 2.4 The quality of research

Despite the considerable variation between different areas of research in terms of theories of science, traditions and ways of working, we would argue that questions concerning good research practice can be discussed in a meaningful manner across disciplinary and faculty boundaries. The demand for quality in research can be broken down into a number of general principles that are widely recognized within the research community.

First of all, the basic assumptions and points of departure of a study must be made clear and explained. The project should have a clear aim in terms of answering or shedding light on certain interesting questions, which should also be stated. The researcher must be able to explain the methods to be used, and should be able to show that, by these methods, answers to the questions posed may be found. The methods must be deployed in a correct and competent manner, and empirically based projects should involve a systematic and critical analysis of carefully collected data. Arguments should be clearly formulated and relevant to the conclusion the researcher wishes to reach. The project as a whole, its documentation and the report setting out its results should be characterized by clarity, order and structure. But quality also includes things like scientific imagination and originality. If a project is creative and innovative in some respect, its quality will be significantly enhanced.

The list of requirements given here is of course by no means exhaustive. Nor can each of the criteria on its own be seen as a *sine qua non* for the quality of a project. There must, for example, be scope for exploratory studies without clear goals. But a project that is lacking in several of the respects referred to above will often be considered to be lacking in quality.

## 2.5 Honesty and integrity

A demand that can be made of all research is that, when analysing, interpreting and presenting their own results, or citing those of others, researchers never distort or embellish those results in order to gain support for their hypotheses. Nor should researchers restrict themselves to citing research or data that corroborate the hypothesis they wish to pursue. Evidence to the contrary – if known – should also be presented.

What stakeholders the results may possibly benefit or damage is, in this regard, irrelevant. Researchers have to be able to draw whatever conclusions their data support, even if from certain points of view they are undesirable. As far as possible, therefore, they must be free in their work from any ties that could put at risk the possibility of achieving such knowledge as their research is intended to produce.

This respect for the results obtained, or for “the truth”, can be expressed here as a demand for integrity on the part of the researcher. Researchers should seek to adopt a critical stance towards their own expectations, and those of others, about what the data will demonstrate, and to their own and others’ hopes of ground-breaking conclusions or rapid career progress. Shortcomings in integrity, too, affect the quality of a research project.

Nor should a researcher pass over in silence earlier investigators who have put forward the same or similar ideas to those now being tested. For the researcher, the requirement of honesty is very far-reaching. Research, by its very nature, involves a search for new knowledge, for an understanding that is as well-founded as possible – and researchers demonstrate their honesty precisely by respecting the results they arrive at.

## 2.6 Merton’s CUDOS norms

In the 1940s, the American sociologist Robert Merton formulated four principles which he believed constituted a “moral consensus” in science. Com-

monly referred to as the CUDOS norms or rules, they have been of great significance for both the substance and the historical development of the discussion about the ethics of research. Several scholars and other contributors to the debate have subsequently developed on or modified these principles, among them the physiologist André F. Cournand with his “Frensham Formulation”. Merton’s norms merit attention as one starting point for a discussion about what constitutes good research practice.

The norm of *communism*, or *communalism* (C), means that the research community and society as a whole have the right to be informed of the results of research. New knowledge should not be kept secret and concealed for non-scientific reasons. According to Merton, therefore, there is no such thing as “intellectual property”, owned by the researcher. His norm of *universalism* (U) requires scientific work to be evaluated with reference to scientific criteria alone. When assessing the validity of the results, we are to take no account, for example, of the researcher’s race or position in society. The norm of *disinterestedness* (D) means that the researcher must have no other motive for his or her research than a desire to contribute new knowledge. The fourth norm, *organized scepticism* (OS), requires the researcher to constantly question and scrutinize, but also to refrain from expressing an assessment until he or she has sufficient evidence on which to base it.

Since these principles were put forward, the position of the researcher, or at least the general perception of it, has changed in many respects. Being a researcher can no doubt colour an individual’s whole way of being and thinking, but these days it is quite a common professional role, and researchers are employed specifically as researchers. They, too, are expected to be loyal to organizations and superiors, and have to take financial factors and their own job security into account. In many cases, therefore, Merton’s norms will be difficult to live up to in reality. His rule of *disinterestedness*, which says that the researcher’s main reason for doing research should be to contribute new knowledge, is a case in point. Researchers must surely be allowed to have other motives as well, such as promoting their prospects of employment through the work they do. The important thing, rather, is that motives of this kind do not influence the researcher in such a way that he or she arrives at interpretations or conclusions for which there is no scientific basis, or withholds findings for which evidence does exist.

Merton’s strict requirement of *communism* is also difficult to live up to in many types of research and in certain research environments, for example in an industrial setting, although the importance of publishing results and communicating them to society and to other researchers will nevertheless often be acknowledged in such environments as well. In addition, this norm may in certain cases have to take second place to other ethical re-

quirements, such as the protection of informants. There are various problems with Merton's other norms, too. The ideals expressed in the CUDOS norms nevertheless provide one of the cornerstones for the present-day discussion about research misconduct (see chapter 8). They are also reflected in the requirements of honesty and openness that were formulated in our introduction (see chapter 1).

## 2.7 Other roles of the researcher

So far we have discussed the requirements of quality and integrity chiefly with regard to actual research, but they also need to be discussed in relation to the other activities which a researcher may undertake. Researchers are often called upon to make assessments, for example of the work of colleagues, as external assessors in connection with appointments or as referees or reviewers for articles submitted to journals. They may supervise post-graduate students, and often teach, not only at higher education establishments, but also in other contexts. In addition, they may communicate research results to the public or to specific groups, for instance via the media. A researcher may also, in his or her capacity as a researcher, be appointed to various boards or committees. In all these contexts, he or she is generally perceived as a representative of the research community. In these roles too, therefore, honesty, integrity and respect for knowledge need to characterize the researcher's actions.

In chapter 7 we will discuss what good research practice can entail more specifically in relation to these other roles of the researcher. That discussion, like the rest of this report, will be expressed largely in general terms, rather than focusing on any particular field of research. However, it should be easy for anyone with personal experience of research to relate what is said to relevant, concrete situations. In some cases, more detailed examples will be provided.

One of the responsibilities of researchers working at universities and colleges is to disseminate their results and thus contribute to the development of society, and this is something we should also be able to demand of those employed in other organizations. In addition, researchers are sometimes expected to make an active contribution to public debate about social or political issues, for example in the media. In such contexts, good research practice requires the researcher to critically consider what course of action is appropriate, and to be aware of the risks that can arise if the confidence placed in the expertise of the researcher is misused to support positions that fall outside his or her sphere of competence.

## 2.8 Research ethics and professional ethics

In this report we primarily discuss questions concerning the quality of research, the honesty and integrity of the researcher, and the conduct of the researcher in certain roles other than actual research. We do not, in other words, examine what is often considered the primary focus of *research ethics* (and what is commonly meant by the Swedish term *forskningsetik*), i.e. issues relating to how researchers take into account and protect the interests of participants, informants, subjects and others affected by their research. Research ethics in that sense is concerned, for example, with how human subjects are selected, what information is provided and how, how participation affects participants during the project and on its completion, and how publication may affect participants, as well as with questions relating to third parties, for instance regarding information, publication and how such parties may be affected.

In Swedish, the word *forskareetik*, which could be translated as *the professional ethics of the researcher*, has been suggested as a term for the area dealt with in this publication. The emphasis here is on the researcher's relationship to the actual role and task of research, rather than his or her relationship to participants or third parties. The term does, though, encompass the researcher's relationship to co-workers, other fellow researchers and funding agencies. The distinction between the two concepts is difficult to define satisfactorily, however.

It is also possible to distinguish between *internal* and *external* research ethics. Sometimes this distinction is used in a way that coincides with the distinction between the professional ethics of the researcher and research ethics in the sense outlined above, but sometimes it is given a different meaning.

The following example describes what is primarily a problem of research ethics in the sense of issues relating to participants and others affected by research.

### What would you do in the following situation?

A researcher discovers that a famous writer had an original and unusual sex life, and that his marriage was a mere façade to hide it from the outside world. The researcher relates this discovery to some disputed passages in the writer's work, arguing that it sheds new and original light on them. However, the widow and several other relatives of the writer are still alive. They are offended by the researcher's publication of his findings, and contest his claim.

*What consideration should the researcher show for the feelings of relatives in a case like this? Would it have been different, in your view, if the subject of the research had been a well-known politician who had vigorously championed the cause of sexual minorities? What do you feel about the differing guidelines that apply to researchers and journalists in such situations?*

In postgraduate training, attention obviously needs to be paid both to the professional ethics of the researcher and to research ethics, in the senses used here. A familiarity with the legislation, guidelines and ethical codes that apply to a researcher's particular field is desirable and important. Such documents include, in Sweden, the regulations of the National Archives, the Personal Data Act, the Act concerning the Ethical Review of Research Involving Humans, the regulations of the Medical Products Agency, the Animal Welfare Act and Animal Welfare Ordinance, the Declaration of Helsinki, the Swedish Research Council's guidelines on medical research (*Riktlinjer för god medicinsk forskning*) and ethical principles for research in the humanities and social sciences (*Forskningsetiska principer inom humanistisk-samhällsvetenskaplig forskning*), and the various rules and conventions on research adopted by the European Union (EU) and the Council of Europe. Some of these texts are described in chapter 9.

The ethical issues which a researcher may need to consider are not, however, restricted to the areas referred to above as research ethics and professional ethics, as the examples below make clear.

### What would you do in the following situations?

You have been given permission by the National Prison and Probation Administration to study the reading habits of prison inmates. You discover two shocking cases of physical abuse in the prisons you visit, but both the victims ask you not to raise the matter with the prison management, as they are afraid of reprisals.

*Do you as a researcher have any special responsibilities in this context?*

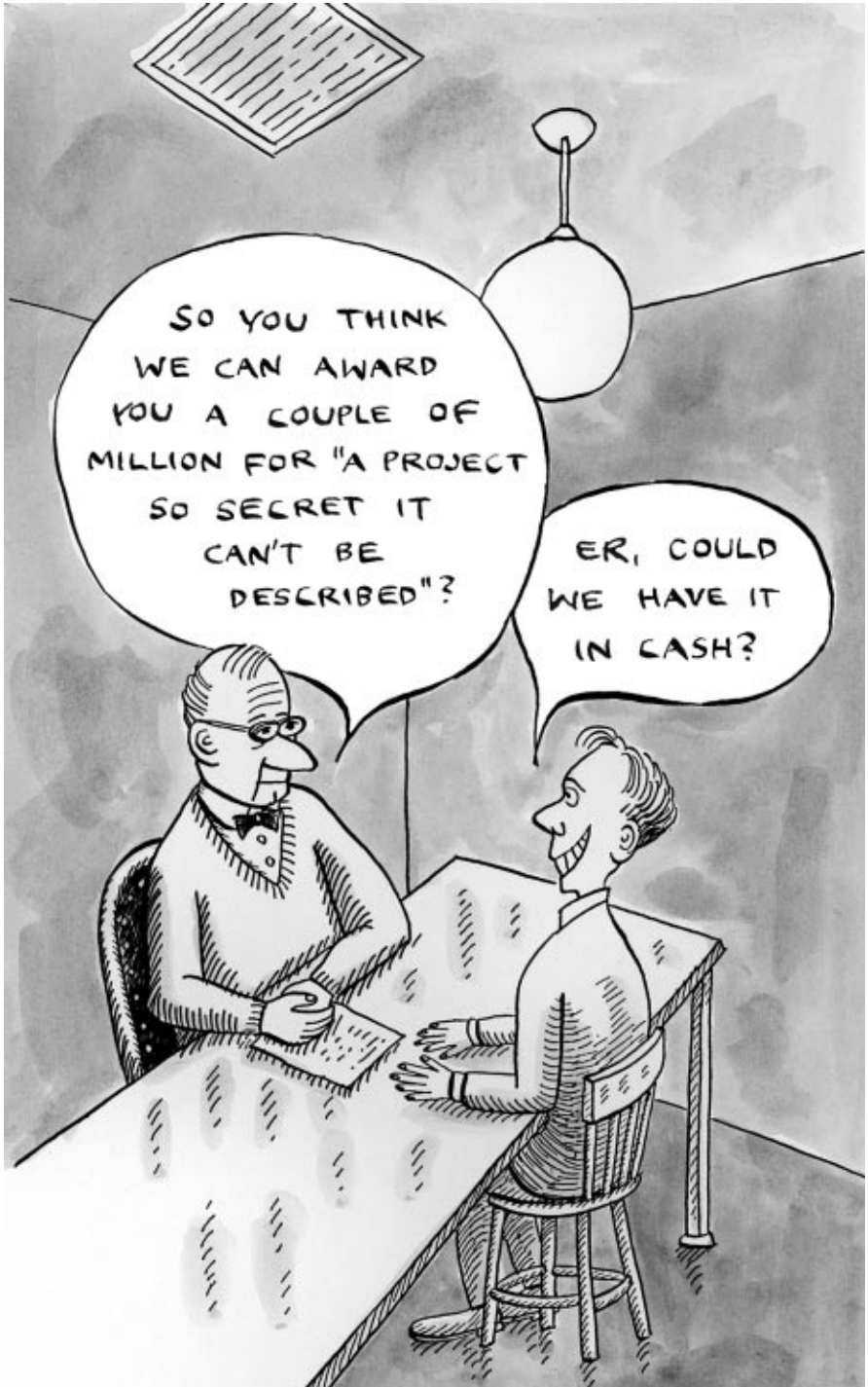
Researchers working in certain fields can sometimes, through their research, gain insight into situations, for example in people's homes or at day nurseries, which raise ethical questions. How should you handle the conflict that can arise when, as a researcher, you come into contact with instances of neglect and abuse? On the one hand, trust has been placed in you, for example by your being admitted into a family; on the other, as a professional you have a responsibility to report ill treatment of elderly people, children etc.

*What would you do in such a situation?*

In a research project involving analysis of tissue samples, one sample reveals a type of cancer for which the prognosis is very good if the disease is diagnosed early. By mistake, the tissue sample has not been de-identified.

*What do you do with this information? Do you contact the person concerned or not?*







## 3 PLANNING RESEARCH

We will now discuss various aspects of what good research practice may entail, and will do so by following, in broad outline, the different stages in the research process. This chapter will chiefly be concerned with the reasons for undertaking research and the planning of a research project. In the next two chapters, the focus will be on how research is conducted and how the results are handled.

### 3.1 The purpose of the research

In the introduction we argued that, from a general, societal standpoint, research can be undertaken with a view to achieving beneficial and useful applications, but that it can also have the important and more fundamental aim of increasing our stock of knowledge, and thus broadening our perspectives and contributing to a richer life. For the individual researcher, the purpose may be more personal, such as satisfying a sense of curiosity, an enjoyment of problem-solving or a mania for collecting, indulging a love of fault-finding and criticism, helping to tackle problems in society, impressing other people, advancing one's career, or earning money from inventions and patents. This is not the place for a closer scrutiny of such personal motives, which in many cases are probably mixed and perhaps not consciously apparent to the researcher concerned. But they may influence the direction of the research undertaken, and the environment in which it is carried out.

The research community has traditionally taken a generous view of researchers' personal motives. That is a good thing, in that it allows many people, with varying motives, to contribute to the research culture and the growth of knowledge. On the other hand, a research environment which for example emphasizes individual careers may become destructively competitive. It may make it impossible for other researchers, not motivated primarily by a concern for their careers, to assert themselves or feel at home. And an environment focused on the personal gains to be made from patents could result in a distorted emphasis on short-term benefits. A research setting with a one-sided focus on the value of basic research in its own right, by contrast, may become an "ivory tower", disdaining any attempt to see research and its possible applications in a social context.

These risks will be reduced if the approach to researchers' motives remains open and generous, not least within the research community and

individual research groups. The important thing should be *that* someone wishes to contribute to the research endeavour, not *why* they wish to do so. However, in our opinion an open discussion of personal reasons for doing research, within research teams, departments and faculties, is also important. An awareness of one's own motivation must be seen as one of the outcomes of a good researcher training programme. Among other things, such an awareness should help to ensure that more applicants for permanent research positions maintain their commitment to research over the years. If that commitment sometimes falters in researchers who have finally secured such posts, it may be because they have for a long time been unclear about their reasons for doing research.

It must surely be reasonable to argue that a researcher ought to believe in the value of what he or she is doing in a project. This is important on several counts. Researchers who no longer believe in their own work can easily generate a stultifying atmosphere in their department, not least among younger colleagues and students. Such researchers need to rethink what they are doing. At best, such a reappraisal will result in their turning their attention to problems that they find more inspiring, and which are perhaps more important for society as a whole. Departments should encourage, rather than stifle, an ongoing discussion about the relevance of research projects in various respects, and researchers wishing to pursue new lines of inquiry must be supported by colleagues and research funders.

Another important issue for the individual researcher is the choice of research problem. He or she may for example be faced with a choice between a well-defined problem which could relatively quickly lead to publishable results, but which does not seem of very great relevance to society, and one that is vaguer or less beneficial in career terms, but of major social significance. The choice has to be made by the individual researcher, and researchers who decide to change direction and leave a project on ethical grounds should be respected by colleagues and the research community as a whole.

Such a step is not easy to take, however, especially for researchers in the early stages of their careers. But both the research community and society at large stand to benefit significantly from enabling researchers in this situation to pursue new directions. Funding agencies need to bear this in mind. There is a danger of such "defectors" being if anything penalized by colleagues in the peer review process, who may concentrate more on past performance than on potential when assessing the new projects they propose. At worst, such narrow assessments may be the result of a blinkered outlook on the part of senior reviewers, hardened by a life of hard work and sacrifice in pursuit of their own careers.

A problem of particular importance arises when researchers realize that they are involved in research which they themselves judge could have detrimental consequences. Such an assessment is often very difficult to make, but even so the individual researcher concerned is frequently the person in society who is best placed to attempt it. Situations of this kind were discussed in conjunction with the drafting of the Uppsala Code of Ethics for Scientists, published in 1984 (see Rydén under references). This code recommends that, as far as they are able, researchers should try to arrive at such judgements, and that if they conclude that the applications of their research will cause more harm than good, they should discontinue the work and publish their assessments. The code also calls on colleagues and the research community at large to support such individuals. We concur with these recommendations of the Uppsala Code.

Sustained individual commitment to a research undertaking is also important, however. Most research projects are of such a character that they require a very substantial investment of effort and concentration. The journey from initial idea to completion is as a rule both long and uncertain. Most research involves clearly creative elements, but in between there are frequently long, arduous and uneventful stretches of road. Meanwhile, others are often dependent on the researcher maintaining a certain momentum. Devotion to the task, application and an ability to concentrate are therefore important qualities in a researcher and a research environment. What is more, a researcher who has undertaken to present a doctoral thesis on a subject or to carry out a project, after receiving support from a funding body, should not simply abandon the task because he or she no longer “feels like it”. That is not the same thing as wanting to change the direction of one’s research on ethical grounds. There may be different reasons, then, for a researcher to withdraw from a project already embarked upon, and they are not all equally good.

### What would you do in the following situation?

A capable and productive researcher tells you at a party that he no longer enjoys doing research. Asked why he continues all the same, he says: “I can’t do anything else, and I have to make a living and pay maintenance for three children. But I never have time to see them. I’m not sure I can go on much longer.” A few days later, a gifted student whose final-year thesis you are supervising says she is thinking of going on to do a PhD and is keen to have your colleague as her supervisor, “because he’s so incredibly enthusiastic”.

*Do you do anything?*

## 3.2 Describing and documenting the project

Really good research can rarely be planned in detail. Often its focus has to change significantly as the work progresses. This is inherent in the nature of research. It is, after all, a matter of exploring the unknown, and that will bring surprises for those open and flexible enough to see them.

That does not mean that it is not a useful habit to try to describe in advance what you intend to do – to draw up and follow a project plan, while still being free to modify it on an ongoing basis. This is particularly important when doing research in a group, and when several young researchers and PhD students are involved. They are appointed on fixed-term contracts and often have to report results at frequent intervals to secure renewal of their contracts. They need such a plan for their own planning, and to give their work the necessary long-term stability. The project plan should also indicate who does what and, if possible, include estimates of the time needed for different stages in the work. What is more, a research plan is required by most research funders, and by regional ethical review boards. And detailed plans are particularly necessary when human subjects are involved, for example in clinical trials of drugs or large-scale treatment studies.

It is also a good idea to keep a regular record of how the work progresses. Especially in a group setting, continuous, structured documentation of this kind is of great importance. Researchers sometimes have occasion, later in life, to deeply regret not having properly documented some aspect of a study. If there is no documentation and no one can remember exactly what was done, it is impossible to give clear answers about details of the work, either within the group or to others. Going back to try to reconstruct what happened involves a duplication of effort that could have been avoided. Regular documentation is of course particularly crucial in an ethically sensitive project. An additional reason for it is that, without proper records and retention of source data, it can be more difficult to respond to allegations of research misconduct and to clear a researcher's name (cf. chapter 8).

## 3.3 Applying for funding

There are a great many sources of research funding in Sweden, including foundations and organizations of various kinds and central government agencies. Major bodies which distribute public funds include, for example, the Bank of Sweden Tercentenary Foundation and the Swedish Research Council.

Grant-giving bodies expect an application for funding to provide a clear description of the intended project, set out under a number of specified headings, as a basis for assessing the scientific quality and potential significance of the project. Usually this presentation will include an account of the current state of research (the scientific background), a formulation of the problem or problems, and a description of the purpose of the research. Researchers are also asked to state what data they intend to gather and how they will go about it, what methods and approaches they plan to use to analyse the data collected and, where relevant, what hypotheses they intend to test.

In addition, the application should give the names of the principal investigator and the other researchers to be involved, as well as describing the relevant experience and qualifications of each participant. As a rule, applications also have to state whether a similar application is being made to other funding bodies, with the same or another principal investigator. Any commercial or comparable interests and affiliations which could affect the project should also be declared; for funding from the Swedish Research Council, for example, such information is obligatory. Relevant factors here include grants, employment and consultancy fees, and also any links between the project and business activities engaged in by the researcher. If funding is being provided from another source, the application has to state what conditions apply and how the implementation and results of the project could be affected (see 9.8 below concerning the Swedish Research Council's guidelines).

Recipients of research grants are expected to submit regular progress reports, describing how the funds have been spent and what has been achieved during the period covered. The scientific reports submitted in this context should give a clear account of the work for which the grant was sought and has been used during the funding period.

Applicants sometimes feel that too much red tape is involved, in terms of information to be supplied and forms to be correctly completed. It has to be remembered, though, that funding bodies receive hundreds of applications every year, and that to a large extent these applications are evaluated by fellow researchers, often to tight deadlines, in their spare time and for little financial reward. It is therefore important to ensure that proposals are relatively easy to compare, allowing reviewers to focus on assessing their scientific value.

In the light of our own experience, we would recommend proposal writers to be as honest and open as possible. Submitting an application which candidly describes sources of error, makes a balanced appraisal of the project's value etc. usually pays. To try, as many do, to "sell" a project by exaggerating its significance is a deplorable practice, and often counterproductive. What is more, here as in other scientific contexts, exaggeration tends to discredit

those who practise it. It also contributes to a culture which – not least in the applicant researcher and group themselves – undermines a proper sense of moderation and balanced criticism, qualities that are of great value in research training and research itself and therefore need to be encouraged in the research environment.

Nor should the title or presentation of a project be slanted to give the false impression that the proposed research lies within a field given priority by the funding body. Twisting the truth in this way is common in funding applications and tends in turn to engender a fairly brutal cynicism on the part of the agencies receiving them. As a researcher – if only to retain the respect of funders – one should avoid perpetuating this bad habit.

Equally, an honest application should not have a hidden agenda. Seeking a grant, for example, not because you wish to carry out the project, but to reassure a staff member by pretending to try to secure research funds for him or her, and calmly reckoning on the application probably being turned down, or even letting the reviewers know, off the record, that funding is not all that important, is obviously a practice that should not occur.

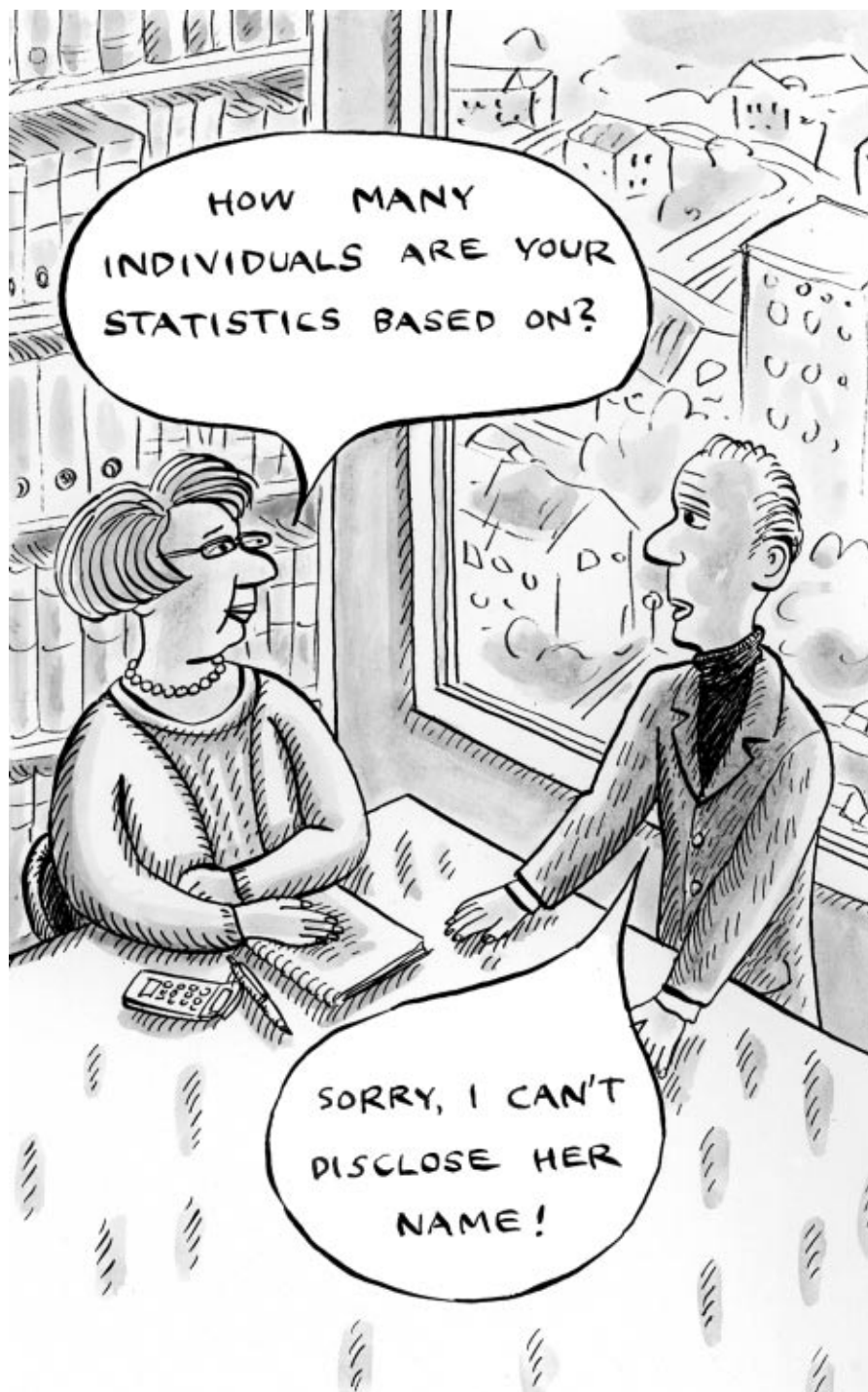
Likewise, no attempt should be made to mislead reviewers by tactically including an applicant, or even a main applicant, who it is believed will enhance the status of the application, if the person concerned is not in fact prepared to accept full responsibility for the project. This type of deception usually backfires in several ways. Many reviewers routinely check what contributions the different applicants can realistically be expected to make and, with fierce competition for the funding available, this can provide them with a good reason to reject a proposal. What is more, heated disputes can easily arise over ownership of a project and its results if a grant is awarded and a nominal applicant begins to make unanticipated claims.

Another form of dishonesty is to exaggerate in the application what resources are required, on the basis that the sums will in any case be reduced and, this way, funding may end up at an acceptable level. Such exaggerations also give rise to quite a brutal culture among reviewers, in the long run devaluing the credibility of researchers. In addition, they increase the risk of honestly estimated requests for funding being reduced as a matter of course.

It is of course also important to be honest in one's assessment of the potential ethical problems of a project and how they can be managed or resolved. Since it is only recently that such issues have gained wider attention, applications are still received in which researchers fail to adequately address them. Careful ethical assessments, however, are a mark of quality, not only in research reports, but also in applications. A well-considered examination of ethical concerns may very well be a deciding factor in the evaluation of a proposal.

If a researcher wishes to use a research grant for *other purposes* than those for which it was originally awarded, he or she should inform the funding body and enter into negotiations with it in good time. In the case of commissioned research, special conditions may apply. Minor deviations from the original plan are natural, and usually acceptable. But since it is difficult to draw clear dividing lines in this regard, it is always advisable to contact the grant giver when you know that you have made significant changes. It is also important to bear in mind that a modification of a project could raise new ethical problems. Sometimes this may necessitate a new ethical review of the project.

A special form exists for applications for appraisal by a regional ethical review board, the various points on which are together intended to illuminate the ethical aspects of the project. An application that has been submitted to a public authority, such as an ethical review board or the Swedish Research Council, becomes an official document from the moment it is received. If there are no grounds for classifying it as confidential, it also becomes a public document. Its contents are thus available to anyone who requests access to it, which can cause difficulties for example in connection with patent applications. Ways of solving these problems are currently being discussed.





# 4 CONDUCTING RESEARCH

## 4.1 Choice of method

The method chosen for a research project is crucial to the value and character of the results. The choice is often difficult, requiring considerable experience, and often boldness. Not uncommonly, it is made on the basis of knowledge acquired and work undertaken in the past, perhaps by earlier generations in the same research group or department. Sometimes the research environment at the department in question is so “steeped” in this methodology that alternative approaches are simply not discussed or even considered. In such cases it can be useful to deliberately look for alternatives and perhaps (possibly in collaboration with researchers from other methodological traditions) to undertake parallel studies using different methods.

In scholarly research, questions of method are crucial, and linked to criteria of scientific quality. This is true not least in the humanities and social sciences. There is, for example, a difference that is more than merely practical between studies of humans based on measurements, say, of reaction times or response frequencies in structured questionnaire surveys, i.e. “positivist” methods, and “hermeneutic” studies in which the researcher interprets the thinking of individuals, as revealed for instance in correspondence or in-depth interviews. In a discussion of what method to choose, the generalizability and supposedly more or less objective character of the results may have to be weighed against the interest and “depth” of the scientific conclusions that can be arrived at. This does not mean, though, that it cannot be particularly rewarding to attempt collaborative research which combines positivist and hermeneutic methods. The choice between these two approaches also has ethical implications. In studies of the first-mentioned kind, the researcher’s relationship to the individuals studied is often cooler and more distanced; in the second type, it involves a greater element of empathy. In both cases, the researcher’s position can entail ethical complications or risks.

Choices of method can also involve other important ethical deliberations. It may be a matter of deciding whether animal experiments can be completely or partly replaced with work on tissue samples, whether a drug trial should be abandoned when serious adverse reactions emerge, or whether placebo treatment of a control group should be cut short when the drug is found to be effective. It may also be a question of how to limit the scope

of an interview study of children of abused mothers, to what extent violent tendencies or intelligence should be measured in socialization studies of different ethnic groups, and so on. In principle, the ethical aspects of such work should be considered by a regional ethical review board. Generally speaking, for a particular piece of research, a method should be chosen which minimizes the conceivable harmful consequences for the individuals concerned, if in other respects the methods available are of reasonably similar merit. In addition, the benefits of the research planned, and the scientific value of the results that can be expected, should be weighed against any adverse impacts.

In the natural sciences, medicine and other fields, in Sweden and elsewhere, the work of research groups tends to be quite strongly method-driven, being based on a methodology developed within the group and forming a unifying link between a number of different projects in which it is employed. In such cases, the choice of research problem may be determined by the preferred method. This is at odds with the conventional notion of the researcher as a problem solver, who first asks a question and then chooses a method to answer it. At worst, the research undertaken by a method-based group will become fragmented, and much of it may be quite superficial. On the other hand, a systematic exploration of the potential of a newly developed method can be of great value. It also has to be said that, in general, many advances in the modern natural sciences, from astronomy to brain research, are to be regarded largely as a result of developments in technology that have made possible new methods. Advocates of “pure science” may prefer to ignore it, but the fact remains that technical progress has made possible many of the advances in the natural sciences, just as scientific discoveries have made possible progress in technology. Research groups working in natural sciences have every reason to acknowledge and value the contributions made by technical specialists, both within and beyond such groups.

### What would you do in the following situation?

A PhD student has a supervisor who received her own training in a positivist tradition and who has a solid grasp of quantitative methods and concepts. The student is working on a problem that could also be studied using other, qualitative methods. He wants to study these methods more closely, and has the support of others at the department. But his supervisor wants him to stick to his original research plan, and threatens to withdraw as his supervisor if he does not. The PhD student realizes that, if he insists, it could damage his career.

*What should he do?*

## 4.2 Data handling and archiving

The various data and samples that are collected in the course of a research project are referred to as source, or primary, data. They may consist of instrument output from experiments, astronomical images from space telescopes, X-ray images from hospitals, tape recordings of interviews, results of large-scale computer simulations, soil samples, tissue samples and so on. Many researchers put a huge amount of effort into gathering such material. At many departments, researchers regard their source data as their personal property. That view, though, has to be questioned. The work of collecting the data has as a rule been done as part of a contract of employment, often with public funding; society may thus have invested major sums in the study in question. The value of material of this kind may be considerable, for later generations as well, and perhaps for reasons which cannot currently be foreseen.

It is important, therefore, to handle source data with great care and to retain and archive them in such a way that they can be made available to researchers other than the ones who gathered them. In the shorter term, this is important in order to allow published results to be verified following publication, for example to trace sources of error or to enable the researcher to counter accusations of research fraud. Investigators therefore cannot promise that no other researchers outside the group collecting the source data will ever, under any circumstances, be given access to those data. A PhD examiner, for example, may need to be able to review the data collected.

Establishing procedures for archiving can hardly be regarded as the responsibility of the individual researcher or research team alone. Such procedures have to be put in place and maintained by departmental managers. But in practice responsibility for ensuring that they are followed often falls on the project leader and individual researchers.

Obviously, every piece of data, every computer run, every test result from an accelerator etc. does not have to be preserved for posterity. As part of its procedures, a department should have ways of determining practical limits to the endeavour to document research. But it is important to make sure the procedures adopted are in fact applied by all concerned. Nowadays, the turnover of postgraduates and young researchers holding short-term posts is so high at many departments that large quantities of data and the knowledge associated with them are regularly lost by research groups because adequate procedures for documentation and archiving either are not in place or are not followed.

### What would you do in the following situation?

The research council is short of funds this year, and you have to make cuts in your projects. At the same time, one of your PhD students is on parental leave, and another has just finished and left the department. You are in the middle of a major data collection project. Your own processing of the data is in danger of making no headway, as it is so time-consuming. Archiving the data is not straightforward either. You could do with setting up a new digitized archiving system, but while this will have to be done in the longer term, now is not the right time. In addition, the doctoral student who has just left did not keep very careful records of his initial processing of the data, with the result that the task of archiving them feels insurmountable. Directives have been issued centrally, requiring data to be archived and made available. This threatens to bring the project to a complete standstill for at least six months, preventing you from publishing and obtaining continued funding.

*What do you do?*

In Sweden, processing of data and archiving are subject to legislation which also applies to research (see section 9.12).

### What would you do in the following situation?

A researcher, Adam, collects data from a specific group of adult informants. He promises that no one outside his research group will have access to the data. Later his findings are questioned by two other researchers, Brian and Cecilia, who request access to his source data. Adam refuses to hand them over, referring to his promise to his informants. The case reaches an unexpected conclusion when colleagues of Adam's say they have destroyed the source data on their own initiative.

*Is the action taken by Adam's colleagues ethically acceptable? Is it compatible with existing legislation? Has Adam promised more than he can deliver?*

The above example draws attention to problems that can arise in both social science and medical research, and can help to clarify the principles mentioned earlier in this section. As regards what a researcher can promise, what information should be retained, how source data should be archived and who should have access to them, it may be helpful to distinguish between a number of different situations:

#### 1. Verification of data, e.g. in conjunction with the presentation of a PhD thesis

In our opinion, access to source data for verification purposes is non-negotiable. That is to say, a researcher cannot promise that no other researcher, under any circumstances whatsoever, will be allowed to scrutinize the data. This is of course subject to the condition that the examiner or other

person looking at the data undertakes to observe the same confidentiality etc. as the researcher has promised the participants. In clinical trials of drugs, such a principle has long applied.

## 2. Secondary use of data, i.e. subsequent use in other research

It is a basic principle that source data and other research material produced with government funding, for example in the form of a grant from the Swedish Research Council, are not the private property of the researcher. Under certain circumstances they may be used again, after a certain time has elapsed and subject where relevant to ethical review and other appropriate consents. This is a way of making research more efficient, and is already systematically applied in many quarters, for example with respect to data collected at major international research facilities. The researcher can, however, restrict other investigators' access to data for such purposes, for instance if the data are personally sensitive and there is good reason to believe that subjects will otherwise refuse to take part. The alternative, in other words, might be no research at all. That risk has to be weighed against the gain in efficiency terms from allowing other researchers (at a later stage) to use the data for further research.

## 3. Investigating allegations of research misconduct

If allegations of research misconduct are made, and it appears from an initial consideration of the case that they cannot be dismissed as unfounded, then a more in-depth investigation has to be undertaken. This is also in the interests of the researchers accused – only by conducting such an investigation is it possible to clear them of suspicion. This can be done with the help of the Swedish Research Council's Expert Group on Research Misconduct. This group, whose members are appointed by the Council's Board, then has to take over all the pledges of confidentiality made by the accused researchers. Scientists who destroy data to prevent anyone else gaining access to them can never at a later date be cleared of allegations of research misconduct.

This means that researchers can never promise that no other researcher, under any circumstances, will be allowed access to the data collected. It should be made clear in the information given to participants that this may happen in special circumstances and for specific purposes, for example for a scientific review of the research, but that the researchers performing such a review will undertake to honour the promises of confidentiality which the researchers collecting the source data, or the equivalent, have made to the participants.

## 4.3 Results – validity and generalizability

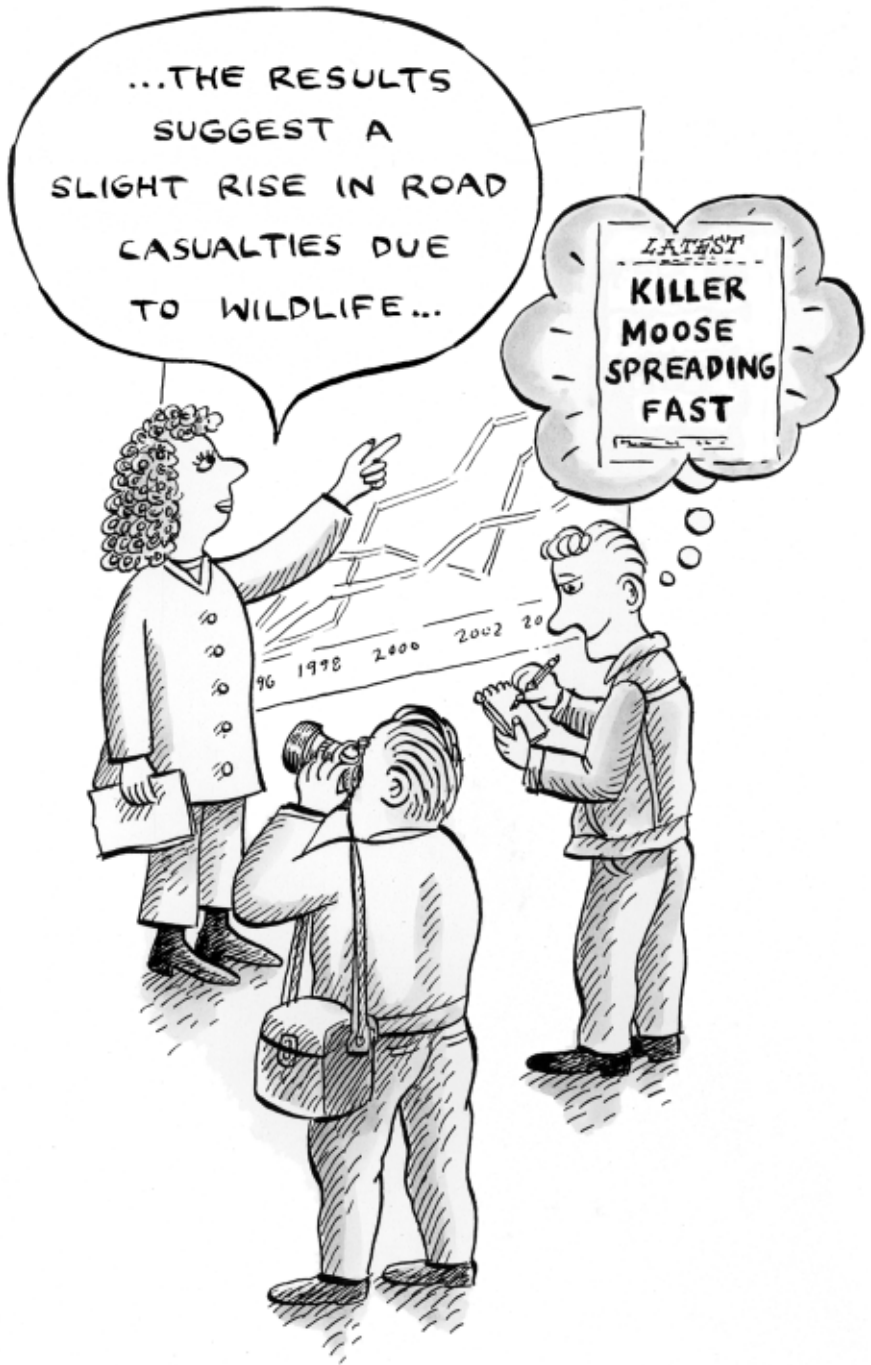
When a scientific study begins to generate results, the researcher is faced with the difficult task of assessing how much confidence can be placed in them. This is an integral part of the study. In most research traditions, a careful error analysis is usually required, or at least a discussion of possible sources of error and other factors that could affect the validity of the results. The challenge is to ensure that such assessments are realistic. It is ethically questionable, and damaging for the research undertaken, if indications of substantial sources of error are deliberately ignored, for example to be able to publish an article at all, or if the researcher takes a gamble on the results being correct, so as to be the first to announce a new discovery. On the other hand, researchers should not allow exaggerated caution to deter them from publishing their results altogether. The most important thing is to be clear, critical and honest about how sources of error have been assessed.

This assessment is often limited by the research tradition and method within which one is working. Certain sources of error are not “visible” if the analysis is performed in the light of a particular theory or model. It is important therefore, when undertaking an error analysis, not to confine oneself to “internal errors” falling within the framework of the chosen approach, but to broaden the perspective to take in other, alternative approaches. This can be very difficult, however. Often the researcher is forced to limit the scope of the analysis, but it is then all the more important to carefully describe its starting point and limitations.

A common and tempting mistake can be to overestimate the importance of the results achieved, and to extrapolate them far beyond the field in which they have been found to hold good. Problems can arise, for example, when a supervisor gives postgraduate students research tasks based on vague speculation of this kind, without making clear to them, or even to him- or herself, the uncertain basis for the work.

It is also important for researchers to realize that what they communicate to others not only has an impact on the expert discussion in their own discipline, but also has significance in a wider context – among researchers working in other fields, in the media and among the general public. Particularly when dealing with non-experts it is important to make clear the uncertainty of any extrapolations. It is not uncommon to come across researchers who, within their own discipline, are careful to emphasize the limited validity of their conclusions, but who in the press and other media quite calmly express themselves in wildly misleading ways, perhaps to attract interest.

Such behaviour is unacceptable. Journalists may well want straight answers, and preferably sensational ones, but that does not excuse researchers who allow such speculation to be presented as fact.





# 5 PUBLISHING RESEARCH RESULTS

## 5.1 General remarks

### Why publish?

Researchers are generally considered to have a duty to publish their results and not to withhold their findings from society and other scientists. Publication is to be regarded as an integral and essential part of the research endeavour. Researchers must be careful therefore, for example when accepting commissioned work, to make no undertakings to refrain from publishing their results, to restrict their publication or, say, only to publish them if a particular outcome is obtained.

Publication serves several purposes. Only if the results are made public does the research conducted contribute effectively to the transmission of new knowledge to the wider society. What is more, publication is often essential if others are to build on the researcher's ideas or to develop practical applications. But it is also necessary to enable the scientific community to scrutinize and discuss the results achieved. The report which the researcher presents consequently has to meet a number of quality requirements. In addition, publication serves as an announcement of what the investigator (or group) concerned has accomplished. The work published is thus of importance when it comes to assessing the worth of a contributing researcher, for example when he or she is applying for a position.

In the case of projects funded by the Swedish Research Council, researchers are required to make their results available to others. A body providing co-funding may not delay publication for more than two months, unless a patent application is planned, in which case a time limit of six months applies (see the Council's guidelines in section 9.8 below).

### Disclosure of financial and scientific dependence

When publishing one's results, it is important to clearly disclose any ties or dependencies that may exist. If the research is commissioned, the commissioning organization should be named. Details should also be given of any individuals or bodies providing financial support for the work. A researcher often builds on other people's results, uses ideas, concepts, theories and methods drawn from their work, or develops his or her arguments in dia-

logue with others. It is important to describe such relationships, too, to make clear what the researcher's (research group's) own contribution is.

## Background, materials and conclusions

An honest and clear account of the background to the study should always be included in the published report, which will involve quoting and referring to relevant earlier publications. Materials and methods must be described with sufficient clarity and detail to allow a reasonably well-informed reader to assess the scientific quality or significance of the results. Where research is based on empirical data and statistical methods, for example, any missing data must be reported and the statistical analysis clearly explained. Empirical studies must also be presented in such a way that their reproducibility can be tested, i.e. it must be possible to repeat them or verify them in some other way. These requirements have to be met if it is to be possible to check the work done and assess its quality and the significance of the results.

It is important that the presentation given of the results and conclusions is balanced and fair. An account of the assumptions underlying the conclusions drawn, the limitations of those conclusions and the area in which they apply, for example, and a discussion of possible objections are crucial quality factors in the publication of research.

## Forms of publication

Research results are normally reported in writing, either in book form or as articles in scholarly journals. In many fields of research, for example in medicine and the natural sciences, it is now common in Sweden and other countries for a doctoral student to present a thesis incorporating a number of such articles. Where this format is chosen, the articles are preceded by an introductory narrative, which provides a background and summary and shows how the articles are related to one another. The individual articles may have several authors, but the introduction should be the work of the PhD student alone. Somewhere in this opening section or in the rest of the text, it should also be made clear what aspects of the research and what corresponding portions of the articles are the work of the student.

In the humanities and social sciences, the monograph – a single, coherent text, written by the PhD student alone – is currently the normal form of publication used for doctoral theses. After completing their doctorates, too, researchers in these fields often publish their results in book form.

In the various fields of research there are established practices and explicit norms regarding the format of dissertations and articles. Generally,

the results will be of international interest, in which case they should be published in a language that is widely understood, preferably in an international journal. For topics and results of interest to a more limited Swedish or Nordic audience, it may be appropriate to write in Swedish. Researchers based in Sweden also have a responsibility to help maintain and develop an adequate scientific vocabulary in Swedish. The language of publication thus has to be decided on a case-by-case basis. A publication in Swedish should, though, include a summary in another language, such as English. Results can also be published by means of an oral presentation at a conference, generally combined with printed documentation.

### What would you do in the following situation?

A postgraduate student intends to write a monograph thesis, despite the fact that the work to be presented forms part of your project and you feel you have a major stake in the results. You would therefore prefer the results to be published in a series of articles, with yourself as co-author. The student says that “it will feel much better to have written a book of my own”.

*Do you try to influence her decision? And if so, how?*

## The “third task” and the media

Under Sweden’s Higher Education Act, one of the main tasks of the country’s universities is to inform the general public about research. This is most commonly, and most easily, achieved through the media. It is important in this context for researchers to understand how the media operate. Their concern is to discover and transmit news, and they therefore want to be able to report what is happening or being developed as early as possible. They have a natural urge to try to get researchers to “reveal” new findings and discoveries, and to be the first to report things that could challenge the established wisdom. There is also a clear tendency to stress the dramatic, the different and, if possible, the personal and the kinds of issues that will directly involve the individual reader, viewer or listener.

These are mechanisms of which the researcher should be aware. It may be tempting to succumb to this media pressure and announce results prematurely, and even exaggerate their importance. There have been cases of authorities and funding bodies, too, pushing researchers in that direction.

The researcher should resist these temptations and pressures, however, and not allow the popular media to publish preliminary results that have not yet been independently checked by other scientists. It has to be possible to present the data and methods on which the results are based. If at a later date, and on closer scrutiny, the results announced prove incorrect,

then false hopes will have been raised among the various people directly or indirectly affected by the study, for instance patients or relatives of patients with the disease being studied. Prematurely publicized results may also cause third parties completely unnecessary anxiety. Well-founded alerts to newly discovered problems should of course be published as soon as possible, but the researcher must guard against exaggeration, for example by securing independent peer review of the results.

On the other hand, researchers should learn not to shy away from media enquiries, but instead try to answer them, or else refer them on to suitable experts. The researcher has an important part to play in answering, clarifying and discussing, in both interviews and articles, research problems raised in the general news or in public debate. Secrecy and silence give rise to misunderstandings and suspicion.

### What would you do in the following situations?

A journalist interviews you for a national newspaper following a new discovery, and the resulting article paints you as a hero and hugely exaggerates your contribution, particularly compared with researchers abroad. You protested when you saw the draft – but the published version is still over the top. You are considering writing a letter to the editor to correct it and, if it is not accepted, sending copies to the researchers concerned and others. Next week the research council is to decide whether your research group is to receive a “grant for excellence”.

*Do you also send a copy of your letter to the members of the council? Or are you unsure about the appropriateness of such a gesture?*

In a science programme on the radio your professor gets his facts wrong, and not for the first time. He expresses himself, with great self-assurance, on matters far beyond his field of expertise. You raise the matter with him (again, not for the first time), but this time he does not simply shrug his shoulders, but tells you to get in touch with the producers to do a piece of your own and “have the fight out in the open”. Next term he is to decide on an extension of your postdoctoral fellowship.

*Do you contact the radio station?*

## Publication on the Internet

A form of publishing that is becoming increasingly common is publication on the Internet. This is an excellent way of making texts available and of presenting results with minimum delay. However, to safeguard quality and also to avoid the problems associated with preliminary results, mentioned above, an article should not be posted on the Internet until it has also been

accepted by a scholarly journal. In our view, it is not sufficient for the article to have been submitted to the journal. In such a context, moreover, the journal may impose certain conditions that have to be observed by the researcher.

## Publication as a measure of worth

Since published works are of major relevance as evidence of a researcher's worth, for example when he or she is applying for a position, there is a temptation to break research results down into "least publishable units", so as to be able to present a larger number of titles. Such a proceeding is contrary to good research practice. It makes it more difficult to check the results of the research, with each individual article only providing some of the information which a more comprehensive one could convey. Generally speaking, a complete presentation of the results should be given, and published reports should not be fragmented in such a way that subsets of results from the same study are presented in different publications. If this nevertheless occurs, there must be clear reasons for it, and cross-references must be given to where other results from the same or very closely related studies are published. Duplicate publication, i.e. the publishing of articles very similar in content, perhaps with different titles, should also be avoided.

It is imperative that departments, faculties and research funders make it clear that it is the quality and not the quantity of publications that is the decisive criterion when appointments are to be made and grants awarded, and they must apply this principle consistently. A publications list is not necessarily better because it contains more titles. When writing assessments of applicants, it is important to be critical of authors who repeat themselves in one article after another.

### What would you do in the following situation?

For far too long now, in your applications to the research council and at various international conferences, you have been talking about a major work that is soon to be finished, and of which you are rightly proud. Now you are finally going to publish it – and not before time, because you have heard that a group in Hamburg have a similar publication in the pipeline. Then one of your colleagues discovers an irritating error in one of your computer programs. Probably it is of no significance, but it will take at least six months to fully investigate the consequences. If your work is not published before the next application round, or the Germans beat you to it, the livelihoods of a postdoc scholarship holder and a postdoctoral research fellow funded from your council grant will be put in jeopardy.

*What do you do?*

## Key players

Apart from the author or authors, a number of other parties are involved in and influence the process of publication. The most important of them are the responsible publisher, the editor, and the referee or reviewer. They all have responsibilities in relation to the matters mentioned above, but in addition they have certain more specific areas of responsibility.

## 5.2 The author

As a rule, the author is considered responsible for the contents of a book or article presenting his or her research. That includes everything related to the actual project – methods, validity and reliability of the results etc. – but also the quality of the manuscript. It is also the author's responsibility to ensure that one and the same manuscript is not simultaneously submitted to or published in several different journals. Another responsibility is of course to make sure that the references and quotations in the text are correct. The basic principle is that it is the author's job to check all the references.

In the case of research based on statistical analysis, a scientific interpretation has to be undertaken, taking careful account of all the basic assumptions and limitations of the procedure used to test the hypothesis. The results also have to be interpreted in the light of previously published findings, and other investigators' results cited where relevant.

Researchers studying, for example, the links between gender and absence from the workplace, the incidence of crime in different groups in the community, or the economic situation, genetics and dietary habits of different ethnic groups, must make sure they present their statistical interpretation of the data, in relation to their scientific hypotheses, and explain what that interpretation shows and what underlying assumptions have been made, even when the results are published outside traditional academic circles. If authors foresee a risk of too much being read into the results in the media, they have a responsibility to try to preclude that risk, especially if it might cause harm to third parties.

In general, a good scientific presentation will include an active discussion of the results by the author. That means, as emphasized earlier in this report, that the author should not only cite or refer to works which support the proposition advanced. It is also necessary to present possible arguments against it, and try to respond to them in the text.

Every effort must be made to write clearly and precisely. This is not just a matter of form. Many academic dissertations are read only cursorily, or

barely at all, and the results reported in them must therefore be immediately apparent if they are to have any impact. Similarly, underlying assumptions and significant sources of error must be clearly stated, and not fudged or glossed over. To say that you are “not a very good writer” is no excuse. You can take time to improve your writing, and you can also ask colleagues who are better writers to read and correct your work. It should also be noted that, as a rule, acceptance for publication in an international journal is no guarantee of high quality. Many journals these days do not have the capacity to undertake meticulous quality control, and many formally qualified referees are short of time and cut corners. Slipshod publications can render all your work as a researcher meaningless, and there can be no one but yourself to blame for a poorly written article.

## 5.3 Multiple authors – responsibility – publication rules

Why is the question of authorship important? One reason is that the authors’ names are, rightly or wrongly, seen by colleagues in their field as an indication of the quality of a publication. Consequently, it is important to know who actually did the work, so as to be able to evaluate the results. A second reason is that researchers applying for positions are assessed to a large degree on the basis of their publications. Obviously, therefore, it is important that no one is listed as an author who should not be, and that no one who should be so listed is omitted. In addition, most credit is to be gained from appearing as the first author of a scholarly article. Two questions thus need to be asked:

- Who should be designated as the author or authors of an article?
- In what order should multiple authors be listed?

The first question has been discussed at length internationally. An influential group of journal editors decided to attempt to draw up general guidelines on co-authorship. The result was a set of criteria described in the *Uniform Requirements* mentioned in section 9.10 below.

To be credited as an author according to these criteria, it is not sufficient, for example, to collect patient data or provide a limited input – such contributions can be acknowledged in other ways, for example in notes or a preface. “Bartering” between authors, whereby they take turns as first author in

different publications, should also be avoided, unless there is justification for it on the basis of their actual contributions. A “political” placing high up on the list of authors to secure funding for one of the groups involved, for example, is inappropriate.

For an individual to be judged to have done enough to be listed as a co-author, several criteria in fact have to be met: he or she must have contributed to the basic conception or analysis, and to the drafting or critical revision of the article. Finally, all the authors must confirm that they accept responsibility for the article. This also rules out “honorary authorship”, i.e. including a well-known scholar as author purely as an honour – and perhaps with the ulterior motive of more readily securing publication of the paper.

An alternative to the approach just described is simply to list everyone who has been involved in the work in some way and to state what they have done, roughly in the manner of the closing credits of a film or television programme. Which is better depends on what one wishes to achieve. If the aim is to reduce the number of people given as authors, the *Uniform Requirements* criteria are to be preferred. If we want a system that reflects what contribution everyone has in fact made, then the second approach is better.

As regards the order of authorship, too, practices vary. One common tradition is to list the authors in alphabetical order, unless one of them has had a clearly dominant responsibility for the work presented. If the order is other than alphabetical, the first author will generally have made the most important contribution. Appearing first in the list will then carry most credit (assuming it is a good article). To avoid misunderstandings, disappointment and frustration, it is important for the rules in this respect, too, to be known, and for deviations from them to be stated and explained. New PhD students should be familiarized with such rules as part of their post-graduate training.

Many problems can be avoided if agreement is reached at an early stage, not only on who does what, but also on the order of authorship. Preliminary agreements can and should of course be changed if someone other than the person originally intended as first author turns out to make the biggest contribution.

### What would you do in the following situation?

Prior to a meeting of a PhD examining committee, one of the members discovers that three of the articles making up the thesis have a co-author who died three and a half years ago. The articles concerned were published this year or have recently been submitted. The author in question had in other words been dead for at least two years before the papers were completed. The data were collected around five years ago, however, so the person concerned may have had a hand in planning the project and collecting the data,

but hardly in their analysis and interpretation. Still less was he in a position to influence the drafting of the articles or to choose not to be listed as co-author if he had felt unable to accept the contents. And obviously he could not have approved the final versions of the texts.

*Is it right for the deceased researcher to be listed as a co-author? What arguments could be advanced for and against his inclusion? What course of action should have been chosen instead?*

## 5.4 The reviewer or referee

Different phases in the work of the researcher present different temptations to compromise on basic standards of scientific quality. A special type of temptation arises in the assessment of someone else's work, for example when a supervisor reads a draft of an article or a thesis chapter, or when a manuscript is submitted to a journal for publication. It is very common in the academic world for a researcher's work to be assessed by his or her colleagues. Since such assessments presuppose expert knowledge in the field concerned, there are few alternatives to this system, which is generally referred to as "peer review". In recent years, however, it has been called into question in many quarters, including in publications such as the *British Medical Journal*.

One reason the system has been challenged is a number of flagrant cases of peer reviewers abusing the trust which being given access to a colleague's work to assess it entails. Such abuses have included reviewers stealing ideas from submitted manuscripts, "sitting on" manuscripts for a long time to enable researchers in their own groups to publish their results first, or trying without just cause to prevent the publication of colleagues' work.

Another important reason why the peer review system has been questioned is that the volume of manuscripts submitted to journals is now so great that it can be difficult to find willing and competent reviewers or referees. This is also a reason why researchers should not try to publish articles which they themselves, deep down, realize are unsuitable for publication on scientific grounds.

Journal reviewers sometimes know the identity of the authors, but the authors do not know the identity of the reviewers. Unfortunately, this asymmetry has sometimes been exploited to the detriment of scientific opponents or personal enemies. Temptations to abuse the system could be reduced if it were either entirely open or else double-blind. With the first alternative, the reviewer knows who the author is, and the author knows who the reviewer is. With the second, neither party knows the identity of the other. (Concerning conflicts of interest, see 9.9.)

For the system of peer review to work, reviewers must submit their reports as quickly as possible. It is also essential that they do not use information in the manuscript for their own purposes without referring to the source, and that if they do wish to use it, they first contact the author and ask whether he or she has any objection. Finally, reviewers must be guided by objective reasons in deciding whether or not to recommend publication, and must try to be constructive in their criticism.

#### What would you do in the following situation?

You are refereeing an article and discover that the authors have made a great deal of a discovery you yourself made 20 years ago, but never wrote clearly about at the time – only a parenthesis buried in a long article. Now they are claiming credit for the discovery. However, you currently have an article of your own at the proof stage, and are now considering adding a section about your old discovery to underline your ownership of it.

*Would it be right to do so?*

## 5.5 The responsible publisher and the editor

The responsible publisher of a scholarly journal has a responsibility to ensure that existing rules in the area of research ethics and current legislation relating to research have been followed. Leading international journals now insist on review of a project by an ethics committee or the equivalent as a condition for publishing the results. In our opinion, this is something that every scientific journal in a field involving research on humans or animal experimentation should require.

The editor of a journal has the overall responsibility for its scientific quality. That means, among other things, that he or she should request clarifications of methods, results or interpretations, for example, if they seem unclear. Alongside the author, who obviously has the main responsibility, the editor is also responsible for making sure a published article provides accurate references to relevant earlier research, and that the choice of references is not improperly influenced by rivalry or a conflict of interest. The editor should also provide space in the journal for debate about published manuscripts.

Researchers have found that it can be difficult to get negative results published. But what constitutes a negative result depends on how the hypothesis is framed. The editor should ensure that it is also possible to publish articles showing that a certain hypothesis does not have scientific support.

If the hypothesis is one that is currently under debate, then such negative findings are important and space should be made available for them.

**What would you do in the following situation?**

As a journal editor, you have received a manuscript from a very well-known, older researcher. You see that he has published over 50 articles in your journal, long before you became its editor, and that many of them are now classics. But his new article seems to be mostly a rehash of old material, and what is more is quite poorly structured. The referee recommends rejection. You are considering giving him special treatment by going through his paper carefully and suggesting a number of specific changes, although even then you hardly expect the result to be very good.

*Would you do this?*





## 6 RESEARCH COLLABORATION

Research is an activity that involves the accumulation of significant amounts of knowledge, and its results can be of lasting value for many people. That means that research can be very rewarding for the individual to be involved in, but it also means that it can never be a purely private matter, least of all when paid for out of public funds. Research projects are fundamentally collaborative endeavours, with a large number of interested parties.

In fields of research where large-scale projects need to be undertaken, perhaps involving heavy investments in instrumentation, large computer programs, massive interview surveys or clinical studies, extensive collaboration is a practical necessity. In many natural and engineering sciences, almost all research is conducted by large teams, possibly including hundreds of researchers scattered across the globe. Such collaborative projects do not come about by themselves: administration and project management are important in making them work. If they are to last, moreover, purposeful efforts are needed and more or less clearly stated rules have to be followed. The organization of projects of this kind and the collaboration that occurs within them raises particular problems, which we will now discuss.

### 6.1 Relations with fellow researchers

Perhaps the most common reason for establishing scientific collaboration is to broaden the capabilities available within the planned project, for example by involving a colleague who is a specialist in a method of analysis with which you yourself are not familiar. Another reason might be that a colleague has access to resources, such as an instrument, not available to you. Yet another could be that the project requires more working hours than you yourself are able to devote to it, or that you wish to complete the project in a shorter time by involving more people in it. It is also common, no doubt, simply to want to have other people to work with, to be part of a team. Collaborations can also arise naturally when researchers supervise students in the framework of their own projects.

Whatever the motives for collaboration, it is crucial to form a clear idea at an early stage, and to make it clear to your fellow researchers, what you expect of each other, and not least what you yourself are able to contribute.

The division of labour should be a realistic one. It is important to establish a time plan for the various parts of the project, even if it has to be updated as the work progresses. Like all joint ventures, scientific collaboration requires a certain degree of reliability in keeping to agreed timetables.

It is still possible to see examples of scientific collaboration in which the participants take such responsibilities quite lightly. Collaborators contribute to the common undertaking “when the spirit moves them”. If the project involves postgraduate students or researchers in early stages of their careers, this is *totally unacceptable*. They are so dependent on being able to produce a track record of publications and other results in order to be able to continue at all that collaborative projects in which they participate must involve a realistic sharing of the workload and a viable and quite strictly regulated time plan.

In many collaborations, a modified division of labour gradually crystallizes out, with some researchers not contributing in accordance with the original plan, while others fill the gap by doing more. Such adjustments are natural, but they should be openly discussed when they become apparent, and should be reflected in the authorship of the final publications. It causes a great deal of trouble and frustration if researchers who do not have time to participate as intended nevertheless continue to promise to contribute to the joint project, with no realistic chance, or perhaps even intention, of actually doing so.

### What would you do in the following situation?

A research group is dominated by a charismatic leader with brilliant ideas and widely fluctuating moods. He is seen as Nobel Prize material. The group is funded entirely by large research grants which he has secured. As a newly employed member of the group you challenge the leader at an informal seminar. He leaves the room. You are told that he is sensitive, and has several times threatened to leave the department and take a post abroad when his prima donna ways have been criticized. This would be a total disaster for the group's survival.

*Should you learn to restrain yourself? Or do you quietly leave the group?*

The different roles which various participants assume in a collaborative research project are not always what everyone would wish. As in other joint efforts – whether it be a matter of domestic chores or team sports – you can end up with certain people taking on responsibility for broader plans, or tricky details, while others look after routine tasks or maintain order. Preferably, of course, everyone should have the chance not only to use the abilities they already possess, but also to learn new skills. This is particularly true of research students and other young researchers; senior members of a

group have a special responsibility to ensure that their younger colleagues' interests in this respect are provided for.

It is a good idea to broach the subject of publications and their authorship early on, at the planning stage. These issues should be discussed again if the division of labour changes or the project develops along new lines. It may be tempting to put off crossing that bridge until you come to it, but experience tells us that, by then, it may be too late. Plain speaking about what rewards different individuals expect and lay claim to in terms of publication credit greatly reduces the risk of conflicts later in the day.

When the project and its results are presented in more informal settings too, for example in papers at international conferences, care should be taken to give a correct picture of different participants' contributions. In such contexts, the results presented are commonly perceived chiefly as the speaker's own, and precisely for that reason emphasis should be placed on the contributions of one's colleagues.

A large research group often generates a sizeable and valuable common database of experimental data, computer software etc. Who owns such material? This question is sometimes raised, not least when postgraduates or postdocs from the group move to other centres to continue their careers. Will they then have free access to the database? This cannot be taken for granted, especially if the researchers in the group have not yet completed and published their analysis of the data. It is important to discuss such questions when the database is created, or at any rate before PhD students and other collaborators leave the group.

## 6.2 Responsibility for a collaborative project

In certain contexts it is necessary to identify the individual or individuals formally responsible for a joint project. If, for example, use is to be made of a major international research facility, such as CERN or ESO, a *principal investigator* (PI) has to be designated. Preferably, this should be the initiator of the project or its administrative leader and coordinator. A PI also has to be identified in an application for ethical review. It is important not to fall for the temptation to choose a "high profile" name, if the person concerned cannot take on full responsibility for leading the project. In general, it is also advisable to refrain from naming celebrated researchers as co-applicants, members of reference groups etc., merely to give the project greater credibility. Such individuals can express their favourable opinion of the work in other ways, for instance by writing a letter of support. As part of

a professional evaluation of project proposals, funding agencies will seek to clarify the real management structure of projects and the capabilities of those actively involved in them. It makes for greater credibility if such matters are dealt with openly.

When a project involves a large number of researchers at different stages in their careers, large quantities of unique equipment or very substantial funding, competent management and effective administrative arrangements are essential. Many research projects are wanting in precisely these respects, making the research inefficient and completion times unnecessarily unpredictable. For postgraduate or early-career researchers especially, such a situation creates difficulties. From the point of view of society at large, too, it is obviously unsatisfactory if resources made available are not put to efficient use. The bohemian charm often associated with creative environments does not excuse laid-back or incompetent leadership or careless management of funding. Public agencies and other funding bodies have a right to expect all researchers entrusted with public funds to make sure they are used in the best possible manner, and clearly that applies especially to large-scale projects. Such projects, moreover, have resources which they can devote to this purpose. Resources also need to be set aside for documentation and archiving of the often unique research data generated.

### What would you do in the following situation?

Your research group has become part of a major international consortium that is to build a large instrument at a synchrotron light source. You take on the task of developing the sensitive detector system, a project that involves you yourself as research group leader, two postdoctoral fellows, a research engineer and two PhD students. Two years into the project, the most important partner in the consortium pulls out. The group concerned now has new leaders, with different priorities. An American group is prepared to take its place, but they also want to provide the detectors, to a different design which, it turns out, outperforms your own. The other members of the consortium seem inclined to accept the American offer, leaving the work which you, and especially your PhD students, have put into the project out on a limb. What is more, there is a risk of you ending up with no funding for your group. If, on the other hand, you can persuade the research council to increase its grant to the project as a whole, you could use it as an argument for keeping your group involved. You would be able to “buy your way back” into the project.

*Do you try to secure a larger grant, despite the fact that, scientifically, the project would benefit from the American detectors?*

## 6.3 Interaction with funding and commissioning bodies

Major collaborative projects may involve or affect dozens of research groups in as many countries. They may be supported by a large number of funding bodies, often national research councils or the like. An honest and open attitude to these funding agencies is important and, in the long run, beneficial to the research undertaken. In an international project, there may be a temptation to describe your own national involvement as more advanced or extensive than it really is. This can occur both in your direct dealings with the funding body, for example when you apply for grants; and more indirectly, in your dealings with the media: differently targeted press releases may perhaps be written for the media of the different participating countries, lending exaggerated prominence to each individual country's own researchers.

In the case of large-scale projects in particular, funding agencies quite justifiably wish to monitor progress. It is therefore important for project managers and participating researchers to develop appropriate ways of keeping them regularly informed. It is particularly important to give ample warning of forthcoming decisions within the project which will have far-reaching financial consequences. The agencies' experts, who will usually have introduced the original proposal to the relevant review panel, are often colleagues of the researchers who make up the project management. They, too, should be kept posted on how the work is progressing.

In principle, researchers should show the same openness to non-public commissioning and funding bodies as to public ones. Of particular interest in this context, of course, are private companies. It is not uncommon for the researchers involved in a project to have partly different motives from the companies that have commissioned and supported it. This is not something that should be denied or hushed up – on the contrary, once again openness is to be recommended. But these differences in motives may very well re-surface in new ways, not least when a strategy is to be adopted for the way ahead in the light of results necessitating a reappraisal of the project design. In such circumstances, researchers should make it clear where they stand, and not try to negotiate with hidden agendas.

### What would you do in the following situation?

In the course of a research project, you discover that a classic problem of applied psychology, which you and others have long been working on, has in fact been wrongly formulated. With your deeper insight, you now realize that a number of earlier contributions in

this field are irrelevant. Certain chemotherapeutic methods which seemed promising will probably not work. On the other hand, completely new possibilities have now opened up, though hardly of a kind that can be turned into commercial therapeutic products in the foreseeable future. You have an annually renewable contract with a company to develop the originally envisaged chemotherapeutic methods into commercial products. That grant provides funding for a PhD student who needs another three years to complete her doctorate.

*How do you act? Does the situation influence your eagerness to publish the new results without delay, results which you are almost certainly the only group in the world to have arrived at?*

The biggest collaborative scientific projects assume the form of international research organizations, based on formal international agreements. Sweden is often represented on the governing bodies of such organizations by researchers or officials, appointed by central government agencies. It is important that researchers selected for such positions do not simply regard their appointment as a personal distinction, but also see themselves as representatives of the country's research agencies and research community. This entails, among other things, ensuring that the positions which they adopt on important questions enjoy broad support from the relevant agencies and community, and regularly reporting back to their constituencies on what is happening in the organizations concerned.

## 6.4 Commercial aspects

A growing proportion of Swedish research is paid for by external funding organizations, some of which provide their support in pursuit of commercial goals. Such research is often directly commissioned by the companies concerned, and to a certain extent they may temporarily reserve an exclusive right to make use of the results. This gives rise to problems regarding the openness otherwise practised in international research today. In terms of the principles involved, these problems are accentuated by the fact that, when all is said and done, central government generally foots part of the bill for such research projects. It is justifiable to ask to what extent public commissioning bodies should agree to research results being kept secret. In 2003 the Swedish Research Council introduced rules limiting to two months the period for which publication can be deferred on commercial grounds (see 9.8 below).

Matters become especially complicated in projects co-funded by commercial organizations when, as often happens, they involve PhD students or assume the form of major international collaborations. A doctoral thesis is fundamentally a public document – the whole point of it is that it should

be open to public scrutiny by critics. But what if the PhD student's work has been funded by an industrial company that wishes to use the results in product development and therefore wants them kept confidential?

**What would you do in the following situation?**

You and a postgraduate student are applying for funding for a Phase I clinical trial of a drug to treat skin rashes. The project is to be co-funded by a company. The ethical review board refuses its approval, as the expected benefits are not judged to outweigh the risks. At that juncture, one of the managers of the company offers to get together volunteers on a private basis and carry out the trial outside both the company and academia. Your PhD student says that she can find a few friends to take part, and she herself has already started trying the drug. Your own assessment is that the medical risks are small.

*What steps do you take?*

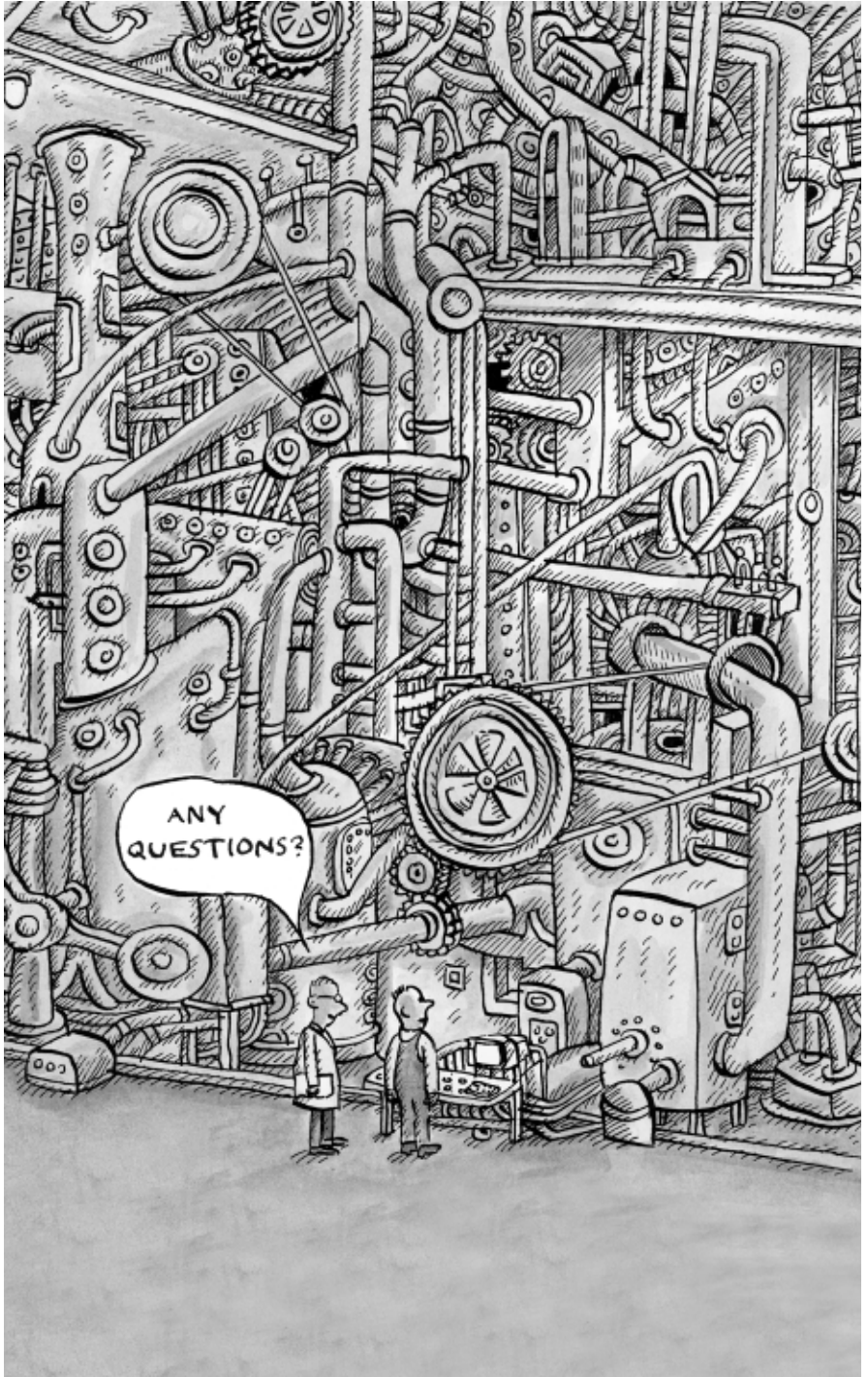
When commercial aspects arise in an international project, the diverging regulatory frameworks of different countries can cause particular problems. In Sweden, the “teacher exemption” allows research results arrived at during working hours, for example at a university department, nevertheless to be patented by the individual researcher concerned, resulting in private financial gain. In other countries, such as the United States, patent rights are to be assigned instead to the university where the work has been done. The question of ownership of the results of an international collaborative study can be extremely complex, and can easily poison the atmosphere in such a project.

Issues of this kind, including purely practical aspects of how any commercially exploitable results are to be handled, must be discussed in detail by the research groups concerned – preferably before they become a pressing concern. All participants in the project, and not least any doctoral students involved, should be informed about what rules apply.

**What would you do in the following situation?**

A company is funding a series of drug studies. Your research group has been given a large grant for such a study, in which you are comparing the company's products with similar products from other manufacturers, under varying conditions and on different target groups. The company is taking care of publication, and publishes the studies with the results most favourable from its point of view first, the less positive ones much later, and the negative ones not at all. You protest at this. The company responds by saying that all the studies will be published in the fullness of time, and that anyone who is unhappy with the company's policy can look elsewhere for research funding.

*What action do you take?*





# 7 OTHER ROLES OF THE RESEARCHER

Naturally linked to the role of researcher are a number of other roles and tasks which researchers may be entrusted with in their capacity as researchers. In our earlier discussion about the publication of results we commented on one such role, that of the journal reviewer or referee (see 5.4 above). Here we will discuss the roles of supervisor, teacher, communicator, assessor of applications and committee member.

## 7.1 The supervisor and postgraduate supervision

### The supervisor's role

#### Research areas, environments and traditions

The structure and content of postgraduate training vary according to the field of research, research environment and research tradition involved. In certain areas, PhD students undertake a clearly demarcated research project of their own, perhaps resulting in an independent monograph. In other fields, they will be one of a group of researchers or postgraduate students working on one aspect of a larger project. Here their work may result in a series of articles that will then be combined into a thesis. These differences and a number of other circumstances mean that good practice as a supervisor can be achieved in many different ways.

#### The tasks of the supervisor

In general, someone who is appointed as a supervisor has a responsibility to create conditions that will help to develop the doctoral student's knowledge and skills. The supervisor must also promote the student's own research, with a view to enabling him or her to successfully present and defend a thesis. Through discussions, teaching and their own example, good supervisors transfer knowledge, skills and experience to their students and guide the research which they are undertaking. This can be done in various ways, but certain things can be demanded of the supervisor in all the different tasks involved. Demands can also be made of the supervisee (see below).

### Respect and responsibility

Supervisors are expected to show respect for their PhD students as individuals and to give attentive support to them during their training and in their thesis work, but they also have to provide assurance of the scientific quality of their work. These different requirements may come into conflict and a balance will sometimes have to be struck between them.

One important task is to work with the supervisee to define a suitable thesis project and to draw up an individual plan of study consistent with the general plans laid down by the faculty and the department. The extent to which postgraduates are able to choose and shape their research topics can vary, however. In medicine, the natural sciences and engineering, students will often be offered a place in an existing project group, where the problems to be investigated will already essentially have been formulated. There may thus be varying scope for the postgraduate to influence the programme of research to be undertaken. It is therefore important for the supervisor to discuss with the supervisee, before a topic is chosen, the basic requirements of the intended project.

Supervision should be informed by an attitude of care and respect for the PhD student. Even if the student is “only” working on one part of a larger research project, he or she must not be seen merely as a cog in a machine. For the supervisor, the student’s own work and training as a researcher must be the focus of attention.

Where more than one supervisor is appointed, the different supervisors’ functions and relationships to the postgraduate should be clearly defined from the outset.

### Supervising a group

When supervising a group of PhD students, it is important to try to be as fair as possible, for example in terms of the time devoted to each of the students. While collaboration within the group should be encouraged, among other things as part of their training, the supervisor also needs to pay due attention to the contributions of individual postgraduates and to take them into account, for instance, when results are to be published. All students must receive recognition for the contributions they have actually made. Consequently, supervisors should not take on so many PhD students that they do not have time for them all.

### Contributor of ideas, critic and discussion partner

The supervisor serves as a contributor of ideas, a critic and a discussion partner. The supervisor is the person the doctoral student can test his or her ideas on, the person who provides encouragement, but also the person who

reads with a critical eye the texts which the student produces and who comments on results, as well as on questions of interpretation and method. The supervisor thus acts as both adviser and critic. The role of constructive critic is very important, but difficult. Criticism on a scientific point should not be withheld out of a misguided concern not to hurt the supervisee's feelings; the consequences for the postgraduate at a later stage could be devastating. Obviously, however, that does not mean that a criticism can be conveyed in any way whatsoever. The normal ground rule of all scholarly discussion should be meticulously observed: be objective, not personal.

### A professional relationship

Although supervisor and PhD student often work very closely together and it is natural for them to see each other as friends, it is important that the professional relationship that is basic to the interaction between the two always takes precedence. The supervisor has a responsibility to ensure that no circumstances arise that could jeopardize this relationship.

The supervisor is also in something of a position of power in relation to the postgraduate. This not only affects the work in progress, with the supervisor in a position to influence what is or is not to be done, what is to be written and how it is to be written. It can also affect the student's future prospects, within or outside the sphere of research. The supervisor, therefore, must constantly ensure that this power relationship is handled in a proper manner and that the student is not exploited for the supervisor's own ends.

The supervisor's demands must not be allowed to interfere with the postgraduate's right to a private and family life. There are departments which encourage an "all or nothing" relationship, and which put pressure on PhD students (and others) to give lower priority to their social lives. Such an attitude can damage postgraduates' and other young researchers' chances of developing as rounded individuals. In our view, good research practice requires that, as supervisors, we do not try to force our PhD students into a narrow researcher role which dismisses everything outside research as unimportant.

It also has to be remembered that the relationship between supervisor and supervisee can change over time. Both dependence and competition can arise. Gender discrimination and sexual harassment are other risks that need to be borne in mind. As a doctoral thesis nears completion, it is also important for both supervisor and student to consider and discuss how the fully fledged PhD can develop an independent relationship to his or her supervisor.

Even long after postgraduates have completed their doctorates, their supervisors may be consulted about their qualities and abilities, for example in connection with a job application. In such, often informal, contexts it is important to be balanced and fair. Many see their task as being to act

as their ex-supervisee's chief promoter, while others are unable to contain their personal disappointment or even envy. It may be easier to keep a sense of balance in such a situation if you ask for time to reflect, and then express yourself with care, possibly in writing. In our experience, the support which a researcher may wish to give a former PhD student is not diminished by the fact that he or she does not offer an immediate opinion, but asks for time to think about it. On the contrary, it generally makes for greater credibility if such assessments are carefully considered.

### What would you do in the following situation?

As dean of faculty, you discover that the PhD students in a certain department have serious grievances against two supervisors. Both supervisors have large research grants and are funding two postgraduates through them. The students concerned feel they are little better than "serfs" and that they are constantly harassed. You have little hope of persuading the supervisors to change their ways. The head of department has tried, but to no effect whatever. Neither the department nor the faculty really have the resources to provide alternative funding for the PhD students.

*What do you do?*

### Whose ideas?

In discussions between supervisor and supervisee, different arguments and approaches are tested and views and ideas exchanged. Sometimes it is also important in such contexts to consider how justice can best be done to the two parties' contributions as the work continues and the results are published. In the introductory section of a thesis the PhD student should clarify any scientific dependence on others, including his or her supervisor. But it is also important that, if the supervisor uses or develops on ideas from the student, this is done in consultation with the student and no attempt is made to conceal their origins. Ideas which the supervisor suggests to the supervisee for further investigation, however, do not thereby become the latter's property. The supervisor, too, must be able to continue to work on these ideas in his or her own research without it being considered unethical.

### The thesis and its presentation

The ultimate goal of the PhD student's research is to produce and present a scholarly dissertation. The supervisor decides, in consultation with the student and the examiner appointed for the discipline concerned, when the work can be considered complete and its public defence arranged. A host of different factors will be taken into account in reaching this decision, including purely financial considerations, the future prospects of the student,

undertakings regarding completion time, and the personal wishes of the student – but also those of the supervisor, for example to see a postgraduate gaining his or her PhD as soon as possible.

The primary considerations in this context, however, must be respect for the student and respect for the research programme undertaken: what else might the student be expected to achieve with the data in terms of meeting the scientific requirements for a doctorate? Forcing the pace of completion, for example to collect “PhD points” for the department, may be unethical, although it does happen in certain research settings. It also shows a lack of respect for one’s PhD students not to allow them to demonstrate their ability or show what they could achieve with the data they are investigating.

### Responsibility for ethical and legal compliance

Different types of research raise partly different ethical issues. The ethical and legal rules that apply vary, depending on the kind of research being conducted. As the leader of the specific research project on which the postgraduate student is working, the supervisor is responsible for ensuring that the project complies with the ethical standards relevant to the type of research involved. He or she must consequently keep abreast of the basic documents setting out these standards.

In Sweden, such documents include the *Act concerning the Ethical Review of Research Involving Humans*, the relevant provisions of the *Personal Data Act*, the regulations of the National Archives and the faculty’s or department’s own archiving procedures, together with the latest version of the *Declaration of Helsinki* and the Swedish Research Council’s guidelines on good medical research (*Riktlinjer för god medicinsk forskning*) and ethical principles for research in the humanities and social sciences (*Forskningsetiska principer inom humanistisk-samhällsvetenskaplig forskning*). They also include (where applicable) such documents as the regulations of the Medical Products Agency and those guiding the work of radiation protection and animal ethics committees (see chapter 9 below). The supervisor should discuss the relevant documents with the supervisee and try to create an awareness of what their application entails in specific situations and, in particular, in the student’s own research.

Since responsibility for the ethical aspects of the PhD student’s project rests with the supervisor, it is the supervisor who has to ensure, for instance, that experiments in medical research are terminated if patients or healthy subjects suffer unexpected harm, if the ratio of risk to benefit is not consistent with the risk-benefit assessment arrived at when the research was planned and approved by the regional ethical review board, or if other undesirable complications are reported under the applicable rules.

### What would you do in the following situations?

A student tells you that one of your colleagues, who is the examiner responsible for her subject, has told her that her master's thesis would be approved if she did not publish the results. You see from the thesis that, by and large, it is publishable, but that the student has arrived at results completely at variance with earlier results obtained by your colleague in a similar study. You talk to your colleague, who claims that the thesis has been "knocked together, probably faked". The student wonders whether she should report the matter to the dean of faculty.

*What advice do you give her?*

You have suggested an excellent project to one of your postgraduate students. His progress is irritatingly slow, however, despite the considerable support you have provided as his supervisor. You hear that an Italian group, including one of your earlier postdocs, is now working on the same problem, employing the same method as you are using, and which you yourself developed. The postgraduate then announces he is taking parental leave. When you point out the seriousness of the situation, and suggest that you quickly step in and complete the project yourself, the student walks out, slamming the door behind him.

*What do you do?*

A research student is involved in a collaborative project with you. There are now six months to go before his doctoral studentship expires and he is due to present his thesis. The thesis looks quite promising, but the student has decided to give up research after getting his doctorate and is already applying for jobs in industry. You now discover that measurements which the thesis is largely based on, and which you performed together, are marred by serious systematic errors which, at this stage, it is hardly possible to reduce. These errors mean that the results can scarcely be published. You offer the student a further year on a research grant to enable the measurements to be redone, but he insists on completing his PhD as planned. Otherwise he will leave the department without a doctorate, depriving the department of a "PhD point". You realize that the student "shouldn't exactly draw attention to the errors" in the thesis if he is to be sure of it being approved at the public defence.

*How do you handle the problem?*

## The postgraduate's responsibilities

A postgraduate research training programme should always be based on a general syllabus or plan of study, which the student is required to follow. As a rule, a more or less detailed, individual plan of study will also be drawn up for the student's research and the writing of the thesis. This plan can also be seen as a contract between the postgraduate student and the supervi-

sor/department. It is important that doctoral students make every effort to fulfil their side of this contract. They should therefore regularly report and discuss with their supervisors how their work is progressing, what problems have arisen and what advances have been made. They should also provide regular reports on their results in the research environment in which they work, for example at seminars held at recurring intervals.

A research student should not submit grant proposals, manuscripts or conference abstracts without discussing it with his or her supervisor first.

### What would you do in the following situations?

You are a PhD student and have finished writing up your thesis. Your second supervisor points out that, in the customary manner, you should thank your principal supervisor at a suitable point in the text. However, you feel that he has been of little help to you. His suggestions have been ill advised, and he kept you on scholarship funding for far too long, only appointing you to a doctoral studentship in the final phase of your work. Instead of a written acknowledgement, you are considering saying a few well-chosen words at your graduation party. Your second supervisor suggests that this could damage your future career.

*What do you do?*

A postgraduate, Alan, is trying to find a special cell culture for his experiments. Another PhD student, Ben, offers to lend him one, on condition that Alan describes in detail what he is planning to do. Alan does so and is given the cell culture. Later, when he is about to begin work on the experiment, he discovers that Ben has just had an article published describing how he has performed, on the same cell culture, precisely the study which Alan told Ben he was intending to carry out.

*What should Alan do in this situation?*

## The faculty's and department's responsibilities

Faculties have a responsibility for the overall quality of research and research training, a responsibility which they discharge in a number of ways, above all by drawing up local plans of study for postgraduate students and ensuring that such plans are prepared within departments for the different subject areas concerned. In addition, faculties can arrange systematic research training courses, of both a basic and a more specialized and advanced character. They also have a responsibility for funding postgraduate training.

Within a department, overall responsibility for these matters rests with the head of department. If problems arise between supervisors and students, facilities should exist in the department or faculty for consultation with an outside party.

### What would you do in the following situation?

A department has received a grant to set up a centre for research in a particular field. The money is intended to be used over two years, and there is no guarantee of subsequent funding. However, the department wishes to provide research training in the area concerned, and accepts two PhD students. Unfortunately, later grant applications are rejected.

*What responsibilities do the department and the faculty have towards the PhD students in this situation?*

## 7.2 The teacher

A role often combined with academic research is that of teaching, on both undergraduate and postgraduate courses. The role of teacher carries special responsibilities, towards the students and towards the department offering the courses.

Teaching is a difficult but stimulating job. It involves an obligation to provide instruction that is both interesting and factually correct. The subject matter has to be presented as objectively as possible, and yet also made tangible and brought to life. As a rule, there is good reason to describe different approaches to and angles on a particular subject. Often, though, teachers will be forced to simplify, and they should make it clear where this is the case. They should also be ready to admit that they do not know the answers to certain questions asked by their students, while also trying to help them find the answers.

An academic teacher may be obliged to teach on a broad spectrum of courses. To uphold high standards, teachers also have to seek to broaden and maintain their own knowledge and skills. Teaching staff should not – at least not without declaring their limitations – address problems in their lectures and classes which do not fall within their field of expertise.

Teachers must show respect for and commitment to their students. This may for example involve addressing the questions and problems which students raise, and being open to their views and wishes regarding course content, modes of presentation and teaching methods. Teachers must also be fair in their treatment of students and when assessing their achievements. It is important to be aware that the teacher is in a position of power in relation to the students, a position which must not be abused.

Certain departments and other course providers have special ethical rules for teachers. In addition, the Swedish Association of University Teachers (SULF) has adopted ethical guidelines for university teaching staff (*Yrkes-etiska riktlinjer för universitetslärare*). Those working as teachers should be familiar with and seek to comply with such documents.

## 7.3 The communicator and expert

Researchers are invited to appear in a variety of contexts as experts and providers of information. Under the Swedish Higher Education Ordinance, one of the responsibilities of the researcher is to inform the general public about his or her work. Such communication can take place through various channels, including lectures, popular science articles and general surveys. Sometimes it can occur through the media. When presenting their findings to the media, researchers should seek to preserve the collaboration and trust that exist between the media, the research community and the public.

It is important to ensure that information provided by a researcher to or through the media is not misunderstood. If it relates to a policy issue, it should be clearly stated in what capacity the researcher is expressing him- or herself. Where a journalist intends to present research findings in an article, the researcher can often read the draft before it is printed and make any necessary clarifications or corrections. It is also important to avoid exaggerating one's own contribution, and to explain how one's own work and findings relate to those of other researchers. In the case of preliminary research results, the researcher should be cautious about allowing them to be published in the popular media, at least if they could have direct effects on individuals' lives.

When dealing with journalists, researchers should not be afraid of their questions or allow themselves to be surprised into giving answers they do not have evidence to support. Instead, they should try to build a good rapport with the journalist and to think through what they want to say and what questions they are able to reply to. The researcher can then rephrase the question so that a reasonable answer can be given, or suggest other questions which can be answered, or other experts who can offer better answers.

Social scientists may be invited to meetings of organizations or to media events as members of discussion panels addressing topical issues of a political nature. Similarly, medical or behavioural scientists may be asked to give their views on child care or other family or relationship issues, and a natural scientist may be invited to a discussion on environmental or energy policy. In such contexts it is important to be aware that what you say will be perceived as the scientific view on the question. You should therefore be clear in your own mind – and make clear to your audience – what falls within the bounds of scientific knowledge and what represents a personal view, perhaps of an ideological character. When you are expressing the latter, it is important that that fact is clearly understood, to avoid misleading your audience.

It is also important not to let yourself be used to give some sort of scientific seal of approval to a position on, say, a political matter. You may perhaps only be given the opportunity to say things which seem to corroborate an ideologically based view, and not things that contradict it. You should therefore be well aware of what kind of context you are being asked to appear in, what form your involvement will assume and how it may be perceived, before you accept.

### What would you do in the following situations?

You realize that you have made a brilliant discovery, but you also realize that a foreign member of your research team intends to announce it to the media and will then get all the credit for it. You yourself would like to wait until the results have been peer-reviewed, but your head of department points out that the department will miss out on some useful publicity and be left behind if the discovery becomes old news.

*Do you contact the media?*

In a large-scale study you have discovered that a certain drug, used by a very large number of patients with a common condition, has a serious side effect. The risk of developing this side effect is only one or two in a hundred, but because the disease is so widespread, the number of individuals who could be affected is still quite large. You are keen to be the first to alert the media to your discovery. A colleague feels that, before you do so, it should be established whether the complication concerned (blood clots) affects a particular group of individuals with a special genetic risk of developing it. He is concerned that, otherwise, a scare story in the media could result in many patients unnecessarily giving up their medication, with devastating consequences for those who need it and who are at no significant risk of developing the complication.

*What do you do?*

## 7.4 Assessing applications and proposals

Researchers are frequently called upon to review colleagues' research proposals or to act as external assessors in conjunction with appointments. It is important in such contexts to disclose any conflicts of interest, and to decline invitations to provide an assessment when such a conflict exists or there is cause to suspect that it might. This problem needs to be considered in other contexts as well, for example when a researcher is asked to review a manuscript for a journal. Here, too, conflicts of interest can arise from a range of legal, financial and personal circumstances (see 9.9 below for the Swedish Research Council's rules in this area).

It is also important to base assessments of this nature on a careful analysis of the documents and qualifications presented, and to maintain a critical stance towards unfounded claims and opinions aired by others. Appraisals of applicants for employment need to be particularly well founded. Consequently, they should not be modified simply to avoid “rocking the boat”, in response, say, to local arguments about suitability which have little to do with the applicants’ qualifications.

A particular dilemma that can easily arise, both when researchers are involved in assessing job applicants and when they are helping to select successful research proposals, is when the authorities have decided that the position or funding is to be targeted to a specific area. The difficulty lies in weighing excellent candidates who do not have exactly the desired focus in their research against somewhat less well qualified ones whose research emphasis is “spot on”. When you as the assessor or reviewer fully understand and share the assessment on which the chosen focus is based, the decision may be relatively simple. You can then, with some justification, regard your own assessment as reflecting that of the authorities or circles you are working for. But quite often “priority areas” of this kind are seen as political contrivances for which there is little objective justification and which researchers, aided and abetted by reviewers, therefore have every reason to try to exploit by stretching a point or two in both applications and evaluations. Sometimes it may even be claimed that this earmarking of funds was a political necessity to secure the research funding in the first place, but that few people really envisaged the restriction being taken particularly literally. Basing one’s assessments on assumptions of this kind is not a viable strategy, however, since in the long run it will erode respect in different circles for what should be the cornerstone of research: an honest search for the truth, rather than a search for ingenious tactics to twist it.

This does not mean that, as a researcher assisting a research council or other funding body, one should accept without demur a political goal of earmarking funds for specific fields of research. Sometimes there are strong objective reasons for avoiding such targeting: for example, that sufficiently interesting research cannot be expected to be achieved, however much is invested, or that a concentration of funding will undermine the long-term basis for the desired research. If these or any other weighty arguments exist, they should of course be clearly conveyed to the decision makers concerned.

### What would you do in the following situations?

You have been asked to act as external assessor for a senior lectureship appointment at another university. The leading candidate is a brilliant researcher and you know that she is a very good teacher, but her formal track record in that respect is limited as she is only

32 years old. A person at the university in question is also applying for the post. Her research performance is not as impressive, and you consider that her teaching skills are not entirely comparable to those of the younger woman. But she has strong formal credentials, including twelve years as an acting director of studies. At the meeting of the appointment panel, it becomes clear that the majority of the local members favour the older applicant. You now hear that your candidate's name is to be put forward for a professorship. When you phone to interview her she says that, given a choice, she would probably prefer the professorship. But she does not withdraw her application for the senior lectureship.

*Will you as external assessor record a reservation against the majority decision?*

You are assessing proposals as a member of one of the research council's peer review panels. Several of the proposals are concerned with "buying out" researchers from senior lectureships, to give them time to do research. Some of them are hardly high-priority in scientific terms, but it emerges that university funding for the posts of those concerned is under threat, and grants to provide alternative funding are therefore necessary. Otherwise the applicants could face redundancy. You know one of the individuals in question personally and are aware that he is unlikely to find work outside the higher education sector. On the other hand, accepting these proposals would mean having to refuse funding for some promising young researchers with scientifically more interesting proposals.

*How do you prioritize the proposals?*

You are attending a residential meeting of a research foundation's prioritization panel. Your task is to recommend which of over a hundred proposals are to receive a share of SEK 56 million. The total sum applied for is SEK 286 million. One of the panel members has submitted a major application, and withdraws from the room in the customary manner when it is considered. The chair quickly pushes through this application, along with a number of others that have all been given relatively high scores by external experts, with no calls for changes or reductions from other members of the panel. Late that evening you discover that the chair and the member behind the application clearly have a very close relationship. When you raise the matter the next morning, the chair talks about a "temporary aberration" and seems unwilling to discuss whether the decision you took was flawed by a conflict of interest.

*What action do you take?*

## 7.5 Committee work

Researchers may also be appointed to serve on various committees or boards. It is perhaps appropriate to distinguish between memberships related to research councils, research foundations and the like, and those of

a more commercial nature, e.g. a position on the board of directors of a company.

Researchers serving on committees and boards within the research community are subject to very similar ethical requirements to those acting as reviewers or external assessors. They are all involved in decisions and appraisals concerning other people's research. To maintain the research community's confidence in these decisions and appraisals, it is particularly important that committee members make every effort to be independent of their own environments and affiliations, to avoid showing special favour to their own discipline, university or department, colleagues or students. In practice this can be very difficult, not least because they may be seen by their close colleagues in the research community as "their subject representative" on the body concerned. A committee member may in other words be expected to speak up on behalf, say, of biology, in competition with representatives of other disciplines. There needs to be an open discussion about what membership of a given committee or board entails, primarily with the electoral college which selects its members, and subsequently with other members of the body in question.

Appointments to committees of this kind are to be regarded as positions of trust. They also confer influence and power, however, which in the long term, even with the best of intentions, may corrupt those who hold them. In addition, committee responsibilities may take so much time that the member's competence as a researcher suffers. Researchers should therefore only take on a limited number of such positions, and actively seek to promote rotation of members, to allow others, and especially young researchers, to contribute fresh views. It is inappropriate, though, to entrust existing members with recruiting their own replacements, as the temptation to secure a continuing influence which this represents may be difficult to resist.

As a member of a board or committee outside the research community, it is important to realize that, like it or not, in this context it is in fact the research community you are representing. You will usually have been appointed because you represent a certain desired area of expertise. Consequently, here too the researcher has a special responsibility. Your membership should not result in you lending scientific legitimacy to a company's operations or production, for example, when the scientific evidence is in fact unclear or points in the opposite direction. Your task, rather, is to communicate the results and possibilities of research, without exaggeration or concealment.

### What would you do in the following situations?

You have promised to serve on a PhD examining committee in a field somewhat removed from your own. When you are preparing the evening before by reading a survey article by

a well-known international authority in the field, you happen to discover that five lines in the introduction to the thesis are identical to a passage from the article you are reading. You do not have time to talk to the candidate's supervisor until the meeting of the examining committee after the public defence of the thesis. The supervisor is surprised when you raise the matter, but says that the rest of the thesis is no doubt all right.

*What do you do?*

You are on the board of a research council. On the table is a proposal to set up a major computer centre that will support the work of many different research groups. An analysis has shown there to be a considerable need for the centre, and you share that assessment. But you also have in front of you another proposal that is the result of a happy coincidence: the British navy is selling an ocean-going marine survey vessel, which would provide ideal support for three world-class Swedish research groups in marine biology and oceanography. One of the groups, from Göteborg, is a lead partner in a UN-organized project on the role of ocean currents in long-term climate change. The vessel is now available at a bargain price, just a tenth the cost of a new one, and an immediate decision has to be taken. Similar offers are very rare on the ship market.

The two projects are competing for the same funds. You are a geoscientist on the research council board, and happen to know that the leader of the Göteborg group is considering an offer of a chair in California. He has hinted that he will accept the chair and take most of the group with him to the United States if the purchase of the survey vessel does not go ahead.

*How will these circumstances affect your position at the meeting?*







## 8 RESEARCH MISCONDUCT

### 8.1 Questions of definition and scope

What is research misconduct? It can be defined in several ways. In a narrow sense, research misconduct (or scientific misconduct) refers to obvious violations involving the theft of other people's ideas and data, falsification and manipulation of data, and plagiarism of other people's texts. In a wider sense, it also includes other forms of reprehensible behaviour, such as dishonesty towards funding bodies, exaggeration of one's qualifications in applications, publication of the same study in multiple contexts, sexual harassment, defamation of colleagues, sabotage of colleagues' work and so on.

The choice between wide and narrow definitions is not only a matter of linguistic usage. It also has consequences, for example, when it comes to applying rules or sanctions for research misconduct. With a narrow definition, only certain phenomena can be acted on; with a wider one, others can as well. The requirements of due process suggest that we should concentrate on central, reasonably well-defined transgressions such as plagiarism, fraud and manipulation of data, and deal with other forms of inappropriate behaviour in other contexts and under other headings.

Another problem that is not always easy to handle is how to distinguish between research misconduct, on the one hand, and carelessness, incompetence, rushed work and poor research, on the other. The wider our definition of research misconduct is, the more difficult it can be to make this distinction. Two terms can be used in this context: *research misconduct*, which has a narrower sense, presupposing an intention to deceive the reader, and *deviation from good research practice*, which can be found to have occurred without any need to speculate on whether the author had such an intention to deceive. In practice, it may make things easier if we work with both these concepts in parallel.

How common is research misconduct? No one can say for certain how often it occurs. In Denmark, with a population half that of Sweden's, 14 cases were reported in 2002 to the groups of experts set up to deal with misconduct in research in that country. In the United States, the Office of Research Integrity (ORI) received 191 complaints over the same period, compared with 196 in 2001 and 173 in 2000. In 2002 ORI completed investigations into 30 cases, and findings of research misconduct were made in 13 of them. The number of cases reported may possibly reflect the number actually existing,

but it is also possible that they are just the tip of an iceberg. This also depends, of course, on how research misconduct is defined. The damage done by even a small number of cases, however, can be considerable, and not only if they receive media attention. We do not know exactly what the figures are for Sweden, but there is little reason to believe that the situation here is any different from that in Denmark, for example.

### What would you do in the following situation?

A PhD student, Eric, sends his thesis to fellow postgraduate Nicole at another university to get her feedback. They work in the same field and have previously met at a seminar, at which they got on well. Nicole uses some of the data and ideas from Eric's work in her own thesis, which she presents before Eric completes his. Eric is accused of plagiarism.

*What should the PhD students, their supervisors, heads of department, vice-chancellors and their colleagues do?*

## 8.2 The adverse effects of research misconduct

Why is research misconduct damaging? In general terms, its occurrence undermines confidence in published scientific results. This makes research less efficient – everything has to be constantly checked. What is more, confidence in the research community is eroded, as is the trust between researchers, providers of funding and the people who participate in research, for example as subjects. Why should they expose themselves to risks, which are sometimes not entirely negligible, if they have reason to believe that researchers plagiarize, falsify or “massage” results? Why should funders support research if they believe that the results are not above-board, but deliberately misleading or based on theft and plagiarism?

In many types of research, there is another angle as well. Research findings are used to make choices in the treatment of patients, to select construction methods for tunnels, bridges or aircraft, as an input into planning of various kinds (e.g. in health care, social work, road safety or education), and so on. If those findings are based on research misconduct, people could suffer harm as a result of poorer treatment, collapsing bridges and tunnels, and incompetent planning.

Why does research misconduct occur? In some cases it may have purely pathological causes. But in the great majority of cases, one of the main reasons is no doubt the existing system for assessing a researcher's worth. For those applying for university posts, publication output is the criterion that carries most weight. Another causal factor could be the system of research

funding. Without grants to supplement the very limited resources which universities and colleges are able to provide for research, research would in practice be impossible. This could tempt researchers to take short cuts. The pressure for rapid completion of doctorates, to secure “PhD points”, may involve similar temptations. Other causes may also exist. To prevent research misconduct, it is necessary – as when treating a disease – to begin by establishing the causes.

### What would you do in the following situation?

A doctor carried out a study to establish whether high-dose chemotherapy followed by bone marrow transplantation could improve the survival of a certain group of patients with breast cancer. The results were questioned, however, and the doctor was unable to produce the patient records and source data to confirm them. Other researchers then tried to repeat the results, without success. It is one person’s word against another’s, but primary data that could clear the doctor’s name are not available.

*What should the next step be? Who should do what?*

## 8.3 Prevention and sanctions

What can or should be done to counteract and prevent research misconduct? The list of possible causes above suggests a number of strategies: review the criteria for judging merit, emphasize quality more than quantity, and involve external experts in the allocation of research grants and the appointment of staff. In practice, this might mean requiring applicants for posts to submit, say, their ten best publications, rather than all of them. Research ethics courses on which the problem is discussed – to ensure that no one can claim they have never heard of it – could be another preventive measure. The responsibility of the supervisor in this context also needs to be stressed.

Another method of preventing fraud and manipulation of the truth could be to avoid putting more pressure on researchers – in the shape of rigid career structures, mechanical measures of productivity or short-term funding of various kinds – than is necessary. Researchers placed in positions of trust within research councils and faculties should try to promote more stable, long-term research funding and a more in-depth, quality-based appraisal of applicants’ qualifications. The principle that “hungry dogs hunt best” may perhaps be true in the short term, but real research generally has little to do with hunting, and more to do with sustained reflection.

What can be done when allegations of research misconduct are made? If we say that misconduct is a serious matter, but do nothing about it when

cases are suspected or shown to have occurred, our credibility is undermined. For all concerned, it is important that such allegations are investigated. But it is also important to maintain appropriate legal safeguards for both the complainant and the respondent during the investigation process, and to ensure that any sanctions are proportionate to the nature of the misconduct concerned. Such sanctions could include barring the offender from the use of laboratories for a time, freezing funding, removal from positions of trust etc. In the collegial environment in which research takes place, such measures often have a very major impact, a point that should be taken into account when sanctions are determined.

The Swedish Research Council has established a two-stage system for the investigation of research misconduct, which the country's universities can avail themselves of. The first stage seeks to establish whether there is an objective basis for the complaint. If there is not, the matter is taken no further. The second stage involves an investigation of what has occurred, based on interviews with those concerned, verification of source data etc. Whereas the first stage can probably be completed fairly quickly, due process requires that the second involves a detailed investigation. This stage may therefore take longer. At present a discussion is under way as to whether such investigations should be conducted on a voluntary basis or within a statutory framework, supplemented with some other system.

The Deutsche Forschungsgemeinschaft (German Research Foundation, DFG) has published detailed guidelines on how research should be conducted in order to safeguard its integrity. With effect from 1 July 2002, the DFG has also made it a condition of its own research funding that institutions receiving grants and conducting research must follow these guidelines. They must also have appointed an ombudsman, to whom individual researchers can turn with questions and suspicions of misconduct. The ombudsman provides guidance to researchers and carries out an initial inquiry, before deciding whether the allegations justify a detailed investigation. If they do, the ombudsman refers the matter to the management of the research department or institute concerned, which arranges for an investigation to be conducted.

In Germany there are around a hundred local ombudsmen at universities and research institutes. In addition, the DFG has a committee of three central ombudsmen, whom researchers receiving funding from the DFG can consult without having to go through their local ombudsmen.

### What would you do in the following situation?

You discover that one of your older colleagues in the department has falsified a series of measurements in a minor publication, with no very sensational results. He is close to

retirement. When you raise the matter with him, he breaks down crying and blames the head of department's demand for "at least one paper a year". If he fails to meet that target, he will not get a share of the "special research resource" and will have to teach 400 hours a year. The man is in poor health and has no great talent for teaching.

*What do you do?*



# 9 KEY DOCUMENTS RESEARCHERS SHOULD BE FAMILIAR WITH

## 9.1 The CODEX website

There are numerous laws, directives, guidelines and codes of research and professional ethics which researchers need to be familiar with and observe in their work if they are to be able to undertake it in an ethically acceptable and well-considered manner. Which of these documents are relevant naturally varies, depending on the nature of the research concerned. With support from the Swedish Research Council (and previously from its predecessor councils), the Centre for Bioethics at Karolinska Institutet and Uppsala University (formerly the Biomedical Ethics research programme at Uppsala University) has set up a website on which the great majority of documents that may be relevant to the researcher can be found. The site includes all Swedish legislation with a bearing on research: the *Act concerning the Ethical Review of Research Involving Humans*, the *Archives Act*, the *Secrecy Act*, the *Personal Data Act*, the *Health and Medical Services Act*, the *Animal Welfare Act* etc. Also to be found here are various directives and conventions of an international character, adopted for example by the UN, UNESCO, the EU and the Council of Europe. The site also features the full texts of codes of research ethics for different disciplines and fields of research, along with texts dealing with specific issues, such as informed consent or publication. In addition, there is a section on the use of animals in research. Other texts available here include the *Medicinal Products Act and Ordinance* and the Swedish Medical Products Agency's regulations on clinical trials. CODEX is administered by the Swedish Research Council and can be found at [www.codex.vr.se](http://www.codex.vr.se).

Below we comment briefly on some of the documents of key significance for research in Sweden. The full texts (in some cases in Swedish only) can be found on or through the CODEX site, along with many other relevant and useful texts dealing with closely related issues.

## 9.2 The Declaration of Helsinki

The *Declaration of Helsinki*, which is concerned with biomedical research, carries great weight in that it has the backing of the World Medical Association. It has been very widely accepted and is regarded in the West as binding. This document has been updated on several occasions, through a series of amendments and additions. The version currently in force was adopted in 2000. The Declaration contains a number of rules on such matters as qualification requirements for researchers; the need to weigh the benefits and risks of research, but with the emphasis on the well-being of the patient; and requirements concerning informed consent: what information is to be provided and how consent is to be given, by whom and to whom. The Declaration also contains certain rules on publication. In addition, it includes provisions on medical research combined with medical care. A requirement often laid down in connection with research funding and publication, for example in international journals, is that a medical research project has been assessed against the criteria set out in the Declaration.

## 9.3 The Swedish Research Council's guidelines on good medical research

For medical research in Sweden, the former Swedish Medical Research Council (MFR) produced two sets of guidelines: *Riktlinjer för god medicinsk forskning* ("Guidelines on good medical research") and *Riktlinjer för etisk värdering av medicinsk humanforskning* ("Guidelines for the ethical evaluation of medical research on humans"). Responsibility for these documents has been taken over by the Swedish Research Council. The first of them (regarding the second, see the next section) is primarily concerned, like the present publication, with good research practice. Here the questions addressed and approaches suggested are directly related to the medical sphere and are thus more specific. Excerpts from various documents on authorship and on documentation, retention and archiving of research data are included as appendices.

## 9.4 The Swedish Research Council's guidelines for the ethical evaluation of medical research on humans

This publication (cf. 9.3 above) is aimed specifically at researchers, research students and ethics committee members, and is designed to provide guidance in the planning and ethical review of research projects. It can also be said to serve as a practical commentary on the principles of the Declaration of Helsinki.

## 9.5 Good Clinical Practice

For clinical trials of drugs, the relevant document is a guideline on *Good Clinical Practice (GCP)*. This document applies in the EU, the United States, Japan and Australia and is virtually of a legally binding character. It contains a large number of detailed principles, together with a glossary defining relevant concepts. The latest version of the document can be found via the CODEX website mentioned earlier. There, guidelines on *Good Laboratory Practice (GLP)* are also to be found.

## 9.6 The Council of Europe Convention on Human Rights and Biomedicine

The Council of Europe's *Convention for the Protection of Human Rights and Dignity of the Human Being with Regard to the Application of Biology and Medicine: Convention on Human Rights and Biomedicine* comprises 38 articles, several of which directly or indirectly relate to biomedical research. It deals in particular with the protection of individuals undergoing research and with the conduct of research on persons without the capacity to give consent. One article deals with research on embryos *in vitro*. This document, together with the EU Directive on Good Clinical Practice, has directly prompted the new Swedish Ethical Review Act (see 9.11 below). A link to the full text of the Convention on Human Rights and Biomedicine can be found on the CODEX site.

## 9.7 The Swedish Research Council's ethical principles for research in the humanities and social sciences

The Swedish Research Council's ethical principles for research in the humanities and social sciences (*Forskningsetiska principer inom humanistisk-samhällsvetenskaplig forskning*) are a straightforward revision of the principles previously formulated by the Swedish Council for Research in the Humanities and Social Sciences (HSFR). Research is required to satisfy both (1) the research criterion, i.e. the research involved must be important and of a high quality, and (2) the criterion of protection of the individual, i.e. participants, subjects and informants must not be harmed. The latter criterion is spelt out more clearly in rules requiring information, consent and confidentiality, and stipulating how research data may be used. To obtain funding from the Swedish Research Council or the Swedish Council for Working Life and Social Research (FAS), a humanities or social science project has to meet the criteria set out in this document. The two councils can therefore require a grant applicant to submit his or her project to a regional ethical review board for ethical scrutiny in this respect. Such a review is *advisory*, i.e. the resulting assessment constitutes advice (in this case, to the research funder).

## 9.8 The Swedish Research Council's guidelines on commercial ties

An applicant for funding from the Swedish Research Council has to clearly disclose any financial interests relevant to the project and to describe in what ways they could affect the project. The Council requires the results of research which it funds to be made available to others. Another body providing co-funding may not delay reporting for more than two months; where a patent application is planned, a time limit of six months applies. The Swedish Research Council's guidelines on commercial ties are available in Swedish (*Riktlinjer för att redovisa kommersiella bindningar*) on the Council's website, [www.vr.se](http://www.vr.se).

## 9.9 The Swedish Research Council's rules on conflicts of interest

The Swedish Research Council has adopted rules on conflicts of interest which apply to its own activities. These rules are based on the *Administrative Procedure Act* and are applied here to the work of the Council's scientific councils, review groups and prioritization panels. The discussion of relations between researchers and their colleagues or students, between researchers and departments etc. to be found in this document should be of some assistance in handling conflicts of interest in other contexts, where researchers serve on boards or committees or as external experts of various kinds. The document is available, in Swedish (*Jävsregler för Vetenskapsrådet*), on the Council's website, [www.vr.se](http://www.vr.se).

## 9.10 Guidelines on publication

Apart from what individual codes of research ethics, such as the Declaration of Helsinki or the Swedish Research Council's ethical principles for research in the humanities and social sciences, have to say about publication, two international documents are of particular relevance in this context: on the one hand, the *Editorial Policy Statements* of the Council of Science Editors, on the other – and most important – the “Vancouver Rules”, published by the International Committee of Medical Journal Editors under the title of *Uniform Requirements for Manuscripts Submitted to Biomedical Journals*. A point emphasized in both these documents is the clear link between the right to be credited as an author and the obligation to assume responsibility for and have contributed to the intellectual content of the publication.

## 9.11 The Act concerning the Ethical Review of Research Involving Humans

Since 1 January 2004, ethical scrutiny of research has been regulated in Sweden by the *Act concerning the Ethical Review of Research Involving Humans*. Under this Act, all research on humans which, expressed in fairly broad

terms, (1) concerns sensitive data and is conducted without informed consent, or (2) is designed to exert a physical or psychological influence, must be assessed from an ethical point of view by a regional ethical review board. In the first case, the board's review involves an examination of the project description to establish whether it involves any infringement of human rights or human dignity. An assessment is also made of the relationship between the value of the project and any burdens or risks which it might entail for the subjects of the research. Its value must be judged to outweigh the risks. In the second situation, the factors just mentioned are also considered, but in addition an assessment is made of the informed consent that is required in this case. The Act applies to all research of these kinds, regardless of how it is funded.

In addition to statutory review of projects, regional ethics boards are also able to carry out *advisory* ethical reviews, which are required, for example, to obtain financial support from the Swedish Research Council or FAS, or to be able to publish results in certain international journals (see 9.7).

Reviews undertaken by the regional boards are subject to a fee.

The text of the Act, information about the review process, the regional review boards and the Central Ethical Review Board (which among other things considers appeals from decisions of the regional boards), an application form and other information about ethical scrutiny are available at the website [www.forskningsetikprovning.se](http://www.forskningsetikprovning.se).

## 9.12 Other legislation

In Sweden, universities and other educational establishments that conduct research are public authorities. That means that data collected as part of a research project fall under the legislation that applies to such bodies. Under certain circumstances, therefore, a researcher's data and other material are regarded as constituting "official documents", i.e. documents that have been received or prepared by a public authority. Such material is thus also subject to statutory provisions concerning documentation, confidentiality, disposal and archiving. Relevant texts in this context are the *Freedom of the Press Act*, the *Archives Ordinance*, the *Archives Act* and the *Secrecy Act*. Research may involve personal data: sometimes personal datasets may be established, or information obtained from them. In addition to the Secrecy Act, the *Personal Data Act* is the main piece of legislation in this area. Other relevant enactments are the *Health and Medical Services Act*, the *Health Care Registers Act* and the *Animal Welfare Act* and *Animal Welfare Ordinance*. The full texts

of all the above laws are available (in Swedish) via CODEX. Concerning medical research, CODEX includes a policy document on the processing of personal data, drawn up by the Ethics Working Group of the Swedish Research Council's Scientific Council for Medicine.



# BIBLIOGRAPHY

## Theory and philosophy of science

- Chalmers, A. F., *What is this thing called Science?* 3rd ed. Buckingham: Open University Press, 1999
- Follesdal, Dagfinn, Walloe, Lars, & Elster, Jon, *Argumentationsanalys, språk och vetenskapsfilosofi*, 3 uppl. Stockholm: Thales, 2001
- Gilje, Nils, & Grimen, Harald, *Samhällsvetenskapernas förutsättningar*. Göteborg: Daidalos, 1995
- Johansson, Lars Göran, *Introduktion till vetenskapsteorin*, 2 uppl. Stockholm: Thales, 2003
- Kuhn, Thomas, *The Structure of Scientific Revolutions*. Chicago: University of Chicago Press, 1996
- Losee, John, *A Historical Introduction to the Philosophy of Science*, 4th ed. Oxford: Oxford University Press, 2001
- Popper, Karl, *The Logic of Scientific Discovery*. London: Unwin Hyman, 1959
- Popper, Karl, *Conjectures and Refutations*, rev. ed. London: Routledge, 1989 or later

## Research ethics

- Att värna om vetenskapens integritet och en god forskningsetik*. En rapport från Kommittén om forskningsetik. Stockholm: Utbildningsdepartementet, 1998
- Broad, W., & Wade, N., *Betrayers of the Truth*. London: Century, 1983
- Bulger, R. E., Heitman, E., & Reiser, J. R. (eds.), *The Ethical Dimensions of the Biological Sciences*. Cambridge: Cambridge University Press, 1993
- Beach, D., *The Responsible Conduct of Research*. Weinheim–New York: VCH, 1996
- Beauchamp, T., & Childress, J. F., *Principles of Biomedical Ethics*, 5th ed. Oxford–New York: Oxford University Press, 2001
- Danish Committees on Scientific Dishonesty, *Annual Report*. Copenhagen: Danish Research Agency, 1993–
- Eriksson, B. E., & Månsson, P., *Den goda tanken*. Stockholm: Allmänna förlaget, 1991
- Erwin, E., Gendin, S., & Kleiman, L., *Ethical Issues in Scientific Research. An Anthology*. New York: Garland Publishing, 1994
- Etikprövning av forskning som avser människor*, Ds 2001:62. Stockholm: Utbildningsdepartementet, 2001
- Forskningsetiska principer inom humanistisk-samhällsvetenskaplig forskning*. Vetenskapsrådet, Stockholm, 2002
- Forsman, B., *Forskningsetik. En introduktion*. Lund: Studentlitteratur, 1997
- Forsman, B., *Vetenskap och moral*. Nora: Nya Doxa, 2002
- Forsman, B., *Forskarens frihet. Om makt och moral*. Lund: Studentlitteratur, 2004

- God sed i forskningen*, SOU 1999:4. Stockholm: Utbildningsdepartementet, 1999
- Hermerén, G., *Kunskapens pris*, 2 uppl. Stockholm: HSFR, 1996
- Loue, S., *Textbook of Research Ethics. Theory and Practice*. Dordrecht: Kluwer, 1999
- Nilstun, T., *Forskningsetik i vård och medicin*, 2 uppl. Lund: Studentlitteratur, 1994
- Petersson, B., *Forskning och etiska koder*. Nora: Nya Doxa, 1994
- Petersson, B., *Forskningsetisk vägning 1. Forskningens värde*. Linköping: Centrum för tillämpad etik, 1999
- Riktlinjer för etisk värdering av medicinsk humanforskning*, Medicinska forskningsrådets nämnd för forskningsetik, 2:a rev versionen. Stockholm: Vetenskapsrådet, 2003
- Riktlinjer för god medicinsk forskning*. Stockholm: Vetenskapsrådet, 2001
- Rydén, L. (ed.), *Etik för forskare*. En antologi med utgångspunkt i arbetet med Uppsalakodexen. Stockholm: UHÄ, 1990
- Studies in Research Ethics*. Skriftserie utgiven av Centrum för forskningsetik. Göteborg, 1991–



# ABBREVIATIONS

CERN.....	European Organization for Nuclear Research
DFG.....	Deutsche Forschungsgemeinschaft (German Research Foundation)
Ds.....	Ministry Publications Series
ESO.....	European Southern Observatory
EU.....	European Union
FAS.....	Swedish Council for Working Life and Social Research
GCP.....	Good Clinical Practice
GLP.....	Good Laboratory Practice
HSFR.....	Swedish Council for Research in the Humanities and Social Sciences
MFR.....	Swedish Medical Research Council
ORI.....	Office of Research Integrity (USA)
PI.....	Principal investigator
SOU.....	Swedish Government Official Reports
SULF.....	Swedish Association of University Teachers
UHÄ.....	Swedish National Board of Universities and Colleges
UN.....	United Nations
UNESCO.....	United Nations Educational, Scientific and Cultural Organization
VR.....	Swedish Research Council

Good Research Practice – What Is It? Explores some of the ethical issues that arise in research, and is intended to provide a basis for reflection and discussion. It is aimed at researchers in every field of inquiry, and in particular at postgraduate students and their supervisors.

The three authors, Professors Bengt Gustafsson, Göran Hermerén and Bo Petersson, are themselves experienced researchers. They discuss the basic ethical principles applied in research. They also describe the existing regulatory framework in Sweden, and consider the standards of conduct which apply, or should apply, among researchers and between researchers and others.



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