Chapter 2

Doing research

The main ethical themes and values in doing research are:

1 The researcher is a member of a research community and has to follow common guidelines and rules, but has also individual goals and aims.
2 The safest way of doing research is to follow mainstream thinking and settings, while one of the basic values of research is to be able to challenge previous research and transcend boundaries.
3 There is always a certain time pressure in doing research, which may lead to slipping in principles.

Approaching ethics by using guided dialogue typically requires researchers and research communities to consider the following key ethical issues when doing research:

- Are all research questions equal from an ethical point of view?
- Which ethical issues are connected with selecting methodology and approach?
- How does the research community discuss the balance between harm (e.g. for research objects) and cost (e.g. expensive research infra-structure), on one side, and on the other, the possibilities to do ambitious and ground-breaking research?
- What does responsibility of a researcher towards his or her employer mean in the research context?
- Which kind of decisions and choices are researchers obliged to make as members of a research community?
- How do individual researchers and the research community as a whole handle the grey areas surrounding strict ethical rules?

The research ethics guidelines and rules compiled in many countries during the last 25 years concern mostly the process of doing research.[1] The striking faults and shortcomings discussed in public are usually violations of these strict principles.[2] The agreements and understanding that has led to these rules has been a major step towards a new, more ethically conscious, culture within research communities. However, in the real discussion on research ethics questions, these violations of ethical guidelines comprise only the tip of the iceberg. They raise the question about the reasons why a researcher has violated ethical guidelines of research. This question is often psychological, organisational and/or educational rather than ethical. While pondering on the reasons for violations is interesting, the community has an even more important task in engaging with everyday ethical questions in doing research and working in academia. In the process of creating an ethically conscious research community we have to speak of the iceberg under the water, where we find a lot of complicated and unclear situations. While the tip of the iceberg may be clear and simple, everyday ethical questions are typically situated in the vast grey area, commonly hidden from view. This chapter aims to provide tools to discuss these often obscured issues using guided dialogue.

Ethical questions follow researchers in all phases of research: in the selection of the topic; when the methods are determined; when the group agrees on the distribution of labour; when deciding whether the results are reliable enough; and when the study is ready to be published. Recognising and providing reasoned solutions to these types of ethical questions is a core professional skill in research.

For example, one of the guidelines of research is the strict prohibition of any kind of falsification or fabrication of results. However, in reality a researcher meets complicated situations where guidelines do not give a clear answer. Let us suppose that the results of an experiment do not unequivocally support any suggested hypothesis or theory. However, if only a few of the results were excluded, the situation would be quite different. It is quite clear that a researcher cannot just remove some results in order to reach a desired conclusion. On the other hand, sometimes it is correct to brush aside odd results that are caused by an evident mistake or based on a standard practice for 'noise reduction' in a particular field. Often, it is not clear whether the outlying results fall into a category that allows them to be reasonably and appropriately omitted from the analysis and subsequent conclusions. An ethically solid, and also wise, option in this situation would be to repeat the experiment and collect more evidence. However, this is not always possible due to, for example, time or funding pressures. Another option is to openly discuss the decision to omit results in the following publications. The researcher may think that this will decrease the possibility of the paper being published and thus faces an ethical question requiring the decision.

How and when outlier data can be removed is an example of an ongoing need for dialogue within a research community. This dialogue focuses on both methodology and ethics, which is typical as ethical questions are in most cases embedded within the research questions themselves. A researcher is able to take

part in this dialogue only after comprehension of wider contexts of research. This requires awareness that individual decisions all reflect concerns beyond the researcher her- or himself and the methods/materials. Almost everything is part of a larger whole in which individual research belongs to the global network of researchers closely engaged with society as a whole. Ethical validity of research methods and outcomes is an important element of ethical dialogue between the research community and society.

This chapter focuses on the actual process of doing research. A stereotypical understanding of research is based on the assumption that researchers publish the results of their own studies in scientific publications. Indeed, this is often the case: science progresses on the basis of new materials and data collected by individual researchers or research groups. These may be results of laboratory experiments in which certain materials or physical laws are tested or test persons are set into strict planned situations or they have answers to a set of questions. Data can be collected also by interviewing people or observing their behaviour.

However, not all research is based on results reached by the researchers themselves. One can develop new statistical analyses or qualitative findings by using a data/material commonly available, e.g. statistical data on the weather, people's personal data or opinions, texts produced by people or data based on longitude time series. Much of this material can be collated without any intention for it to be used in research.

Publishing new analysis based on concrete data is not the only way researchers develop science. Science is also progressed by creating theories, methods or models which help us to do better research and understand the essence of phenomena more deeply. In some fields the researcher's role is to bring out fresh interpretations of well-known texts, such as the Bible, Shakespeare's *Hamlet*, or Wittgenstein's *Tractatus Logico-philosophicus*. New interpretations may be based on a better contextualisation of these works or a new point of view that has gone unnoticed by previous researchers.

Results in the common language are often interpreted only to mean the first type of results stemming from actual investigation and collection of data. However, when we speak of research results in this book, we explicitly refer to all possible outcomes and findings made by a researcher, not only concrete results of experiments made by the researcher his- or herself. This broader understanding of 'results' allows us to capture research endeavours more completely and to show how ethical issues are present regardless of how we do research.

This chapter applies the guided dialogue process to understanding the everyday ethical issues in doing research. Guided dialogue helps to make visible everyday small ethical questions and allows communities to approach them collectively. When discussing concrete ethical challenges, we will often put them in this larger collective, and sometimes global, context. As guided dialogue is a systematic way of understanding an issue rather the producing simple answers, this chapter, like all those that follow, is filled with questions to support the process of decision-making in practice.

Our discussion begins with three important elements of ethical reasoning, as described in Chapter 1: identification of stakeholders; rights and responsibilities; and defining options in the context of doing research work. We will then explore the decision-making process through cases and examples. The three ethical approaches are coded: [CONSEQUENTIALIST], [PRINCIPLED] and [VIRTUE].

Identifying stakeholders

An important phase in ethical thinking is the identification of stakeholders. The **researcher** him- or herself is an evident stakeholder when discussing ethical issues in the process of doing research. She or he may approach the ethical question as an individual or as a member of a **research team**. The forms of cooperation vary. In biosciences and medicine a research team comprises half a dozen to ten researchers. It is possible for hundreds of researchers to take part in large projects like accelerator experiments in physics, where each of them has a very specific role in the group. On the other hand, in sociology scholars may still write books alone, but in the foreword they may thank 20 colleagues who have been somehow involved in the process. Independent of the scale and cohesiveness of the team, the researcher has a certain influence on close **colleagues**. In many cases, the research group comprises also **laboratory assistants**, **IT-specialists** and other **supporting personnel**. They may not be mentioned as a co-author in publications, but they are inescapably also stakeholders who must be taken into consideration in ethical thinking.

The **research community** is a definite stakeholder. In most fields, there are always several competing research groups. Every move taken by one of them influences the others – for example, in the grant application processes they all participate in. Research by its very nature is a global endeavour and that is why the global research community is a stakeholder as well. Although the influence is often invisible and very small, the general idea of research is that every researcher is building the joint worldwide stock of knowledge, which is then globally available for other researchers. Thus, it is possible and reasonable for an individual researcher to consider ethical issues from a global perspective. This is especially relevant in the selection of a research theme/question.

Enablers of research, the organisation (faculty/university/research centre) that provides a physical environment for research and various funding bodies and agencies (national/regional/global), comprise an important group of stakeholders. Among financers of research there are different actors: state-owned funders of basic research and innovation (research councils, agencies, ministries, etc.), private non-for-profit foundations as well as commercial and for-profit sources of funding. They set their own rules for spending money and may demand results that are in accord with their own goals and principles. They are enablers of research in the proper sense of the word, because a substantial part of research would not be conducted without their support. We return to the ethical questions connected to funding research in Chapter 7.

We already mentioned one group of **users** of results of research, namely colleagues forming the research community. A further important group of users located outside the academic world include commercial enterprises, not-for-profit organisations and the public sector. Benefits transfer also to the level of individuals. Schoolchildren, patients in hospitals, consumers and citizens in their everyday lives may gain from the new knowledge produced by researchers. The benefit coming from research is always possible, but never certain. Individuals and other beneficiaries are only potential stakeholders of research to a differing degree, depending on the applicability of the research and mechanisms of transferring research into practice. However, this potentiality does not mean they may be forgotten in considering the harm and benefit of research.

The **research subjects** are evident stakeholders whenever research uses individuals or material from and by them in any way as part of the research. If we are dealing with surveys, the number of stakeholders may easily exceed thousands. When a researcher observes wild animals in nature, their role is naturally quite different from that of experimental animals, but nevertheless they must be taken into consideration. In addition, it may be necessary for a researcher to think of whether the research inquiry influences different types of stakeholders or stakeholder groups, like a lake ecosystem, a historically important object, or a school class. In most cases, one can see an immediate effect: changes in water, the object wears out in the researcher's hands or for the school class the visit of the researcher is an important event. Therefore, the subjects of research are important stakeholders that must be taken into account in all research design.

In guided dialogue it is essential to explore and explicitly identify stakeholders within the context of the actual choice to be made. Stakeholders cannot be assumed as the context is essential in understanding who they are.

CONSEQUENTIALIST

Stakeholder identification is crucially important for all considerations of consequences. Without knowing stakeholders, definitions and comparisons of utility are at the very least weak, if not pointless. When considering harm and benefit estimates and comparisons, the stakeholders are often considered in the light of research goals and costs in both time and resources. In addition, stakeholders may need to be prioritised against each other – for example, should we give more value to objects of art than new information about that particular era, or to animals rather than the potential for new medical knowledge?

PRINCIPLED

Identifying stakeholders has a direct link in considering their rights and responsibilities. This embodies an important ethical consideration, where we are asked to define whether it is even reasonable to speak about rights in relation to fruit flies or historical objects. Alternatively, the defining of stakeholders invites us to explore whether there are inherent rights or responsibilities that can never be lost.

Understanding rights and responsibilities

In this section we focus on the researcher perspective. In reference to responsibilities, the researcher has at least three different kinds of responsibilities to consider. There are legal responsibilities set typically by national legislation, including privacy, treatment of research animals or use of genetic material. In addition to these, there are research guidelines set by national committees, regional (e.g. EU) agreements and international collectives (e.g. the Singapore Statement) describing responsibilities, particularly towards colleagues and enablers of research as well as towards core research principles like honesty, diligence, accuracy and giving credit to others. Unwritten and silent responsibilities formed by the research group, field and/or institution are the third source of responsibilities to consider. All of these responsibilities define boundaries within which research must take place if the researcher desires to continue working within the research community. One of the key challenges appears when different responsibilities become contradictory and upholding them simultaneously appears difficult if not impossible.

These responsibilities produce certain corresponding rights as well. Researchers have a right to be recognised for the work they have done. They also have a right to trust the work of other researchers and to build on their work. A considerably more complex question is to define a right to academic freedom, which is often formally noted as a right in itself. If we operate within the boundaries given by responsibilities, are we completely free to study whatever we are interested in? Or is there an unwritten limitation to this freedom to study something 'useful'? This question is an enduring one and has become increasingly more significant in the current era of external funding. For this reason we will visit this question several times in this book.

Another interesting issue to consider is researchers' responsibilities towards the enablers of research – in other words, the funders and the institutional context. Are all responsibilities fulfilled when the research is done with the greatest care and adherence to research principles? On the other hand, is there a reasonable duty for the researcher to include or accept suggestions for methodology or choice of topic? At the same time, we can ask whether the researcher has responsibilities towards the research community to conduct certain types of research or at least conduct their research in a particular way. Or is it rather a responsibility to remain independent to avoid excessive compliance pressures, traditions and expectations imposed by the research community in exchange for belonging?

Defining rights and responsibilities is an ongoing process. It reflects changes within the research community and society as a whole. Advances in technology, changes in knowledge or shifts within the social and natural environment often initiate these changes. It is vital for the research community to engage in this dialogue at all levels to create the best conditions for research and researchers to flourish.

Defining options

There are typically multiple options when responding to any ethical issue. Each option often supports a particular set of values, advances only some of the goals or reflect only partially values held by each stakeholder. A true ethical dilemma appears when all options require us to give up on an essential value or goal. On the other hand, we have a real winning option when we feel it aligns with all key values and goals held by key stakeholders. Guided dialogue can be used to explore options, evaluate them and seek further options where an ethical dilemma appears.

At the early stage of any research project the researchers are faced with a plethora of realistic and possible options. For example, there is an endless variety of possible themes to be studied. Of course, availability of equipment, research material and other external circumstances limit the reasonable alternatives for selecting the topic, but still the buffet of choices remains extensive.

When reasoning around options, different ethical approaches may be used to create questions and considerations within the dialogue that will clarify the options and how they align with values and goals:

- What is beneficial/harmful for the individual/
  research group/university/society?   [CONSEQUENTIALIST]
- What aligns best with the general principles
  of research?   [PRINCIPLED]
- How does an ideal researcher make this decision?   [VIRTUE]

In another example, when ethical issues appear in research collaborations, there are usually a vast number of options as a response. The challenge may be in the very number of options with uncertain outcomes or in the varied ways different stakeholders understand the options and the values they attach to them. Asking specific and guided questions will help to reveal true values and assist in managing uncertainty.

- How do I define the harm and benefit of each
  option to each stakeholder before I even start to
  evaluate the balance of harm and benefit?   [CONSEQUENTIALIST]
- Are there binding agreements that affect what
  can be done to resolve the problem?   [PRINCIPLED]
- How do I wish to appear in the research
  community and which options align with my
  vision for myself?   [VIRTUE]

When ethical issues appear during the research process there are always at least two options: to continue the research according to current process/plan/ methodology or to refrain from doing it. As the research develops, the latter

option becomes increasingly problematic as different stakeholders have made commitments to achieving the identified research goals. To stop the project and to return the funding is usually too radical of an outcome for all parties. Typically, further options are available. These allow for negotiating alterations in one or more critical aspects of the process.

In the rest of the chapter we utilise these steps of defining stakeholders, rights and responsibilities as well as options, and explore key ethical issues in doing research. This is done to show how the guided dialogue approach can work in different phases of research. In the life of a researcher, research builds a chain whereby new topics grow upon the current work. This is why it is not easy to differentiate phases of research. However, from the point of view of ethical discussion, it is helpful to split research into smaller and more concrete phases which each typically generate their own ethical issues. At the same time, we see ethical reasoning as having a cyclical nature where previous decisions influence the new questions posed and many questions require several iterations before the conclusion of the research question or project.

In this chapter we will follow a typical and natural research cycle from the selection of the topic to the collection of material and application of research methodologies. The ethical issues arising from sharing research results will be the focus of Chapter 3.

SELECTING THE TOPIC

Research work commences with the selection of a research topic. This often self-evident step incorporates multiple ethical choices. The research topic may be selected in various different ways. Most common ones are a topic given by a supervisor, a research request from a client and a topic chosen by the researcher independently. As the last option represents the greatest level of freedom and thus ethical options, we will focus on it.

The researcher may pause to consider whether the topic is worth the time and effort. In other words, is the topic worthy of being investigated? It is possible to seek answers to this question from many perspectives. Within academic freedom the researcher is theoretically free to choose. However, the researcher is bound to consider at least some of the following, which are issues to be included in guided dialogue:

- **Compatibility.** How does this topic suit the research profile of my employer (university, department, research institute)? We can ask to what extent the employer should dictate research directions of individual researchers. Some level of coherence is typically justifiable from a utility perspective as it produces collective and accumulating benefits. Coherent research directions improve the quality of research in the given collective and allow better utilisation of resources. On the other hand, the search for new directions is a core part of research and a strong requirement for coherence may not be

justifiable ethically if we hold as a principle the right to academic freedom. It may also be problematic as a very narrow research focus may lead to a dead end for the whole group. Finding a balance is partly an ethical negotiation requiring decisions on defining benefit and harm and the appropriate timelines to consider them in association with core rights and responsibilities.

- **Facilities.** Is it possible to follow the chosen research direction in the current facilities (equipment, supporting personnel and other required resources)? Because resources are always finite, it is reasonable to consider how they are best utilised. The answer to this is directly dependent on the overall research goals the collective has identified. Sharing resources requires continuous balancing between research goals and individual needs and rights.

- **Publication potential.** Are there appropriate and desirable forums to publish the research results? Publishing results is not only the most important measure of academic worth, but also a key principle around transparency and openness in research. It is easier to publish on well-established topics following familiar research traditions rather than finding a way to publish interdisciplinary research or work concluded with novel methodology. How far should we let the potential for publications direct our choice of research is another broad and fundamental ethical question around the core goals of research enterprise as a whole and to every individual directly.

- **Impact.** How do results influence the surrounding society? Is the research topic important for people outside the academic world? This leads us to consider stakeholders, particularly identifying whose harm and benefit we should focus on and how we choose our timescale. Impact-related considerations bring to the forefront traditional ethical debates on the possible value-based difference between applied and fundamental research. Researchers' personal attitudes to this question vary. We will return to ethical considerations around impact in Chapter 7.

- **Boundaries.** Do I step into someone else's research domain that may lead to social and personal challenges? Can anyone consider owning a research question? Owning a research topic may seem far-fetched, but every collective has its set of boundaries, personal chemistry, traditions and power plays. In a research community it is most often possible to function in a way that will not limit the freedom of others directly. However, it is still common for researchers to consider how many sacrifices and changes to their research plan they are ready to make in order to manage their social research environment. Again, we approach the questions on values held by the collective, individuals and choices between them.

- **Background knowledge.** Does the research team or I have enough existing background knowledge to complete the planned research? There are hardly any topics to be studied where no previous knowledge exists. All research requires knowing the already discovered. But, because time is limited and the amount of information is exponentially growing, it is justifiable to ask how much the researcher should know before they are appropriately prepared to

research the topic or participate in a discussion on it. In some fields the existing knowledge pool is so large that a requirement for everyone to know it all would essentially lead to very limited time to do new research. So we have to draw a line somewhere and we cannot define that line in advance or from the outside.

- **Reputation.** How does the research topic influence our reputation? Research reputation is made out of different parts – research publications, participation in research activities (conferences, committees, seminars, etc.), and interaction with colleagues, students and administrators. The choice of a new research topic may threaten the existing reputation if it diverts from the known research path, particularly if this involves crossing boundaries described above. New directions could lead to dead ends and consume all the time available for the researcher. Similarly, an early career researcher may consider how to choose a research topic for maximum reputational gain – is it through a novel research topic or excellence in a known field? Would it be more advantageous to study the exotic wolf rather than the mundane fly? Would the study of a rare and serious disease be more influential than a study on the common cold? Behind these questions there are values around reputation, its definition and importance. These values guide our research goals.

All of the above questions are important, but most commonly the trump card is held by a different question – the availability of funding. All researchers, whether tenured or not, are expected to increase their research budget from an external source. At the same time there is considerably less funding available than the amount applied for. Therefore funding decisions directly influence the selection of research topics. Every researcher feels this pressure to choose research topics with the maximum funding potential.

This leads us to discuss the ethical questions around selection of research topic from a broader perspective. As funding directs the selection of research topics and directions, we need to explore possible values attached to the selection process. In this chapter we will look at the funding process from an individual researcher perspective; in Chapter 6 we will focus on collectively held values.

Due to funding structures, the trendiness of a research topic becomes a point of consideration in comparison to choosing a topic that has very little momentum. Trendy topics are likely to attract more funding than other topics. But if we always choose trendy topics, are we participating in a process where research becomes mainstreamed and locked into patterns that no longer serve the ultimate research purpose of discovery and novelty? Chasing trends encourages us to choose topics with known methodologies, quick and measurable outcomes and clear social application. It is reasonable to ask whether these considerations are appropriate ones for individual researchers. Maybe they should be the responsibility of collective decision-makers defining funding criteria and selecting successful projects. Ethical responsibility is often defined by an opportunity to choose

differently. When funding pressures increase, it appears that the room for an individual researcher to choose risky topics with new untested methodologies may be diminished.

We may also consider topic selection from the perspective of global fairness. Can we justify that privileged and often Western researchers study only topics concerning themselves? Is it acceptable that research topics can be selected based on the national and individual ability to pay? This type of questioning will lead our dialogue to consider appropriate stakeholders of research and evaluate the impact of research results. At the same time it raises a question of rights and responsibilities. If we define stakeholders globally and impact in terms other than immediate ability to make financial profit, we open a completely new discussion on the purpose of research. We can illuminate this perspective by contrasting research topics of high blood pressure vs malaria; impact of global marketing vs start-up businesses in Africa; or variations in modern English vs study of Mpur, a completely unstudied language spoken by 7,000 people in West-Guinea.[3]

When completing a PhD, the topic selection is further limited by different criteria. The supervisor must approve of the topic and typically it has to be formally accepted by the faculty/department as well. In many research fields the student is accepted into a research group, where the topic must closely align with the work of the group. In some other fields the PhD work is much more independent and thus allows for broader selection of the topic. We will explore PhD topic selection more closely in Chapter 4.

Above we have touched upon the most common ethical questions that are inescapably part of research topic selection. We have offered very few answers along the way. These questions are designed to provide guideposts for guided dialogue. In addition, it is impossible to give answers. Topic selection is very context-specific and rich with values held by individual and collective stakeholders. The most important aspect is the ability to raise these questions, as questions can only be answered once they have been asked.

Next we move on to explore ethical issues and questions in the actual doing of research, the nitty-gritty of collecting samples/material/data, analysis and drawing conclusions.

MISCONDUCT

Research ethics literature has given great attention to forms of research misconduct typical at this stage of the research project – fabrication and falsification.

Fabrication refers to making up research data and falsification refers to altering the data in order to give a wrongful and distorted message about the research methodology and/or results. Both of these are considered completely at odds with the core research values of honesty, accuracy and transparency, as well as contradicting research goals of discovery and improvement. All research guidelines

clearly and strongly forbid these activities as part of research. Most often fabrication and falsification are easy to see as dishonest and undesirable activities. We will focus on illuminating situations where the definitions are not so clear and we are asked to define what counts as fabrication or falsification in a particular field of study.

Scientific misconduct is intentional deception. Both words are important. Being **intentional** indicates that the person is aware of the fact that what is being done is against the rules and they choose to do what they are doing. **Deception** indicates that what is presented is not what should be truthfully presented. The audience, be it other researchers, the public or the funding body, is asked to believe something that is not a true account. The dishonesty can relate to the people involved, the methodologies used and/or the results presented. The audience is deceived essentially with a story that does not tell what has actually happened.

The reasons for scientific misconduct are various. You can probably recognise many of these as factors in your own research as they influence us all:

• time pressures, juggling multiple tasks and looming deadlines – the pressure to publish quickly is familiar to most researchers;
• the pressure to take steps to advance your career;
• the increasing pressures for funding research work e.g. with short-term funding cycles the expectations for significant results can be very high;
• pressures of other aspects of life, the desire for pleasure, other pursuits and family commitments affect most researchers;
• there might be internal or external pressure to become famous either within the research community or in society at large.

Research practice forms a continuum. At one end we have misconduct and at the other end we have good research practice. The ethical challenges are formed in the grey area in the middle when we are not sure if this is acceptable or not. Every research field has its own grey area. On the edges of this area we find the most fruitful questions for advancing guided dialogue.

The grey area around misconduct is important to recognise in your own field as every research field has its own unique patterns for misconduct. The ambiguity can be born from the use of statistics in a way that distorts the real findings: dealing with large data sets where with careful selection almost anything could be proven to be true; rich qualitative data that would allow your subjective interpretation to influence analysis greatly; or managing research conditions in a way that allows you to get the results you want while claiming to have had a different set-up or methodology.

It is everyone's responsibility to know what constitutes misconduct and to make choices to avoid it. Explicitly exploring the risks and potential will strengthen both the ability to avoid misconduct as well as increase the motivation to avoid it.

METHODOLOGY AND MATERIAL

Methodologies vary greatly between research fields, as well as within a field. This variety allows researchers to make choices in most cases. There are, however, research fields where the methodologies are established to a degree that new research is equivalent to turning the same mill with new grains.

Even when the choice of methodology is easy, its application will always carry ethical considerations. Many of the ethical questions have universal appeal, while others only relate to very specific methodologies. In this chapter we will touch upon key ethical considerations across some major methodologies. We suggest that understanding the basics of key methodologies in all research areas is a skill every researcher should have. It paves the way for interdisciplinary collaboration and dialogue.

The ethical questions around methodology have been given detailed attention in research ethics literature previously. For this reason we will explore them in general terms and from the perspective of the research community and guided dialogue. Researchers are usually interested only in very concrete ethical questions concerning their own research. In practice, researchers may think that it is enough to be able to write a description of research procedures to an ethical committee and get a green light for one's research. An aim of this chapter is to give a wider understanding of ethical reasoning as a basis for guided dialogue to take place within the research community. This all-round comprehension of at least some of the ethical issues helps researchers to communicate with their colleagues from other fields and to take part in the general discussion on guidelines of research ethics.

We will explore the following themes:

 1 experimental use of animals
 2 gene technology
 3 humans as research subjects
 4 study of material and objects produced by humans
 5 intervention research
 6 questionnaire studies and representative samples
 7 study of human-made environments
 8 study of natural environments
 9 use of research equipment and infrastructure
10 big data

1 Experimental use of animals

Experimental use of animals brings up some of the core research ethics questions. They are also questions that most people even outside research are aware of and often hold strong opinions on. Use of experimental animals is one of the starting points for the entire field of research ethics and the need to form shared and acceptable guidelines on how research is carried out.

Experimental use of animals is typically discussed using two polarised ethical approaches based on either utility or principle. These often lead to two opposing judgements on the appropriateness of animal use in experiments. Let us start with the consequentialist approach.

CONSEQUENTIALIST

The experimental use of animals from the consequentialist perspective focuses on the balance between the harm experienced by the animal (e.g. pain, life in captivity) in comparison to potential benefits of the research (new/more effective health care solutions, improved farming outcomes, etc.). Ethical justifiability is based on the positive balance of less harm than benefit. This can be achieved by both reducing harm and increasing benefit.

It is common to approach this harm minimisation by adopting 3R principles.[4]

- **Replace** the use of experimental animals with other methodologies whenever scientifically possible.
- **Reduce** the number of experimental animals to a minimum within the scope of the research.
- **Refine** the procedures used on experimental animals to minimise any pain, suffering, distress or harm.

The adoption of 3R principles does not remove the need for ethical consideration. The definition and meaning of pain and suffering are, for example, always deeply ethical considerations. These considerations are further expanded by considering timing of research – should you wait for a later time, when less invasive methodologies might be available, for example? Funding adds another dimension – how to justify spending research funding in the development of less painful/harmful methodologies? Or what if the more humane methodologies are considerably more expensive? Is there an ethical limit on how these costs can be justified?

The number of animals used is typically suggested by scientific reasoning and funding restrictions. However, if funding would allow only the use of an absolute minimum number of animals, which may or may not allow for conclusions to be drawn at the end, should you even begin the research project?

In the case of experimental animals, the utility approach is deeply complicated by the comparison of very different types of harms and benefits. There are no standardised measures of (animal) pain and there is even less agreement on how this pain could be quantified against the benefits of their use in terms of products for people or other animals. Personal and collective values around animals, research, health, environment and farming are inescapably part of all consequentialist reasoning.[5]

PRINCIPLED

The principled approach is an alternative to the consequentialist argument, which typically leads to allowing, at least on a theoretical level, some use of experimental animals. The principled approach typically focuses on animal rights. These rights are considered to require our respect and are not subject to utility considerations. The rights may include right to freedom, opportunity to lead a natural life, and to be pain free. Typically, these rights are similar to those assigned to humans. We reject the idea of using humans for harmful experimental purposes even if great and significant research gains could be made. So why should we subject animals to them? Assigning strong rights to animals is typically based on the concept of experiencing pain and the difficulty of differentiating between all humans and all animals in any logical way.[6]

In addition to the discussions on the general ethical acceptability of using experimental animals, we are also faced with a value judgement between the types of animals used. The animal experimentation discussion typically refers to vertebrates about the size of a mouse. References to pain make sense with these types of animals. However, where do we draw the line in our consideration of pain as we go further down the list of animals? Are we worried about pain in invertebrates, including insects, for example? If their ability to sense pain is less than with vertebrates, does that translate into a different ethical acceptability in their use as experimental animals? Do we extend the same animal rights to them?

It is difficult to find consensus between the consequential and principled approaches in relation to the use of experimental animals. As use of animals in research is tightly legislated, society has made collective ethical decisions around these issues. National and international legislation typically gives ethical consideration to a defined group of animals (for example, non-human vertebrates and cephalopods (type of molluscs)), defines appropriate use and methods of killing, and usually makes reference to 3R as a core principle.[7] This type of legislation attempts to incorporate both utility and principled thinking by granting animals some rights, though not the same rights as humans, and considering the positive balance between harm and benefit.

Everyone has to form their own opinion on the use of experimental animals. This involves identifying rights associated with different types of animals, the definitions of potential harm and benefit in relation to a given research plan and finding an acceptable balance between these considerations. These need to be contrasted and compared with legislation and the available research methodologies. In addition, it is important to keep an eye on the coherence of the argument – animal rights should not be different between rabbits and rats just because one animal is more appealing than the other. Similarly, if one arrives at a conclusion that animal rights should forbid their use in experiments, how does this compare with the use of animals for farming and other human purposes? It is easy to see that this is not a simple or easy set of questions.

2 Gene technology[8]

Another much-discussed research area is gene technology. By gene technology we refer to a wide range of methodologies that explore gene expression, seeking to take advantage of natural genetic variation and make efforts to modify genes and transfer genes to new hosts.

PRINCIPLED

We can approach it from a principled perspective by asking whether genetic modification, cloning or use of stem cells violates core principles or rights associated with living creatures, or just humans.

CONSEQUENTIALIST

Alternatively, we can consider the consequences of gene technology. Are the benefits of these new technologies comparable with the resources required for the research, possible negative social impact of their use or the risk embodied in the unknown? For example, genetically modified crops for arid areas would improve food safety in many regions of the world, they would change the methods for purchasing seeds and there would be a risk of unexpected environmental impact by the new monoculture crops. How would the balance of harm and benefit fall between different stakeholders considering different possible time spans?

Both approaches lead us into complicated considerations. The core value questions invoked by the principled approach ask us to explore our deepest religious and existential values related to humanity, how it evolves and the way things should be. Similarly, the consequential considerations are often extremely complex, with a very large and diverse group of stakeholders and a great amount of outcome uncertainty. Virtue ethics brings us to consider motivations of different stakeholders in the complex social change brought forward by new gene technology.

   A different set of questions with similar roots is raised when considering the use of stem cells, for example. Stem cell research data appear to provide great health care benefits, at least in the short term. The cost of stem cell research as well as the cost of providing stem cell-based care are prohibiting factors in the utilisation of these results. Guided dialogue asks, for example, if it makes sense to develop health care methodologies that wildly exceed current health care resources and would only be available to a lucky minority with significant personal ability to pay. This is an example of a core research question on what we wish to achieve and what are suitable ways to achieve these goals. Associated with this is a question on whose responsibility is it to direct and manage research to address these ethical concerns. In other words, when, if ever, is it your personal business as a researcher to make choices with these considerations in mind?

The use of gene technology with human cells has a second layer of ethical questions associated with privacy, confidentiality and rights. Who owns what when we study genetic material, and how can information be shared when we deal with cells that have great potential and hold detailed information about the donating individual? As gene technology develops, these questions morph into new forms and require ongoing attention from the research community in collaboration with society. Guided dialogue becomes useful as ignoring these considerations in research work can have seriously detrimental impacts on the usability of the results. Both nationally and internationally these questions are debated, and this dialogue is necessary for research to remain ethically robust and to be able to contribute to society.[9]

Gene technology is one of the research areas where international agreements on ethical guidelines are necessary. It is not fair from the perspective of equal opportunities for researchers if research in one country is less strictly regulated than in other countries. It is not favourable if researchers travel around the world seeking the environment that offers the most permissive ethical rules.

3 Humans as research subjects

There is a long history to consider in the ethical use of humans as research subjects.[10] The main focus is to protect test subjects' autonomy to make decisions for themselves as well as their privacy in relation to personal information. Together with debates about the use of animals in research, these questions are part of the foundation and momentum to discuss research ethics at all.

Autonomy is a foundational value in Western societies. Autonomy allows every rational person the right to make decisions regarding their life. These include decisions on how they want information about themselves to be shared and used. Typically, these core values translate into requirements of **informed consent** to becoming a research subject.

Both parts of this concept are important. While consent refers to giving permission and thus exercising autonomy, informed refers to conditions within which exercising autonomy is made possible. A rational decision can only follow from knowing enough about the situation. In the case of consenting to becoming a research subject, the following aspects are typically necessary for informed consent to be possible:

- aims and duration of the research;
- experimental design and possibly associated risks;
- how to leave the study if you no longer wish to participate;
- any responsibilities or benefits associated with being part of a study (compensation, additional care, travel);
- possible benefits of research both to the subject and society at large;
- how the results will be analysed and stored;
- who has a right to access results or data;

- how, where and when the results will be published;
- where to find out more about the research.

Typically, an agreement is formed between the research team and consenting subjects. Forms of valid agreements are often described in national legislation or guidelines.

Despite the extensive literature on gaining informed consent, researchers need to make considerable decisions on how the rules, regulations and guidelines translate into practice in each given research project. Typical questions we need to ask include:

- What is enough information about the project?
- How do we share this information to make sure the subjects understand it?
- How do we check that the consenting participants are in fact informed?
- How much time am I expected to devote to educating the subjects about the research?
- How broad can the consent be, considering all possible uses of the material collected?

Additional challenges appear when the researcher and subject represent different linguistic, cultural, social or education groups. In these situations it may be very difficult to confirm whether given consent is based on adequate information.

A further challenge arises with research subjects who are unable to give consent to research. These include children, people with intellectual disabilities or seriously ill individuals. Typically, a proxy decision-maker gives consent. It is ethically important to confirm who has a right to give proxy consent – do we think a family member or someone with formal authority is suitable, for example?

Anonymity is often considered the gold standard for any study involving human subjects. This could be challenged, however, when doing interviews as an ethnographic method. Let us consider two areas which raise general questions. First, anonymisation needs special methodological skills, but an ethical dilemma rises if an interviewee is against it. She or he may think the researcher is exploiting her or him for scientific purposes and is refusing to even give credit by mentioning the subject's correct name. Guided dialogue can be used to explore the concepts around this request and seek options to find a way to maintain key values for all stakeholders.

Second, when doing pioneering research among indigenous peoples a researcher bears great responsibility for labelling a certain human group in a specific way. Consider a situation in which a researcher is examining the sexual behaviour of a small ethnic group living in the jungles of New Guinea. Ten men are interviewed, but women refused to take part in the study. All the men said they have sex with female partners only by standing against a wall. The researcher reports about these findings in an ethnographic journal. The readers of the journal understand the limitations of this type of research. Nevertheless, the

article gets a lot of citations and publicity. Finally, the facts arrive in textbooks and on Wikipedia. After 40 years, another researcher visiting the same ethnic group finds out that the interviewees of the previous study had lied. Their answers reflected old religious traditions according to which they should behave, but in reality no one had followed it for a long time. The example demonstrates well the tentative character of scientific findings and truths, but at the same time it illustrates the responsibility of researchers in distributing the results of their studies.

A good case for reasoning is the situation with refugees in many countries. It is of paramount importance to study their needs, expectations and future plans, but refugees make a very challenging group of interviewees and test-persons because of their linguistic, cultural and educational variety.

4 Study of material and objects produced by humans

Research may not involve an individual directly, but their objects and materials (e.g. personal belongings, written material or bio-samples). This type of research engages similar ethical considerations as the direct use of human subjects described above. In addition, new ethical issues may arise when it is no longer possible to ask for informed consent to include objects or material in research or to use the material for which the researcher does have consent in a different way to what has been agreed.

When seeking consent to use materials and objects, it is helpful to spend time forming the consent procedure to cover all potential longitudinal research requirements. If this is not done, it may be possible to use some of the collected material in an anonymised form for further research or archiving, but it is considerably more complicated, both ethically and technically.

There are interesting national differences around the use of material in research other than its original purpose. The EU has a principled decision to encourage archiving and multiple/longitudinal use of research material, while some countries have strict rules for destruction of research material in the name of privacy and confidentiality. This may be seen as different ways of balancing potential benefits via ongoing research use and reduced cost of collecting material against the potential harm to individuals from either real or perceived violations of privacy and confidentiality.

5 Intervention research

Intervention in this context refers to influencing the course of events. In the research context, this means the research setup deliberately alters the conditions to study the impact of these changes on behaviour, motivation or health in workplaces or on interactions of humans or animals, for example. This type of research may be considered for studying new care approaches, educational innovations or management styles.

Many of the above-mentioned ethical considerations apply to intervention research as well. In addition, intervention research is typically longitudinal, with the research spanning weeks if not years before the impact of intervention can be observed and verified. This requires significant commitment from both the researcher and the research subject. In intervention studies, the subject typically has an active role and the cyclical engagement between the research setting and the subject adds a new layer of influence. As multiple variables influence the research subjects during the research, validity of the results is always difficult to prove. On the other hand, interventions are often the only way to explore important research questions. So, in order to widen the scope of objects of research, we have to give up the strictest demands for objectivity, being one of the cornerstones of scientific research. This is a big ethical dilemma to be discussed. There are other interesting things to consider in harm–benefit comparison. The length of the study can often be seen as a harm, while the opportunity to gain extra tuition, care or facilities can benefit the research subjects themselves rather than unknown future individuals. A possible benefit is a more positive attitude to research among persons involved in the study. They feel that research is not something abstract and far from their real lives, but something that helps people to solve their everyday problems.

6 Questionnaire studies and representative samples

Research is also interested in the opinions and knowledge people hold. An essential ethical question is found in the decision on subject selection – who are they and how many are included in order to be able to draw the desired conclusions from the study? The research term **representative sample** incorporates these ethical concerns as well, though we are not often aware of the ethical dimension of it. Many fields of study have their own traditions around appropriate sample sizes, but there are no generic rules on how many subjects are necessary to be able to state that they adequately represent the studied population. It is often a balancing act between time and resources available to do the study and the ability to draw significant conclusions.

The choice of research subject evokes considerations of scientific procedure as well as ethical considerations for justice. The appropriate choice of subject is often suggested to include an element of randomness, which distributes both the burdens of participating as well as possible benefits in a fair manner.

Results, particularly from qualitative studies, are rarely simple or straightforward to interpret. As researchers, it is our responsibility to interpret results, as presenting raw data is rarely an appropriate option. We can often rely on research conventions of significance ($p \leq 0.05$) and conventions on how to remove outlier data. While these conventions are helpful for the research community, we are still often faced with questions and decisions around defining significance, and the accuracy we use to measure/present our results.

Typically, we have a choice around whether we attempt to publish our results or not. Funding and career pressures will always add weight toward publishing, even when results lack significance or strong demonstrative power.

7 Study of human-made environments

Challenges in the study of human-made environments are often born from contradictory needs between researchers and society. For example, if historically important artefacts are found on a site prepared for a major construction, whose interests are prioritised? It can be assumed that more valuable artefacts are present in the area and that for the interest of research an opportunity for archaeological excavations would be paramount. On the other hand, the construction company has financial interests and the community may be relying on the building being finished for housing or to provide essential services like childcare or healthcare.

We have different options to approach this conflict of interest:

- allow construction to proceed as planned;
- delay construction until further research has been completed;
- place an indefinite ban on construction in the area;
- place a temporary ban on construction in this and surrounding real estate until research has been completed;
- allow for destruction of existing structures to allow for study in adjacent blocks of land.

PRINCIPLED

There may be rules that give rights or responsibilities to different stakeholders. These rights and responsibilities may be clear enough to negate any need to consider harm or benefit. However, even then, the rules typically include value-rich terminology such as 'scientifically significant', 'considerable importance to the community' or 'great financial burden'. All of these invite a value judgement that defines 'significant', 'considerable' and 'great'.

CONSEQUENTIALIST

Each of these options treats the stakeholders in different ways. If rules and guidelines do not provide simple solutions, the decision will inevitably define priorities between stakeholders. What is more valuable – the research or the building? Timelines become an important factor in evaluating options – how long are we ready to wait to find a solution that would eventually meet everyone's needs? The decision-makers' values will translate into a decision on whose interests are given the greatest consideration.

Research on human-made environments may also require us to explore how much harm research can cause to people in their everyday lives. Many decisions in

society carry the same ethical concern of acceptability – when can essential services be reduced or cancelled, generate noise or block traffic if these are balanced by social or research benefits?

Consequentialist approaches allow for balancing harm and benefit between different stakeholders at different timeframes. The balancing becomes challenging if the harm is assigned to a different group than the benefit, for example. When can we accept such an imbalance?

Often some established rules and guidelines assist in this decision-making. These reveal values held by the community. A city council can give permission to close a section of a road for a racing event but refuse permission for a research group that wants to perform aerosol testing on a much smaller section of road. Behind these decisions there may be some rules made by the city council regarding the conditions for granting road closures. However, if one considers the ethical background of these rules, it is easy to see some value-based harm and benefit reasoning. The car-racing event creates pollution, increases noise levels and blocks a big area of the city for hours, but the benefits are more important: entertainment for a huge amount of people, and a boost for the economy and reputation of the city. For the work of the research group, the harm is much smaller but the benefits are much more abstract and future-oriented, especially if we take the perspective of the inhabitants of the city.

From a different perspective, we can also consider research on objects that will be damaged to some degree in the research process. Research may require scratching a surface, for example, to identify the origin, process, or maker of the object. Would this be acceptable? It may be difficult to speak of rights assigned to an object. We may, though, consider rights of future generations to have access to historical objects in their current/original condition. If such a right exists, it is often contrary to rights held by researchers to study and explore objects.

8 Study of natural environments

Questions relating to the use of experimental animals have led to discussion on most research ethics questions. We have considered ethical questions related to humans and human-made environments and now return to considering research in the natural environment. What can we do in and to the environment in the name of research?

Would it be acceptable to destroy to any extent the natural environment for the purposes of research by bringing in heavy equipment, taking samples, capturing wildlife or restricting natural growth and development? If it is, then how do we balance the harm we do in the name of research and advancement of science? These questions increase in importance when we deal with vulnerable or endangered environments or animals – the values of protection or research may become contradictory and we are forced to weigh the value of knowledge against preservation, even when knowledge may assist with further preservation efforts.

These questions align with questions around harm caused in any effort to achieve good. How much harm are we ready to accept in order to achieve our desired outcome and how do we treat stakeholders in the decision-making process and deal with imbalance between the recipients of harm or benefit? This utility-based thinking is at the core of most social decision-making where finite resources are paired with multiple definitions of good translated into varied goals and desires.

9 Research use of equipment and infrastructure

Research equipment is used for measuring, observing, recording and generating research data. The ethical issues with the use of equipment typically concentrate around acquisition decisions and utilisation of the existing equipment.

Acquisition is closely related to research questions and the suitability of the equipment for the intended purpose. From an ethical perspective, the acquisition decision is about defining an acceptable level of utilisation to justify the purchase. We can describe this as the added value the equipment produces for the research. When the equipment is very expensive, the justification has an increased importance at times of reduced research funding and tight competition for it. Good questions to ask include:

- Is the utilisation rate high enough to justify the acquisition?
- Could sharing the equipment or using equipment already in possession of other research groups increase utilisation?
- How does the equipment increase the research potential and effectiveness now and in the future?
- What are the other possible uses of these research funds? In other words the opportunity cost of the equipment acquisition in terms of personnel, travel, collaboration, etc.?

If the equipment acquisition is associated with choosing a new research topic, we can also ask at least the following questions:

- Is the research topic itself such that this investment will support the department/university/national research profile?
- Is the research topic itself important and beneficial enough to justify expensive equipment, i.e. comparing opportunity costs across different research topics?
- How do we define the benefits? Is it suitable and acceptable to refer to applicability, international reputation or interests of researchers?

The stakeholder group is typically our own research group or department. From an ethical perspective, this narrow focus may not be easy to justify. It is an ethically stronger position to consider a broader group of stakeholders. These could include other research groups, research directions and universities. Considering

benefit and harm from this broader perspective can lead to a very different conclusion on what is worth doing.

Once the equipment has been acquired, another set of ethical questions appears:

- How do we define priorities for use if it is not possible to allow everyone the level of use they would prefer? What are the criteria to have a higher priority – seniority, research topic, stage of research or experience with the equipment?
- If the use of equipment requires training, how do we choose those to be trained to use it? Is it a privilege, duty, burden or opportunity to be trained in this way?
- If the equipment generates occupational health and safety risks (e.g. radiation or chemical exposure), how are the risks divided between users? Would it be justifiable to treat young female researchers differently to other groups?
- Who decides acceptability of risks and how they are managed?
- If the equipment is shared, how do we share costs of maintenance, use and training? Can the group who purchased the equipment, possibly with public funding, profit from the equipment?

Libraries create an important part of the academic infrastructure. The purchase cost of electronic material has become so high that it can be compared with any other significant equipment purchase. Access to electronic databases is no longer an assumption, as even larger universities have to make decisions on which databases they subscribe to. This generates many ethical issues partly related to academic publishing, discussed in more detail in Chapter 3:

- Who decides what material is purchased and what are acceptable selection criteria?
- Can different access criteria be assigned to different members of the academic staff and students?

10 Big data

The rapid development of computer technology has also opened up new opportunities for research. Three things are behind the boost: availability of very large collections of data; continuous growth of computational capacity of computers; and development of programmes and techniques for combining data from different sources. Due to this progress we are nowadays able to collate huge databases of information in many research areas, including meteorology, environmental research, genomics, complex physical simulations, as well as various fields of social sciences and humanities. 'Big data' is often used as a common label for these unprecedented data collections.

While this ability to collect vast data sets has a possibility to increase objectivity and reliability of research, at the same time, it entails several risks with an ethical component.

A large amount of data may give an illusion that it automatically leads to more reliable results. If data are one-sided, the size does not increase our understanding of the phenomenon under scrutiny. If we collect more and more data about air pollution (aerosols and particles) in one location, this does not directly tell us about conditions in other locations with different conditions. The ethical question is to define what provides an acceptable definition of significance to draw conclusions and possibly suggest application and change in behaviour, when the amount of data do not automatically provide that. This question applies to all research and needs to be revisited especially when new methodologies emerge, like now with big data.

Traditional statistical tools have limited applications with big data. With limitless data combinations, traditional tools can be used to prove almost any connection within these vast data sets. This increases the need for transparency of methodology and shared discourse on the conclusive power of any results drawn from big data.

Big data allows for impressive visualisation options. One picture can summarise complex information or provide an impressive way to mislead the reader to interpret the data in various ways.

The collection and analysis of big data raises also the question of cost-effectiveness of research. Expensive 'big data machines' can provide so much raw material that nobody can use it in a reasonable way. Another question is the balance of resources distributed to research where different methods are used.

The utilisation of big data is a typical case of a trendy method. However, what is popular and frequently used at this very moment is not necessary the only feasible way of doing good research. Machine translation is an area where methods have been re-shaped along with technological development. This methodology is based on a structural analysis of two chosen languages. The methodology is partly compensated by statistical methods based on a large amount of linguistic data. The development of the methods themselves definitely leads to scientific progress and it also opens new avenues for practical applications. On the other hand, concentrating on development of statistical methods leads to neglecting the development of other means of machine translation. These approaches do not treat everyone equally. We have large text corpora for only a few languages in the world. Harm is therefore experienced by the speakers of languages that lack a large text corpora.

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In this chapter we have explored the research process from an ethical perspective both chronologically as well as thematically. The chapter has presented far more questions than even attempts to find answers to them. The structure of exploring stakeholders, rights and responsibilities and defining options are suggested as ways to start guided dialogue on many of these issues. The questions themselves are signposts for the types of issues most likely present when we stop to consider

the actual doing of research. Each piece of research is both deeply contextual and simultaneously shares core elements with all other research. In other words, the questions even have global relevance, while the answers are often meaningful only in their local context.

Case study 1: motivation for selecting the research topic

In this chapter we have discussed different factors influencing the choice of the topic of research. Contemplate to what extent the following issues have affected the selection of **your** research topic:

1 availability of funding;
2 priorities/traditions within your research group/department/faculty/ university;
3 availability of equipment/laboratory/material/test persons;
4 your supervisor/colleague/friend/fellow student has given you a hint or advice for that;
5 the topic is trendy in your research field;
6 the topic gives an opportunity to make a breakthrough in research;
7 your previous research career gives good skills to do this kind of research without extra training;
8 the topic is rather narrow and that is why you are able to publish on it in a reasonable time;
9 you are enthusiastic about the topic;
10 the results of the study can be utilised somehow – in developing new products or service concepts, in legislation, in helping people to live a better life, in widening people's worldview or addressing an imbalance in studying third-world problems.

Consider, in a similar way, the choice of another researcher you know well.

After answering the question, think of the ethical approaches you have followed. Have you paid attention to the benefits of research (consequentialist approach)? If so, have you thought about whose benefit you have put into the foreground – your own, that of the department/university or something else? Or have you weighed the questions from the point of view of an ideal researcher (virtue approach)?

How do you think research topics should be selected in an ideal situation? Do you think the current situation is satisfactory, particularly considering how research addresses current world problems? Who is responsible for guiding the selection of research topics – the researcher, research group, financing bodies or policy-makers?

Case study 2: where are the limits of 'sufficient'?

Previously we discussed the issue of 'what is sufficient?'. This is a very practical question. In most cases, the thing to be weighed is the juxtaposition of spending more time in order to fulfil the research standards more rigorously and publishing as quickly as possible. In this issue, the consequential approach may lead to tactical considerations rather than to ethical ones, when a researcher estimates the risks of being caught for unethical behaviour. This is the wrong way to solve the problem. The principled and the virtue approaches give a more fruitful tool for discussing these cases. Consider various aspects of this important question by using the following example as a starting point:

1   **Extent of previous research.** A general idea of research is that it is based on results achieved by other researchers. The aim of research is to bring something new to the worldwide stock of knowledge. This way of thinking leads to the demand to be acquainted with all possible publications where the topic in hand has been touched upon. However, you may think that some of them may be skipped because (a) they were published in another country and/or language; (b) they represent another scientific approach, school or method; (c) they are old-fashioned and no longer relevant.

2   **Added value.** Does the research contribute sufficiently to the current knowledge, appreciating that research fields develop differently? If we are studying phenomena X (e.g. chest cancer or causes of misunderstandings in verbal communication) and we currently assume we understand approximately 50 per cent of the phenomena, and after our article would understand 50.2 per cent, would that be sufficient added value? Or how much more should we know? Alternatively we can ask how much 'new' material there should be in an article, book or PhD thesis.

3   **The scale of material.** In most research fields there is a certain consensus about the number of test persons, experiments or examples which are needed to fulfil the criteria of 'good research'. However, there may be certain practical reasons that hinder the researcher from reaching the satisfactory limit of cases (e.g. time pressure or costs). Are there circumstances where fewer is enough?

4   **Representativeness of test persons.** Test persons for psychological experiments and interviews are often collected on a voluntary basis. The easiest way to find them is to turn to students and pay them a cinema ticket. In the publication based on the experiment, the researcher naturally explains restrictions and possible biases in results

to the readers. In doing so, the researcher leaves the interpretation of results to them. Is this a satisfactory situation from an ethical point of view?

5   **Information given to test persons and interviewees.** According to general ethical guidelines, people involved in research have to be informed about the relevant features of research. However, in practice it is not always clear how to guarantee they have understood everything correctly. Some groups (children, elderly people, mentally or otherwise ill people) are a special challenge here. What is the role of relatives in these cases? How much time should the researcher spend in order to fulfil all the requirements needed?

6   **Degree of reliability.** Repetition of experiments (in cases when it is possible) is a general requirement for research. Every iteration makes the results more reliable. On the other hand, with each iteration the improvements in reliability are less and less. The costs of experiments and the time they need certainly influence the number of reasonable repetitions. Are there other factors regulating the number of needed repetitions?

Case study 3: do the methods determine the value of research?

Some methods seem to be 'more scientific' than others because they reflect more precisely the general principles of research, such as objectivity and quantification. The ideal of science is to achieve univocal and unambiguous results, which can be proven by other researchers repeating the study in a similar way. One may argue that this makes the crucial difference between scientifically proven facts and opinions of people, which are just based on indefinable and vague observations and arguments. The archetype of favourable research is a double-blind arrangement where test persons get real drugs or placebos and the researcher her-/himself, when analysing the results, does not know the distribution of the two test groups. However, if we take the double-blind test as the only acceptable method in medical and health research, we are not able to study such effective cures as psychiatry, physiotherapy and physical exercise. Thus, the principled approach to research methods brings another answer than the consequentialist approach. Similar discussion arises when we compare case or intervention methods with quantitative methods in social sciences and humanities, sometimes valued differently among researchers. One may also speak 'hard' and 'soft' methods in this area.

There are also other differences in aims and traditions of different research fields. What is your opinion about As and Bs in Table 2.1? How about your colleagues or the majority of researchers? Are there scientific principles which make A the better option compared to B, or maybe the contrary is true? Which kind of values are behind such reasoning? Can one use these characteristic for defining what science is about?

Table 2.1   Differences in aims and traditions of different research fields

	Column A	Column B
1	Double-blind method is the only way to reach reliable results on phenomena we are interested in.	Other methods are as important because there are many phenomena that cannot be studied by using the double-blind method.
2	In research we should always strive for quantitative methods because otherwise we fall into the trap of subjectivity.	There are topics that cannot be approached by using only quantitative methods. Sometimes exact figures give a false illusion of objectivity.
3	Only results are important.	The process of doing research is also important because it is a learning opportunity for all taking part.
4	Proven widely used methods are a hallmark of research and researchers should be content with them.	Seeking new, more effective methods is a part of the research process.
5	Research is primary: when there are conflicts between the needs of research and principles widely accepted in society, we should give priority to research because in the long run this benefits society.	Research is secondary: when there are conflicts between the needs of research and principles widely accepted in society, we should follow the same principles as society.
6	Researchers should be given the infrastructure they need in order to compete in the international arena.	Procuring research infrastructure should be seen as an opportunity cost balanced with other needs of researchers.

Case study 4: credibility of the research community

Collaboration between different parts of society is based on trust. Research is no exception. Those utilising research results, be it the research community itself or someone else, assume that the research is done honestly and diligently. In other words, it can be trusted. Trust is the foundation for the division of labour within a research group as well: everyone does their

part, which together make up the whole. Research subjects and those answering questionnaires trust that they have been given correct information regarding the research. When research is sent for review, both the editorial team and the authors trust that the reviewers will do their job with fairness and care.

Exposure of research misconduct may be considered to erode this trust, particularly when the cases of misconduct receive extensive negative media attention. Public and open discussion on research ethics, and particularly violations of codes of conduct, can be considered dangerous and unadvisable. Consider this issue from the perspective of the two polar-opposite opinions below. Which of them presents the most convincing argument? What values and assumptions support each argument? How do you think we should act when misconduct is discovered?

1   It is sufficient that we have the codes and guidelines given by authorities on research misconduct defining fabrication, falsification, plagiarism and misappropriation. Each researcher can reflect on how these codes and guidelines apply to their own research. Open discussion and emphasis of these issues within the research community and especially in the media will only reduce credibility of research work. Any actual misconduct cases should be dealt with quietly within the research community and wrongdoers reprimanded appropriately, without any undue publicity.

2   Open and explicit ethical considerations are necessary as research is filled with questions and grey areas where the codes and guidelines must be applied or where their guidance is only very limited. Only open dialogue can develop the true ethical strength of the research community and shape its identity in society. The research community will lose its credibility if it shows an inability to openly deal with difficult issues like misconduct. Actual cases of misconduct should be dealt with as transparently as possible and people from outside the research community should be invited to explore the issues together with the research community.

NOTES

1   D.B. Resnik, L.M. Rasmussen and G.E. Kissling (2015), An international study of research misconduct policies, *Accountability in Research* 22:5, 249–266 (www.ncbi. nlm.nih.gov/pmc/articles/PMC4449617/pdf/nihms691915.pdf).
2   To learn more about the prevalence of research misconduct, you could start with the following: D. Faneli (2009), How many scientists fabricate and falsify research? A systematic review and meta-analysis of survey data, *PLoS ONE* 4:5, e5738 (http://journals.plos.org/ plosone/article?id=10.1371/journal.pone.0005738); L.K. John, G. Loewenstein and

D. Prelec (2012), Measuring the prevalence of questionable research practices with incentives for truth telling, *Psychological Science* 23:5, 524–532 (http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.727.5139&rep=rep1&type=pdf); C. Gross (2016), Scientific misconduct. *Annual Review of Psychology* 67, 693–711 (www.annualreviews.org/doi/full/10.1146/annurev-psych-122414-033437).

3   Mpur has approximately 7,000 native speakers. The language also has other names: *Amberbaken*, *Dekwambre*, *Ekware* and *Kebar*. It is classified as 'isolated' – that is, not having any relative languages. As a matter of fact, we know more about Mpur than about hundreds of other languages spoken in West Guinea, thanks to fieldwork done by C. Ode (2002), A sketch of Mpur, *Languages of the Eastern Bird's Head*, ed. G.P. Resink, Canberra: Australian National University, 45–107.

4   See: W.M.S. Russell and R.L. Burch (1959), *The Principles of Humane Experimental Technique*, London: Methuen (http://altweb.jhsph.edu/pubs/books/humane_exp/het-toc); and The Interagency Coordinating Committee on the Validation of Alternative Methods (US) (https://ntp.niehs.nih.gov/pubhealth/evalatm/iccvam/index.html).

5   See P. Singer (1975), *Animal Liberation*: *A New Ethics for Our Treatment of Animals*, New York: Avon.

6   See T. Regan (1986), *The Case for Animal Rights*, Berkeley, Ca: University of California Press.

7   See for example:European Directive on Use of Experimental Animals: Directive 2010/63/EU (http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2010:276:0033:0079:en:PDF); US Government Principles of Use of Laboratory Animals (http://grants.nih.gov/grants/olaw/references/phspol.htm#USGovPrinciples); and Australian Acts and Regulations (www.animalethics.org.au/legislation).

8   See: R.M. Berry (2007), *The Ethics of Genetic Engineering*, New York: Routledge; R.W. Kolb (ed.) (2007), *The Ethics of Genetic Commerce*, Malden, MA: Blackwell.

9   Examples of public bodies regulating gene technology are: Australian Gene Technology Regulator (www.ogtr.gov.au/internet/ogtr/publishing.nsf/Content/section-about); European Society on Human Genetics (www.eshg.org/home.0.html); and the National Institute of Health, Stem Cell (http://stemcells.nih.gov/Pages/Default.aspx).

10 Examples of agreements and codes around the use of humans as research subjects: Nuremberg Code (1947) (http://ohsr.od.nih.gov/guidelines/nuremberg.html); World Medical Association, Declaration of Helsinki (1964) (www.wma.net/e/policy/b3.htm); CIOMS International Ethical Guidelines for Biomedical Research Involving Human Subjects (www.cioms.ch/frame_guidelines_nov_2002.htm); Council of Europe, Recommendation No. R(90)3 Concerning Medical Research on Human Beings (1990) (www.coe.int/T/E/Social_Cohesion/Health/Recommendations/Rec(1990)03.asp); and the EU 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, European Treaty Series No. 164 (http://conventions.coe.int).