Explaining Society

Critical realism in the social sciences

Berth Danermark,
Mats Ekström,
Liselotte Jakobsen
and Jan Ch. Karlsson

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4 Generalization, scientific inference and models for an explanatory social science

In Part I of this book critical realism is presented primarily as a metatheory containing a specific ontology and epistemology. Together these chapters show that critical realism apprehends the object of social science in a manner quite different from both positivism, hermeneutics and postmodernism.

But what significance does this have for the methodology of social science? This is the all-embracing question we shall discuss in the second part of the book. When we talk about methodology, it is about the borderline between on the one hand the philosophy of science, and on the other hand the critical methods or working procedures used in specific studies. A recurrent argument in this book is that we cannot commit ourselves to a particular research method; we cannot decide which method is the most appropriate without taking in to consideration the properties of the object we wish to acquire knowledge about.

Critical realism does not claim to develop a new method for social science. On the contrary, it criticizes any ambition to develop a specific method for scientific work. There is no such thing as the method of critical realism. On the other hand, critical realism offers guidelines for social science research and starting points for the evaluation of already established methods. What we discuss in this chapter is just such guidelines. The starting point is three fundamental methodological arguments. Besides this introduction, this chapter contains three sections, unfolding each of the three arguments:

1 All science should have generalizing claims. Methods for acquiring knowledge of the general and for examining the validity of generalizations are fundamental for all social science research. Generalizing may, however, mean different things.
2 Quite essential for scientific methods are various modes of inference. In a science based on critical realism, abduction and retroduction are two indispensable modes of inference besides induction and deduction. In this chapter these four modes of inference will be presented. We shall use the concept of inference in two different meanings: in the first place as the logical inferences treated in formal logic, in the second place as thought operations, i.e. different ways of reasoning and thinking in order to proceed from something to something else (cf. Habermas 1972: 113). To avoid

misunderstandings it is important to state that we use the word 'inference' in these different ways.

3 An overall aim in social science research is to explain events and processes. To explain something implies (from the perspective of critical realism) first describing and conceptualizing the properties and causal mechanisms generating and enabling events, making things happen (see Chapter 3), and then describing how different mechanisms manifest themselves under specific conditions. This kind of investigation requires a methodological approach based on abduction and retroduction, and breaking with the so-called Popper–Hempel model of scientific explanations.

Thus the aim of this chapter is from these three points to present methodological guidelines for a social science based on critical realism. What we will discuss with reference to each of these three issues is at the same time linked to a common problem central to modern science and the philosophy of science. The problem we have in mind is the relationship between the individual/specific and the universal/general. Common to different schools in the philosophy of science (positivism, hermeneutics, Marxism, etc.), and to philosophers who have been active in these schools, is the fact that they have emphasized this problem in their discussions of the logical structure of science.

The whole of this chapter relates to this fundamental problem of science. In the first section (cf. argument 1 above) we shall distinguish between two different forms of generalization. It may seem controversial to assume, like we do, that all science should have generalizing claims. In social science there have been discussions over the years in which some have defended the generalizing ambitions of science, while others have emphasized the value of seeking more thorough knowledge of unique cases. We find the origin of this division (between the general and the unique) in the debates of the late nineteenth century, when several prominent historians and philosophers pointed out that human science is principally idiographic, in contrast to natural science, which is nomothetic (Liedman 1994). An idiographic science draws attention to the individual and unique – a historical event is described with regard to the combination of circumstances making the event unique, people are studied with regard to unique biographies, and so on. Nomothetic science instead seeks the general, the universal and that which conforms to law (*nomos* is the Greek word for law). This division between idiographic human science and nomothetic natural science caused tension within social science. Social science has been influenced by both of these views, but it has always endeavoured to attain some form of general knowledge. However, the relation between the specific and the general has been treated in different ways in different schools of social science (see e.g. Coniavitis 1984).[1]

In Chapter 3 we gave law a totally different meaning compared with what has been common in science influenced by positivism. In the latter, law has meant statements about universal empirical regularities. We argued, however, that a law (e.g. the law of gravity) is a description of a mechanism existing as a property in

reality, but whose observable effects strongly vary depending on concrete circumstances. Hence laws should be analysed as tendencies. What are usually called a qualitative case study in the literature is a method very well suited for acquiring knowledge about such mechanisms or laws.

The division between the general and the unique has marked the discussion of qualitative and quantitative method. It is not uncommon in contemporary social science to take the position that qualitative methods provide knowledge about the specific and unique but that it takes quantitative methods to enable generalization. If we look at social science practice, however, we find that many of the generalizations appearing in the literature are grounded precisely in qualitatively orientated case studies. Let us give a few examples: Erving Goffman (1990) argues from qualitative studies that people's actions practically always have the character of performances where, with the aim of influencing other people's views of us, we hide certain things about ourselves and accentuate others. Through case studies, media researchers have been able to show that there are certain generally existing discursive structures and ideologies behind what on the surface appear as dissimilar texts and narratives shown on television (e.g. Fairclough 1995; Van Dijk 1997). By means of qualitative studies of power relations, researchers have been able to demonstrate that there are certain general power mechanisms recurring under totally different conditions (e.g. Ekström and Danermark 1991). Within the tradition of ethnographic research there have been many qualitative and descriptive case studies, including observations of situated everyday actions and interactions. However, as Silverman emphasizes, ethnography is not limited to descriptions of actions in different settings: 'On the contrary, ethnography shares the social science programme of producing general, possibly even law-like, statements about human social organisation' (Silverman 1993: 49). These are just four examples of research which, mainly with the help of case studies, has led to generalizable knowledge about structures and mechanisms.

In the second section of this chapter (cf. argument 2 above) we pose the question: how can we attain knowledge about the general from knowledge about particulars; or vice-versa, how do we get from particulars to generalities? As a suggestion for solutions to these problems we shall present four different modes of inference – deduction, induction, abduction and retroduction. We see these four as being complementary. They constitute central parts of the structure and logical preconditions of scientific reasoning, and are thus the core of the scientific method.

What we call 'inference' is descriptions of various procedures, ways of reasoning and arguing applied when we in science relate the particular to the general. Characteristic of inference is that from one thing conclusions are drawn about something else. It is important to emphasize one thing from the start: inference, as we use the concept, involves on the one hand formalized and strictly logical rules for deduction. Deductive logic is employed, e.g. to test whether conclusions we draw in an argument follow in a logically

valid manner from the premises given to support the conclusion. We also use the concept of inference to denote various thought operations (e.g. retroduction) which are neither formalized nor strictly logical conclusions, but suggest a form of argument advancing from one thing to something else, e.g. arguing from individual observations to gain knowledge about general basic structures.

In everyday contexts we continually draw general conclusions from observations of individual cases. Some generalizations are well grounded in solid experiences. In other cases they may be manifestations of prejudices we hold, without being quite aware of it. Both in everyday discussion as well as in scientific argument it is important to take a critical attitude to unfounded generalizations. In science we are expected to apply well-reasoned and well-founded methods when we test the validity of a generalization. We will find the basis for these methods in the inferences and thought operations we shall examine in this chapter.

In the third and last section of the chapter we shall present two alternative models for an explanatory social science. The focus will lie in a demonstration of how the different forms of generalization and inference treated in the two previous sections are integrated in different explanatory models.

Generalization – two different meanings

So far we have been talking about generality (or generalization) without exactly defining what this concept means. If we look it up in a dictionary we may find the synonyms 'universal applicability' and 'universality'. Here we use these three concepts as synonyms. What do we mean, then, by generality?

Within science there are two fundamentally different ways of defining and using the concept of generality. We may call these the empiricist concept of generality and the realist concept of generality. According to the first, generality is a question of how large a group of events or other phenomena an empirical observation can be generalized to. In this case generalization is an extrapolation. Knowledge of a limited amount of events is extrapolated to, and is assumed to be valid for, a larger population. Generalizations can be made to larger populations over time, and to events in various sociocultural contexts. Empirical statements (and hypotheses) may in this sense be general to different degrees; they may claim to involve a few specific cases, but they may also refer to larger populations and circumstances of a more common nature. Let us exemplify this with two empirical statements differing in just this respect.

Statement 1: During the last two weeks of the election campaign, mistrust of politics was expressed on several occasions in Swedish television news programmes.

Statement 2: Distrust of politics is often expressed in mass media.

Naturally it takes different types of investigation to test the two exemplified statements. The first one is possible to test through a well-defined empirical study. The second statement is hardly possible to test comprehensively. Statements of this type are based on extrapolation to a larger population from the knowledge about particular cases. Generalizations in science deal partly with this type of empirical extrapolation, but not exclusively.

The empirical extrapolation is confined to what was described in Chapter 2 as the empirical domain, and excludes the domain of the deep structures of reality (what we have also referred to as the transfactual conditions of the objects). According to the realist concept of generality, scientific generalizations largely refer to transfactual conditions, to the more or less universal preconditions for an object to be what it is. Bhaskar (1978: 227) expresses it in the following way: 'Scientifically significant generality does not lie on the face of the world, but in the hidden essence of things'. The difference between these two types of generality and generalizing is illustrated in Figure 3.

What Figure 3 tries to show is, in the first place, that something can be general in two different senses – either in the sense of a *generally* occurring empirical phenomenon/event, or in the sense of *fundamental/constituent* properties and structures. In the second place the figure is designed to show that there are different actions, methods and patterns of inference behind these generalizations. The empirical extrapolation is based on induction. Induction is a process where, from observations of a limited number of events or phenomena (E1, E2, E3, E4, etc.), universally applicable conclusions are drawn from a larger population. It involves drawing conclusions about all from knowledge about a few, without leaving the empirical level. The scientific methods in this context are techniques, e.g. for taking representative samples and assessing the statistical certainty of a generalization. Knowledge about constituent properties or transfactual conditions, on the other hand, is attained by means of transfactual arguments and what we shall later on describe as retroductive inference. Taking

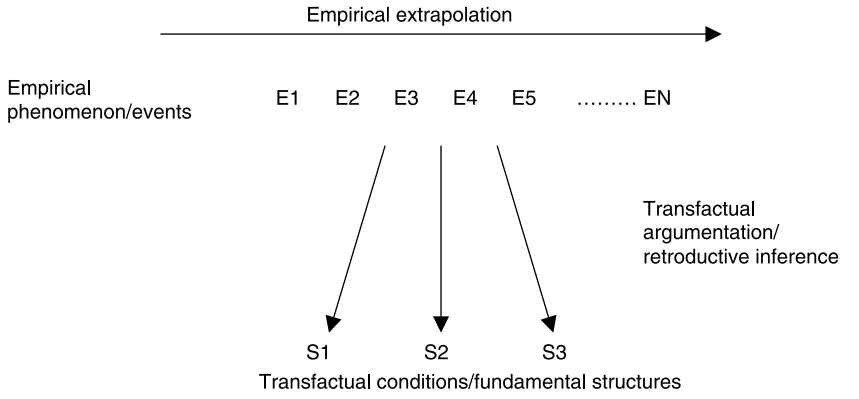

Figure 3 Two types of generalization

our starting point in the concrete we endeavour to abstract and isolate what is the basic constituent. We move from surface to depth, from the domain of the empirical to the domain of structures and mechanisms. These and also other modes of inference will be discussed in more detail in the next section.

Transfactual conditions are the conditions for something – a social relationship, an action, an institution or a social structure – to be what it is and not something completely different. Such transfactual conditions can be more or less general. Let us assume that an action is to be explained. A philosopher, who emphasizes intentionality as something universal for human activity, expresses herself very generally by focusing on the most transcendental – and in that sense universal – preconditions for human action. A social scientist, e.g. Giddens or Archer, who describes principally the relationship between structure and agency, is almost at the same level of generality. A sociologist, who analyses the prerequisites for a certain action in terms of the structures characteristic of a specific organization (e.g. family or school), or a person's internalized dispositions for action (habitus), is still looking for knowledge about general structures, however, not structures of the same universal character as those the philosopher analyses. It is important to see that all these analyses imply the ontology we described in Chapter 2 in terms of 'the three domains of reality'. The analyses do not restrict the search for knowledge to either the domain of the empirical or the domain of the actual.

This way of considering the two aspects of scientific generalization is in line with much of human and social science practice. Within science there are often formulations describing and conceptualizing transfactual conditions, without any claims of demonstrating an empirical generalization (extrapolation).

In scientific contexts, as well as in everyday life, we constantly use concepts implying generalizations – what are usually called universal concepts ('universalia'). Universal concepts express general properties, which distinguish them from concepts expressing something particular/individual. In the methodology of social science it is important to distinguish between two types of universal concepts: empirical categories and abstract concepts. An empirical category comprises a larger population of individual phenomena sharing a formal property. The universal concept of 'women' as an empirical category includes all people of a specific gender; 'elderly' refers to all people who have reached a certain age. Abstract concepts are universal concepts in another sense. They identify something which is universal in the sense of 'constituent'. Concepts like alienation, domination, social integration, ideology and reflexive identity describe more or less universal structures or mechanisms. These two types of universal concepts refer to the different forms of generalization we defined above. Empirical generalizations are expressed by means of empirical categories. Transfactual conditions are expressed by another type of universal concept, that is the abstract concept. We shall now proceed to the question of how the individual and the general are related to each other within the framework of different modes of inference or thought operations.

Scientific inference and thought operations

That reality does not speak for itself, that science can never limit itself merely to observing, registering and reporting, is a well-known fact. Reasoning, our ability to analyse, abstract, relate, interpret and draw conclusions, is a fundamental precondition for all knowledge and knowledge development. Philosophers of science have also emphasized feeling and intuition, as well as imagination and creativity as essential features of the cognitive process.

Thinking is a prerequisite if we are to make sense of what we observe, if it is to mean anything to us, to enable us to interpret the particular in a context, to enable us to draw conclusions about the general from observations of the individual. In this section we shall try to show that scientific method mainly revolves around different modes of inference. The concept of inference or thought operation refers to different ways of arguing and drawing conclusions – moving from something and arriving at something else – having in common that we thereby link observations of individual phenomena to general concepts. Inference is a way of reasoning towards an answer to questions such as: What does this mean? What follows from this? What must exist for this to be possible?

In order to test the validity of different modes of inference, to understand their possibilities and limitations, we must know their fundamental structure. Scientific inference is partly about following formalized, strict rules for logical argument and argumentation. The principal resource demanded of the researcher is the ability for logical reasoning. But scientific inference, in the sense of thought operations, also involves different ways of reasoning, interpreting and drawing conclusions without following strictly formalized rules. Here the researcher's powers of abstraction, as well as imagination and creativity, can be crucial.

We distinguish between four different modes of inference: deduction, induction, abduction and retroduction. Each of these represents a different thought operation, a different way of moving from one thing to something else. Deduction and induction (and, according to some, also abduction) are also concepts in formal logic. 'Formal' implies following the logical form of inference, not the substantive contents. As we shall see, this is manifested in the formalization of inference through different models, and also the use of symbolic language. In the real sense of the word, only deduction is valid as a strictly logical mode of inference. We shall shortly demonstrate what this means. However, we would like to say from the start that we consider the different modes of inference as complementary in research practice. Deduction, for instance, gives us universal guidelines for what is necessary for a logically valid argument, guidelines that can be used to test the validity of the conclusions drawn by means of, for example, retroduction. The account in this section can be summed up in Table 1. We recommend that the reader begin by surveying the table and then return to it as the different modes of inference are discussed in the text.

Table 1 Four modes of inference

	Deduction	*Induction*[a]	*Abduction*	*Retroduction*
Fundamental structure/thought operations	To derive logically valid conclusions from given premises. To derive knowledge of individual phenomena from universal laws.	From a number of observations to draw universally valid conclusions about a whole population. To see similarities in a number of observations and draw the conclusion that these similarities also apply to non-studied cases. From observed co-variants to draw conclusions about law-like relations.	To interpret and recontextualize individual phenomena within a conceptual framework or a set of ideas. To be able to understand something in a new way by observing and interpreting this something in a new conceptual framework.	From a description and analysis of concrete phenomena to reconstruct the basic conditions for these phenomena to be what they are. By way of thought operations and counterfactual thinking to argue towards transfactual conditions.
Formal logic	Yes	Yes	Yes and no	No
Strict logical inference	Yes	No	No	No
The central issue	What are the logical conclusions of the premises?	What is the element common for a number of observed entities and is it true also of a larger population?	What meaning is given to something interpreted within a particular conceptual framework?	What qualities must exist for something to be possible?
Strength	Provides rules and guidance for logical derivations and investigations of the logical validity in all argument.	Provides guidance in connection with empirical generalizations, and possibilities to calculate, in part, the precision of such generalizations.	Provides guidance for the interpretative processes by which we ascribe meaning to events in relation to a larger context.	Provides knowledge of transfactual conditions, structures and mechanisms that cannot be directly observed in the domain of the empirical.

Table 1 Continued

Limitations	Deduction does not say anything new about reality beyond what is already in the premises. It is strictly analytical.	Inductive inference can never be either analytically or empirically certain = the internal limitations of induction. Induction is restricted to conclusions at the empirical level = the external limitations of induction.	There are no fixed criteria from which it is possible to assess in a definite way the validity of an abductive conclusion.	There are no fixed criteria from which it would be possible to assess in a definite way the validity of a retroductive conclusion.
Important quality on the part of the researcher	Logical reasoning ability	Ability to master statistical analysis	Creativity and imagination	Ability to abstract
Examples	If A then B A Thus: B	From an investigation of the attitude of a representative sample of Swedes, draw the conclusion that 30% of the Swedish population is in favour of the EU.	Karl Marx reinterpretation/redescription of the history of humankind from the historical materialist view.	For a ritual to be just a ritual there must exist, *inter alia*, emotionally loaded symbols and common notions of inviolable/sacred values.

Note:

[a] The concept of induction has been used in partly different ways by different philosophers/theorists, and within different disciplines. Here we are talking about induction in the sense of inductive logic. In social science the concept of inductive is also used to describe a certain form of research procedure. We shall return to this research procedure in the next chapter. It is important not to confuse inductive logic with inductive research, since these concepts in part imply totally different things.

In what follows we will first present deduction and then induction as two forms of formalized logic for inference. In social science one talks, however, also about the inductive and the deductive method as terms for research approaches. In this case the issue concerns different ways of viewing the research process and its design, and how empirical observations are related to theories. Characteristic of an inductive approach is that research starts in relatively unprejudiced observations of reality without being bound to a specific theory. Then, step by step, the researcher develops different categories and concepts from collected data. The best-known inductive research approach is probably the 'grounded theory' approach. In contrast, the deductive research process takes its starting point in established theories. Through deduction, hypotheses are derived from these theories, and in the next step they are tested on an empirical material. These two different ways of relating empirical data to theory are something we shall discuss in more detail in Chapter 6. It is important not to confuse deductive and inductive logic respectively, with a deductive and inductive research approach, since they concern in part different things.

Deduction

The concept of deductive inference can be used as equivalent to inference where the conclusions follow in a strictly logical way from given premises. Deductive logic holds a unique position in science, since it is applied (or at least should be applied) when we examine the logical validity in all scientific argument, regardless of which research methods are being used or which research tradition we are following. It is fundamental for scientific argument that we substantiate our conclusions with various assertions, observations, etc. Deductive logic is used not to decide the reliability of these statements; rather it is used to test the logical validity of the conclusions we draw, given that the statements are correct. In that case the statements are called premises. A logically (deductively) valid conclusion is a form of inference where the conclusion must be true if all the premises are true. Deducing is synonymous with derivation. We may use a good definition of derivation taken from Føllesdal *et al.* (1990: 290, our translation): 'By derivation we mean the transition from premises to conclusion, i.e. an action or a type of action that you perform when arguing' (what the authors term 'action' is what we have chosen to call thought operations).

Within the framework of deductive logic a great number of formalized examples of deductions have been developed, which can be used when we test the validity of our own argument and that of others. Deductive logic is generally divided into different parts, of which propositional logic and predicate logic form two main parts. Propositional logic is the part of logic that examines the validity of an argument, where the propositions are related to each other by the words 'not', 'and', 'or', 'if … then'. The most common forms are modus ponens and modus tollens:

Modus ponens:	*Modus tollens*:
If A then B	If A then B
A	not B
Thus: B	Thus: not A

Propositional logic is used not only when we examine the validity of a scientific argument. It also constitutes the foundation in a scientific method called hypothetical deductive method (see Chapter 5). To test hypotheses (H) one deduces consequences (C) from these hypotheses – consequences that can be tested against various kinds of knowledge and empirical observation. If we conclude that the consequences are false we can infer that the hypothesis, too, is false. The logic behind this is modus tollens and can be expressed as follows:

Premise 1	If H, then C
Premise 2	not C
Conclusion	not H

Predicate logic examines inference also containing terms like 'all' and 'no'. The propositions in predicate logical language further consist of, first, what are called individual terms, and second, a predicate stating the properties of what the individual term states (Prawitz 1991). Inference building on predicate logic can have the following form:

All A are B
C is A
Thus: C is B

Deduction is usually presented as the opposite of induction in that it takes its starting point in what is the conclusion of induction, namely a universal/general law. Deduction can thus be used to deduce the particular from the general/a universal law. Here we give an example showing how predicate logic can be applied in such deduction (within brackets we note the symbols we have used so that it will be easier to compare with the formalization above):

Premise 1 (universal law/general statement):	All statements about something (A) *are* relative (B)
Premise 2 (individual observation):	Relativism (C) *is* a statement about something (A)
Conclusion (logically necessary conclusion):	Relativism (C) *is* relative (B)

Given that the premises are true it would be a logical contradiction to state that the conclusion is false. If we in an argument argue that all statements about

reality are relative in relation to a social, conceptual or discursive context (i.e. not universally valid), we can by deductive logic conclude that this relative validity involves the statement itself. This has actually been one of the fundamental arguments against relativism, what has been called the 'inward collapse' of relativism (cf. Chapter 2).

A common criticism of Freud's psychoanalysis has been that Freud regards all people as governed by irrational instincts while at the same time presupposing that the theory, put forth by himself, is rational. Without taking a stance on the issue of whether this critique is based on a correct interpretation of Freud, we can reconstruct the critique by means of the fundamental structure of deductive logic. For the argument to be logically valid, the requirements are, as said before: if premises 1 and 2 are true, the conclusion must also be true.

Premise 1 (universal law/general statement):	All people's ideas (A) *are* manifestations of irrational instincts (B)
Premise 2 (particular observation):	Freud's psychoanalysis (C) *is* the idea of a person (A)
Conclusion (logically necessary conclusion):	Freud's psychoanalysis (C) *is* a manifestation of irrational instincts (B)

Deductive logic can be used in different ways in concrete research practice. In the first place we can start with propositions (universal basic assumptions) that we suppose (or know) are true, and from these deduce a great deal of specific knowledge which logically follows from these basic assumptions. In mathematics (but more seldom in social science) scientists devote their time to showing how a great deal of information can be deduced from a few basic assumptions (the so-called axiomatic method). Second, we can use deductive logic to deduce, from hypotheses, empirically testable consequences and through these indirectly test these hypotheses. Deduction is the core of what is called the hypothetico-deductive method. But deduction is not only associated with specific scientific methods. Deduction can also, in the third place, be utilized when we examine the logical validity of all scientific arguments, regardless of what research methods are being used.

The strength of deductive logic is that it provides rules for what is a logically valid conclusion based on given premises. The limitation of deduction is that it does not tell us anything new about reality beyond what is already in the premises. Deductive conclusions are analytical conclusions. By this we mean that the validity of the conclusions is dependent on our following the logical rules for deduction, independently of what reality is like. In analytical inference the conclusion is implicit in the premises. This means that it does not give us any guidance on how we, from observing particular phenomena, can gain knowledge of the abstract structures and mechanisms that make these phenomena possible. The three modes of inference we shall discuss may be called synthetic forms of inference (cf. Habermas 1972). Synthetic means that the conclusions add new

knowledge about reality, which is not implicit in the premises/propositions. The validity of synthetic inference is thus dependent on what reality is like.

Induction

Inductive inference has been central in science ever since Aristotle, who is usually mentioned as the first philosopher who attached great importance to developing the logical structure of empiricist-orientated science. Inductive logic – as well as deductive logic – comes under formal logic. There is, however, one big difference between them. In inductive inference the conclusion does not necessarily follow from the premise. On the contrary, this conclusion entails addition of new knowledge beyond what is in the premise. We start from something known and given and draw conclusions which reach beyond this.

Inductive inference implies that from a number of observations of individual phenomena we draw general conclusions assumed to be true of a larger number of phenomena than those we have observed. Inductive inference can be a generalization over time and also of a larger population. Let us assume, for example, that we have a kettle filled with water on the stove and a thermometer in the water, and make the following observations:

On occasion one, when we heat this water to 100 degrees centigrade it starts to boil.
On occasion two, when we heat this water to 100 degrees centigrade it starts to boil.
On occasion three, when we heat this water to 100 degrees centigrade it starts to boil.

From this we conclude:
Always, when we heat this water to 100 degrees centigrade it starts to boil.

Here we have made a generalization over time. It states that the connection between heating the water to a certain temperature and the water's boiling, which has been observed on several occasions, exists on all occasions. This implies that the general conclusion – if it is valid – also makes it possible to predict something which has not yet taken place. If we plan on another occasion to boil this water, we can predict that it will boil at exactly this temperature.

Let us assume instead that we have three kettles filled with water and a thermometer in each kettle.

When we heat the water in kettle one to 100 degrees it starts to boil.
When we heat the water in kettle two to 100 degrees it starts to boil.
When we heat the water in kettle three to 100 degrees it starts to boil.
Conclusion: *all* water that is heated to 100 degrees starts to boil.

Here we have made an inductive generalization, meaning that from the

observation that three separate entities of water have a certain quality, we conclude that all water has just this quality.

This mode of inference is often used in social science. The most common form of induction is perhaps when conclusions are drawn about an entire population from studies of a sample of investigated units (people, organizations, tests, etc.). The crucial question is whether the studied cases are representative in relation to the entire population. The samples that are examined must be of a certain size, and one must use sampling methods ensuring that the samples are representative. In statistics and research methodology, sampling and calculating methods have been developed with the object of dealing with just this induction problem. Another form of inductive inference, common in social science, is involved when we, from studies at a particular point of time, draw conclusions about other points of time.

The inductive mode of inference has limitations of two different kinds. One concerns the uncertainty of such inference, the risk of drawing the wrong conclusions although the premises are true. We call these the internal limitations of induction. Further, there is knowledge we will never reach, regardless of how well grounded the inductive premises are – conclusions we will never be able to draw – by means of induction. These can be called the external limitations of induction

The internal limitations have been the subject of lively discussions in philosophy. The core of the induction problem is rather simple. We cannot on logical grounds be certain that a description of observed occurrences (no matter how many they are) is true also of unobserved occurrences. This means, as the Scottish philosopher David Hume pointed out in the eighteenth century, that empirical generalizations are always linked to uncertainty. Nobody has come up with a real solution to this problem. However, statistics provide methods for calculating the degree of uncertainty in generalizations, given different assumptions.

But the internal limitations should not only be discussed in relation to logic and statistics. The possibility of making well-founded empirical generalizations depends on what the reality under investigation is like. To put it simply: when we draw conclusions about a fairly stable reality, the risk is comparatively small of generalizations turning out to be false. In spite of the induction problem (as Hume formulated it) we can in practice conclude that water under normal circumstances will boil at about 100 degrees the next day also, and even in a hundred years' time. If the air pressure is changed the boiling point will naturally change, but then it concerns conditions that are rather simple to control and account for (since air pressure can easily be measured and since there is a definite mathematical relationship between air pressure and boiling point).

In studies of an open and changeable reality, the induction problem has more serious consequences, however. The social reality at the level of events is often very unstable; the effects of social mechanisms depend on numerous concrete circumstances. Concerning for example people's actions, attitudes and values,

scientists have indeed been able to show some relatively stable patterns. But people's actions and views, and even things like economic structures, the political structures of different countries, etc., still very much depend on a range of particular circumstances giving us little opportunity to draw empirically general conclusions from individual observations (cf. Chapter 3 and the discussion of open and closed systems).

An example of this can be taken from so-called reception research. Here, media researchers have sought knowledge about how people interpret and regard, for example, different television programmes. The investigations have often been conducted as group interviews, where the group has first watched a selected programme. One problem in this kind of research has been obvious, namely that the way an audience describes and discusses a television programme they have watched is very dependent on a number of circumstances: who the other co-watchers are, how they watch and what they are doing while watching; what questions the interviewer asks; what the people happen to know about the particular topic of the programme. All inductive inference under such circumstances is subject to great uncertainty. The concrete reality is simply too complex and changeable (cf. Ang 1991).

That inductive inference is associated with uncertainty is of course basically due to the fact that the conclusions do not logically follow from the premises, and that by inductive generalizations we speak about something beyond what we can observe here and now. This is the limitation of inductive inference compared with deduction, but at the same time it is its strength. A science that is only engaged in strictly logical derivations, or that only says something about known observations, would be a very narrow science indeed.

So far we have concentrated on the internal limitations of induction. However, it is no less important to consider the external limitations. Induction is closely associated with empirical science. It has been developed by philosophers attached to some form of empiricism (e.g. Francis Bacon, David Hume, John Stuart Mill). Induction gives no guidance as to how, from something observable, we can reach knowledge of underlying structures and mechanisms; it is limited to conclusions of empirical generalizations and regularities.

We do not suggest, however, that inductive inference as such should be ruled out in research. On the contrary, this mode of inference is part of scientific practice. But we attach less importance to induction than has often been the case, if we look at most of the literature on social science methodology. Our notion is that the objects of science are not primarily empirical regularities, but structures and mechanisms. It is also in these structures that we find the foundation for the fairly stable and lasting (but not unchangeable) character of nature as well as of social reality. 'On the realist view', says Sayer (1992: 158), 'nature's uniformity – to which many scientists have appealed – derives not from the "accidental" regularities of sequences of contingently related things but from the internal relations, structures and ways-of-acting of things themselves.'

We shall now proceed to the presentation of two modes of inference – abduction and retroduction – which in our view constitute a necessary complement to

induction and deduction in a social science seeking knowledge of structures and mechanisms. Neither abduction nor retroduction is a logically valid mode of inference in the sense that deduction is. Both these types of inference represent a more comprehensive way of reasoning, arguing and relating the individual to the universal/general, that is, what we have called thought operations. With reference to the central role played by abduction and retroduction in scientific practice, plus the fact that they have seldom been mentioned in the literature on social science method and methodology, we will discuss them in more detail than we have done with induction and deduction.

Abduction

What is common to the objects of social science is that we can describe them as both individual phenomena, and as manifestations of – or parts of – general structures. This is true about social activities as well as the products of these activities, such as texts, pictures, buildings, situations where people meet, etc. Many of the concepts we use allegedly identify those general structures. Table 2 gives examples of what we mean by this distinction between individual concrete phenomena and general structures.

The difference between what is described in the left and the right columns, respectively, is a difference between on the one hand observable events, and on the other, structures not directly observable. Knowledge of the latter requires concepts and theories. But there is also a difference in generality. In the left column it is a matter of individual phenomena, which can look rather different from time to time. In the right column there is a description of the more general, universal, but not unchangeable dimensions of social reality.

How do we actually make the assumption that individual events may be part of a general, more universal context or structure? What makes us see universal structures in individual events? What is it in, for example, a particular funeral

Table 2 Individual events and general structures

Individual events/phenomena	*General structures*
Men and women who communicate at a place of work, in the home or at a political meeting	Gender structures, internal relationships described in terms of gender theories
Pupils and teachers meeting in a classroom	Norms and rules making school a specific institution
The manifest content of a text	Implicit ideological meanings of the text
A building as a physical object	The power structures that certain buildings can be regarded as embodying
A funeral, people greeting each other, or a morning meeting in a newsroom	Rituals creating social cohesion by means of internal relations and mechanisms

service that makes us see something general, which we call ritual? How does a social scientist discover that certain behaviour is a manifestation of a normative structure? How can a media researcher, who first sees a news item as a concrete description of an event, in the next instant see that what is manifested in the news text is part of an ideological structure? In the following we shall try to provide some answers to this kind of question.

Neither deductive nor inductive logic can inform such discoveries. Deductive inference is analytical and, as we have pointed out, says nothing new about reality. According to induction, general inference is a generalization of properties already given in particular, observed data. But the examples given above involve discovering, or drawing conclusions from, circumstances and structures that are not given in individual empirical data. There must be other processes, another mode of inference behind such conclusions.

To describe the process behind these modes of inference that are neither deductive nor inductive, the American philosopher Charles S. Peirce worked out the concept of abduction. Peirce, who was active in the latter part of the nineteenth and at the beginning of the twentieth century, was a logician and a pioneer of American pragmatics and semiotics.[2] Here we will concentrate on Peirce's contribution to the concept of abduction.

Abduction is a concept which is in part difficult to capture. One reason is that Peirce describes abduction on the one hand as a mode of inference with a defined logical form comparable to induction and deduction, and on the other hand as a more fundamental aspect of all perception, of all observation of reality. The humanists and social scientists who have applied the concept of abduction in recent years, inspired by Peirce, have further emphasized that abduction involves what has been called redescription or recontextualization. These three different ways of defining the concept of abduction are not contradictory, but stress different aspects of scientific inference. When Peirce writes about inference he does not exclusively allude to inference in the sense of strictly logical derivations. He rather alludes to ways of reasoning, thinking and arguing in a wider sense (Habermas 1972: 113). So far his use of the concept of inference corresponds to our use of the concept.

We will start by presenting abduction as formalized inference. Then we will proceed to abduction as redescription/recontextualization, and conclude by showing that abduction can also be understood as a central element in all perception.

Peirce (1932, see also Bertilsson and Christiansen 1990) presents the difference between the logical structures of deduction, induction and abduction by means of the example shown in Table 3 (over the page), and we include it mainly to show that abduction, too, can be formalized.

The last proposition in all logical inference is the conclusion of the two premises. In deduction the result is a logically necessary consequence thereof. A general rule is our starting point, we observe the individual case, that the beans are from this sack. Given that the rule is true, the result, that the beans are white, follows strictly logically. In induction the rule is a conclusion valid with some

Table 3 Deduction, induction and abduction – the formal structures of inference

Deduction	*Induction*	*Abduction*
Rule: All beans from this sack are white	Case: These beans are from this sack	Rule: All beans from this sack are white
Case: These beans are from this sack	Result: These beans are white	Result: These beans are white
Result: These beans are white	Rule: All beans from this sack are white	Case: These beans are from this sack

Source: Peirce 1932 (see also Bertilsson and Christiansen 1990)

probability. We note that the beans are from this sack (what Peirce calls the case) and that the beans are white (what Peirce calls the result), and from this we draw the inductive conclusion that all beans from this sack are white. The conclusion may be wrong, because we have not examined all the beans in the sack. If we know, on the other hand, how many beans there are in the sack and how many we have examined, we can estimate the statistical probability of the conclusion being correct. In abduction the case presents a plausible but not logically necessary conclusion – provided that the rule is correct.

Abduction differs from induction in that we start from the rule describing a general pattern, and it differs from deduction in that the conclusion is not logically given in the premise. Abduction is neither a purely empirical generalization like induction, nor is it logically rigorous like deduction (Collins 1985).

Peirce's example with beans and sacks is in fact not quite relevant when it comes to the application of abduction within social science. The formalization above indeed demonstrates something central to all abduction – that we (1) have an empirical event/phenomenon (the result), which we (2) relate to a rule, which (3) leads us to a new supposition about the event/phenomenon. But in social science research the rule is most often a frame of interpretation or a theory, and the conclusion (the case) is a new interpretation of a concrete phenomenon – an interpretation that is plausible, given that we presuppose that the frame of interpretation is plausible. In Peirce's example there is one true fact: either the beans are from the sack or they are not. We may proceed from the assumption that they are white, and look for other clues and eventually be able to conclude that the beans really come from the sack. We may also examine the rule and see if it is true, and that all the beans from the sack really are white. When we apply abductive inference in social science and interpret a phenomenon in the light of a frame of interpretation (rule), the frame of interpretation constitutes one of several possible frames and the interpretation of the phenomenon one of several possible interpretations. What is common for all abductive inference, however, is that the conclusion provides new insight as an outcome of our interpreting or explaining something with the help of what Peirce calls the rule. But this is always a fallible insight, a form of hypothesis.

The conclusion is one of many possible conclusions following from the fact that we relate different ideas and knowledge to each other (Denzin 1989: 100). A decisive difference between deduction and abduction is that deduction proves that something must be in a certain way, while abduction shows how something might be (Habermas 1972: 113).

We can further clarify the essence of abduction by proceeding from a quotation from Randall Collins (1985: 188): 'in Peirce's view abduction, too, is a mode of inference – of logic in the largest sense – by which one moves from one set of ideas to their conclusions in another set of ideas'. The last part of the quotation captures something quite central. Abduction is to move from a conception of something to a different, possibly more developed or deeper conception of it. This happens through our placing and interpreting the original ideas about the phenomenon in the frame of a new set of ideas. What was called rule in the formalization above, is precisely this set of ideas, which we apply to be able to understand and interpret something in a different way. In scientific work this set of ideas may have the form of a conceptual framework or a theory.[3]

Another way of expressing just this is to talk about abduction as redescription or recontextualization (Jensen 1995: 148). To recontextualize, i.e. to observe, describe, interpret and explain something within the frame of a new context, is a central element in scientific practice. The history of social science contains many well-known recontextualizations. Marx recontextualized the history of man and society from a materialist conception of history, according to which man's way of producing the necessities of life, and the way of organizing this work, constituted the very momentum of history. Durkheim recontextualized suicide as a phenomenon by regarding it as a social fact. In his book *Modernity and Self-identity*, Giddens recontextualizes anorexia as a manifestation of what he denotes reflexive identity, which has become characteristic of postmodern society. He writes: 'Anorexia represents a striving for security in a world of plural, but ambiguous, options. The tightly controlled body is an emblem of a safe existence in an open social environment' (Giddens 1991: 107).

The revolution of recontextualizations is that they give a new meaning to already known phenomena. Social science discoveries are to a large extent associated with recontextualization. Social scientists do not discover new events that nobody knew about before. What is discovered is connections and relations, not directly observable, by which we can understand and explain already known occurrences in a novel way.

Peirce also used a method used by detectives in solving crimes, to exemplify the logic of abduction. The activities of various people, observations at the place of the crime and statements in interviews, are interpreted and gain a significance within the frame of an overall hypothesis about how the crime may have been committed. An experienced, insightful and creative detective is able to recontextualize what she knows about the crime (the clues) within the frame of different possible scenarios of how the crime could have been committed. In a similar way, doctors use abductive logic when interpreting symptoms described by the

patient. By relating to a rule/pattern that the doctor finds conceivable, he or she can also make a reasonable analysis of the causes of the symptoms. A mechanic listening to a jarring noise from the engine likewise recontextualizes the noise within the frame of several possible patterns he or she is familiar with. In social science we interpret actions by regarding them in relation to different theories of social action. An action is described in two completely different ways, depending on whether it is recontextualized within the frame of a theory of rational choices or a theory of ritual action. The detective, the doctor, the mechanic and the scientist have this in common, that they test different frames of interpretation. In some cases several frames of interpretation can be used to complement each other; in other cases they can be integrated. In still other cases, after working through material, we may suddenly be struck by an insight, get a hint of how different circumstances might be connected in a way we never thought of before.

Even if social science research may be similar to the work of a detective, there are some important differences. The detective may find the final solution to the crime. Abductive conclusions in social science are seldom of the nature that we can ultimately decide whether they are true or false. This becomes obvious if we go back to the examples in Table 2 above. When we interpret or recontextualize a text as a manifestation of ideological structures, an action as a manifestation of normative structures, or a building as a manifestation of power structures, the abductive inference is at the same time an abstraction isolating certain aspects of the object. One and the same phenomenon can always be recontextualized in different ways without it being possible to say that one of these is more true than the other. On the other hand we can of course examine a particular recontextualization with regard to how valid it is.

Peirce has argued that it should be possible to verify hypotheses generated through abduction, by the use of experiments and inductive logic (Peirce 1990: 244). The question is, to what extent is this possible? In accordance with the metatheory we presented in Part I, abduction becomes a manner of acquiring knowledge of how various phenomena can be part of and explained in relation to structures, internal relations and contexts which are not directly observable. Such structures cannot be derived either inductively or deductively. Abduction has been given an independent status in the research process, as it provides a type of knowledge that cannot be acquired either through deduction or inductive generalizations. Social science analysis is essentially a matter of using theories and frames of interpretation to gain a deeper knowledge of social meanings, structures and mechanisms. In this way we build up knowledge that cannot be reduced to empirical facts and thus cannot be tested in line with the same logic as the testing of empirical predictions.

However, Peirce too emphasizes that abduction cannot at all be reduced to induction or deduction. The fundamental difference between induction and abduction he describes in the following manner: 'But the essence of an induction is that it infers from one set of facts another similar set of facts, whereas [abduction] infers from facts of one kind to facts of another' (Peirce 1986, in Jensen 1995: 150).

Umberto Eco (1984) distinguishes between three different types of abduction: overcoded, undercoded and creative abduction. They all represent different ways of relating studied phenomena to some form of classification system, frame of interpretation or code giving meaning to the phenomena (Jensen 1995: 158).

Overcoded abduction, according to Eco's typology, is a mode of inference characterized by automatism and naturalness. It is a matter of spontaneous interpretations, which we make from a culturally and socially grounded prejudging. Both in ordinary life and within science we constantly make such interpretations. What is regarded as a natural interpretation in one cultural/social context may be something utterly controversial in another context with other prevalent codes. All observations involve such an abductive process, which is a precondition for the observed phenomenon to have any meaning at all.

Undercoded abduction implies that we choose between a number of possible frames of interpretations or theories. In social science we can ask: What difference does it make if we interpret a particular behaviour from the viewpoint of a theory of ritual action on the one hand, or from a theory of rational choice on the other? Which of several existing theories about the development of history should we take as our starting point when we interpret a particular historical occurrence?

Eco's typology also contains a third type of abduction, which he calls creative abduction. It is characterized by being unique and innovative. In the context of social science it is a form of creative abduction when a researcher observes something from a frame of interpretation that nobody has used before, or which at least opposes conventional interpretations. Charles Darwin's redescription of the evolution of species, Goffman's interpretation of social interaction as a manifestation of dramaturgic action, and Freud's interpretation of people's dreams within the frame of a theory about the unconscious, are all examples of such creative abduction.

In a more fundamental sense, all abduction builds on creativity and imagination. This is the essential difference between abduction and the two other modes of inference we have discussed so far. In their application in social science research, different abilities are required on the part of the researcher. Induction primarily calls for mastery of a specific statistical analysis. Deduction demands the power of strictly logical reasoning. The foundation of abduction is chiefly creativity and the ability to form associations. Besides comprehensive knowledge of established alternative theories, models and frames of interpretation, abduction requires a creative reasoning process enabling the researcher to discern relations and connections not evident or obvious – to formulate new ideas about the interconnection of phenomena, to think about something in a different context, an ability to 'see something as something else'.

The concept of abduction captures a central aspect of the research process, something that has been underlined even by philosophers and theorists of science who do not explicitly take only Peirce's theories as their point of departure. What these theorists have in common is that they emphasize that science

not only involves description but also 'redescription' and detection of meanings and connections that are not given in our habitual way of perceiving the world. Theories and models expressing (assumptions about) more general contexts are indispensable resources in redescription and recontextualization. As an example, Uggla sums up Max Black's and Mary Hesse's views on scientific models in this way:

> For the use of models in science is not motivated by the ability of these models to empirically describe a pure reality. The strength of scientific models lies instead in their ability to break away from a descriptive discourse and provide a possibility to *see 'something' as 'something else'*. Since the purpose of using models in science is to explore reality by establishing new relations in it, the scientific model has a heuristic function in producing new hypotheses and so *discovers new dimensions of reality*.
>
> (Uggla 1994: 400, our emphases and translation)

Abduction is, as Habermas (1972) says, a mode of inference broadening our knowledge and stimulating the research process. It is through thought operations that new ideas are introduced, and thus they are more important for scientific progress than, for example, deduction.

A question that immediately suggests itself is, of course, how do we know if these redescriptions provide better knowledge about our object of study? We shall in part come back to this question in Chapter 5. But we would for the moment like to once again stress that abductive logic, applied in social science, very seldom (if ever) leads to definite truths – not even in combination with induction and deduction. Abduction is more associated with a way of viewing the relation between science and reality, implying that there are no ultimately true theories, and therefore no rules either, for deciding what is the ultimate truth. On the other hand there is the possibility for increasingly better knowledge, and this is meant in two senses. First, redescriptions can provide a deeper knowledge about the particular case under study; second, one can also gradually test, modify and ground theories about general contexts and structures by relating these theories to ever new cases.

In Table 2 above we illustrated the relation between particular phenomena and general structures with some examples. One of them was this:

Individual events/phenomena	*General structures*
A funeral, people greeting each other, or a morning meeting in a newsroom	Rituals by means of internal relations and mechanisms, creating social cohesion

We can now see that abduction in these cases is a matter of redescribing/recontextualizing concrete events from a set of ideas, or a theory of, for example, rituals. Theory provides deeper knowledge of the particular event. From the theory we can in this example understand events and social situ-

ations as rituals, and thus detect relations and mechanisms in these situations that we would not otherwise have discovered. It is not enough, however, to ask: What does the theory say about different events? The purpose of studying different events (of performing new case studies) should not merely be to demonstrate how more and more events can be interpreted and redescribed with the help of a readymade theory. Equally important is the question: What do the events say about the theory? Studies of new, particular cases are essential if we are to test and develop theories about social relationships, structures and mechanisms. When we take our starting point in studies of various concrete situations (funerals, spectators at sports arenas, meals in homes and at restaurants, common ways of greeting known and unknown people, etc.), then a theory of rituals can be modified and refined. In a research practice guided by abduction, the interplay (dialectic) between theoretical redescriptions of cases and case-study-based theory development is absolutely central.

We have now examined two ways of describing abduction – as formalized logic and as redescription/recontextualizing. Peirce also discusses abduction as an interpretative element which is an absolute condition for all perception. In a broader sense, abductive inference can be seen as an overall term for all forms of interpretation made from a pattern or system of classification. According to Peirce it is in the nature of all perception to be interpretative. Perception, or empirical observation, if you like, demands that we give meaning to what we observe, by interpreting or classifying it in a certain way. Classification in its turn means that the object is arranged into general classes or concepts. Even the simplest observation of something is thus linked to a generalization (Peirce 1990: 231ff). Perhaps we do not usually think about it, but we always see something general in the individual. This way of regarding empirical observations is manifested in what Eco calls overcoded abduction. It is also in accordance with a critical realist view of empirical observation. Such observation is part of the transitive object of science; the observation contains an interpretative element. Empirical observation can never be the same thing as an actual reality, which is independent of the cognitive subject. The meaning of two observations of one and the same phenomenon can therefore differ (sometimes in a very radical manner), depending on preunderstanding and conceptual starting points (see Chapter 2).

In a critical scientific analysis it is important to employ the abductive inference for redescription, so that we can interpret particular phenomena as part of general structures. But it is also important to problematize the inference made in a more automatic way (overcoded abduction). Scientific observations and analyses are based on classifications. There may be good reasons for questioning some classifications and conceptualizations as manifestations of ideologies and hegemonic values. The difference between the interpretative/classifying element included in our spontaneous, everyday observations of reality, and the abductive inference we apply in theoretically guided redescriptions, is that the former is very often 'beyond the sphere of criticism', to use Peirce's formulation (Peirce 1990: 232).

Retroduction

Abduction is thus an inference where redescription or recontextualization is the central element. By means of abduction we recontextualize and reinterpret something as something else, understanding it within the frame of a totally different context. In this way we introduce new ideas of how individual phenomena are part of the structure and internal relations. We shall now focus on retroduction, which in this context can be described as a mode of inference, by which we try to arrive at what is basically characteristic and constitutive of these structures. That is to say, what are the basic characteristics of the general structures from which we start, in abduction, when we interpret and recontextualize particular actions and events? In concrete research practice such inferences can sometimes be difficult to distinguish. Nevertheless they represent two different modes of inference that it is essential to discriminate between when the core of the methodology of social science is to be described.

Before describing the specific character of retroduction we will – in order to avoid misunderstandings – clarify in what respect retroduction is an inference and in what respect it is not. Unlike deduction, retroduction is not an inference in the sense this concept has in logic, that is, logically valid inference, from premise to conclusion. Retroduction is not, as are deduction, induction and abduction, a formalized mode of inference (cf. Table 1). But it resembles deduction, induction and abduction insofar as it is a thought operation through which we can move from knowledge of one thing to knowledge of something else.

For the development of knowledge in social science, retroduction as a mode of inference is indispensable, provided that we take our starting point in the metatheory presented in Chapters 2 and 3. This realist metatheory emphasizes the difference between observable events and the domains of structure and mechanisms. Social reality consists of structures and internally related objects containing causally operating properties. Knowledge of this social reality can only be attained if we go beyond what is empirically observable by asking questions about and developing concepts of the more fundamental, transfactual conditions for the events and phenomena under study. Retroduction is about advancing from one thing (empirical observation of events) and arriving at something different (a conceptualization of transfactual conditions).

The core of retroduction is transcendental argumentation, as it is called in philosophy. By this argumentation one seeks to clarify the basic prerequisites or conditions for social relationships, people's actions, reasoning and knowledge. The term 'conditions' here means the circumstances without which something can't exist. In such argumentation we try at the same time to separate the necessary conditions from contingent circumstances (cf. Chapter 3).[4] As this argumentation means that we go beyond the empirical, it is also called transfactual argumentation. Transcendental philosophy has been severely criticized by those who maintain that the only thing we can have knowledge about is what is given, that is, reality as we spontaneously experience or observe it. Critical realism, however, repudiates a science that reduces knowledge to knowledge about the directly given or observable.

One of the best-known proponents of transcendental philosophy is the German philosopher Immanuel Kant. He argued that there are some foundational conditions on which all knowledge is built. One is that all our experiences and all knowledge are structured in time and space. According to Kant the human mind is endowed with such conditions. Therefore Kant's philosophy is called transcendental idealism. Bhaskar's transcendental realism differs from Kant's philosophy in at least two important aspects (cf. Collier 1994: 21):

1 Bhaskar discards idealism and argues that our knowledge of reality is possible just because reality is constructed in a certain way. He means that we ought to look for the transcendental conditions, not in our minds (as idealism does) but in reality, as it exists independently of our search for knowledge.
2 Unlike Kant, Bhaskar does not claim to describe universal and unchangeable conditions for our knowledge of reality. Transcendental knowledge, like all knowledge, is fallible. In addition, the foundational structures we are trying to comprehend by means of transcendental arguments are changeable in themselves.

We do not mean that social science should be oriented towards a philosophical argumentation. What we do mean is that retroduction, as a mode of inference, is central, regardless of whether we as theorists devote ourselves to the most fundamental conditions for social activity and formation of society, or if we as social scientists analyse and try to explain concrete social events. The fundamental question in both cases is: How is any phenomenon, like an action or a social organization, possible? If we call this phenomenon X, we may formulate our question thus: *What properties must exist for X to exist and to be what X is?* Or, to put it more briefly: What makes X possible? In the first part of the book we showed that critical realism regards the objects of social science as (mainly) relational. Social phenomena are what they are by virtue of the internal relations they have to other phenomena. Taking this as one's starting point, retroduction becomes a matter of trying to attain knowledge about what internal relations make X what it is.

There is no reason to leave this way of asking questions to philosophers; quite the reverse. On second thoughts we may affirm that retroduction is continually being used in analyses at different levels of abstraction – from philosophy to concrete social science analysis. What do we mean by different levels of abstraction in this context? Well, the question 'What makes X possible?' can be answered by referring to conditions/structures differing in degree of abstraction and in how fundamental they are. The question of how a certain action is possible can be answered by referring to (philosophical) theories of intentionality as a universal condition for all human activity. But the question can also be answered by attempting to reconstruct the system of social positions, the norms and rules, or the social and culturally acquired dispositions (habitus) structuring a particular action. There is no sharp dividing line between philosophy and social

science if we consider the way transfactual argumentation or retroduction is used. Nor is there any reason why strict boundaries should be called for. It is a matter of differences in degree.

Retroduction is used in social science both by researchers who side with critical realism, and researchers who in their practice share the same view in many important aspects, but who would probably not side with critical realism in every respect. Let us give three examples that illustrate how widely this mode of inference or thought operation is accepted in the social sciences today – both as analyses at a very high level of abstraction and as analyses of more specific conditions for social processes. We shall start with an example of an analysis at a high level of abstraction, in the borderland between philosophy and social science.

Example 1

Jürgen Habermas has developed a theory of universal pragmatics, which has also been called formal pragmatics. The concept of pragmatics here alludes – to somewhat simplify – to the pragmatic aspects of language, that is, our way of using language in an act of speech, in communication where someone talks with somebody about something. The theory is universal or transcendental, as it claims to reconstruct universal conditions for communication (Habermas 1984; McCarthy 1988).

When language is used in practice we always relate our speech acts, according to Habermas, first to an external reality (a reality which we can describe either truly or falsely), second to an inner reality (the individual's intention of her actions, which can be expressed truthfully or dishonestly), and finally to collective norms and values (which can be conceived as normatively right or wrong). Every speech act expresses claims to validity; claims to comprehensibility; truth, truthful and normative/moral rightness. The universal preconditions for a rational use of language are thus:

1 that we can use language representatively and distinguish what is from what seems to be;
2 that we can use language expressively and distinguish between what the individual is and what she pretends to be;
3 that we can use language to develop common values and distinguish what is from what ought to be (McCarthy 1988).

Habermas holds that communication would be impossible without universal claims to validity and without what he calls the ideal speech situation as a regulative notion, inherent in our way of using language. In this speech situation we are making claims of validity but are also expected to meet such claims when they are questioned. Habermas' theory is abstract and has been developed through transfactual argumentation. Abstract, here, does not imply that it describes anything divorced from reality. On the contrary, the theory describes something inherent in language and concrete communication.

Habermas uses the term 'reconstructive science' as a designation for a methodology oriented precisely towards reconstructing the fundamental preconditions of a rational communication (McCarthy 1988: 276). We interpret 'reconstructive science' as almost synonymous with what we, after Bhaskar, call retroduction. Habermas is not a pronounced adherent of critical realism, even if there are close points of similarity (Outhwaite 1987). He has a realist approach in the sense that he claims to lay bare real deep structures and rules, which are the underlying preconditions for communication.

Example 2

In his book *Modernity and the Holocaust*, Zygmunt Bauman (1989) gives some explanations of the Holocaust by asking the question: What made the Holocaust possible? In his sociological analyses Bauman has adopted a postmodern position, which is essentially different from that of critical realism. However, his aim is the same as that of realism, namely to identify foundational conditions behind concrete historical events, and the essence of his argument is what we have described as retroduction. Bauman begins his analysis by discarding those explanations of the Holocaust which amount to it being a specifically German (a result of the economic and political situation), or a specifically Jewish, problem (a result of increasing anti-Semitism). Bauman discards them because they do not draw attention to what he sees as the fundamental condition of the Holocaust, that is the structure of rational modern society. Characteristic of this society, according to Bauman, is that it is a 'gardening culture' – a culture marked by strategies to control and create perfect order, on certain principles, removing that which does not fit in. Racism is one of several manifestations of this. What is also characteristic of modern society is the elaborate, bureaucratic hierarchy, with routines for division of labour and fixed roles, distancing the actions from the consequences of these actions, thus reducing the responsibility of the individual to a matter of playing one's role. The social control associated with these bureaucratic systems of authority is another typical feature. These were the fundamental conditions making the Holocaust possible, the structures making the Holocaust what it was.

Example 3

Randall Collins (1990) has developed a theory – partly from analyses of concrete situated determined interaction – answering the question: What must there be for a ritual to be a ritual? The question could also be posed like this: What is it that makes this particular interaction a ritual? For an interaction to be a ritual, according to Collins, there must be a group physically meeting at a certain place; they must focus on a common object or an activity, sharing certain emotional moods and sacred objects. The ritual interaction is constituted by mechanisms, producing (if the ritual works) social cohesion, group selectivity, emotional energy,

and membership symbols charged with strong emotions. Symbols convey holiness (what must not be questioned) and mark boundaries between those who belong and those who do not belong.

We find that Collins in his analyses of social interaction also poses a more fundamental question: What is the ultimate precondition for social solidarity – indeed for society to exist as a society? What holds society together? Collins, strongly influenced by Durkheim, answers: Rituals with mechanisms producing moral solidarity and a strong emotional power. By saying this we have shown that the retroductive inferences that Collins makes (as we interpret him) focus on both the preconditions for concrete forms of social interaction in specific situations, and on the issue of transcendental preconditions for enabling a society to be a society.

Common to the three studies in our examples above is the fact that they have been seeking the basic conditions for the phenomena under study, looking in social structures and relations. Retroduction serves as guidance in the argumentation behind the conclusions drawn by Habermas, Bauman and Collins. Retroduction is in some way the core of their scientific method. The concrete methods they use, however, are very different.

So far we have described and illustrated the specific way of asking questions and of arguing within the frame of transcendental arguments and retroductive inference. But what is the working process itself like when we are working with such an inference? How do we arrive at the conclusion that certain structures and mechanisms but not others make up the conditions for X to be possible? How can we distinguish between the necessary conditions for X (the constituent properties) and the more contingent circumstances affecting the particular case under study (cf. Chapter 3)? There is no universal method for this. On the other hand there are several strategies which can guide us when we are drawing retroductive inferences, as we will now demonstrate.

What is common to these strategies is that they can help us discern structures and mechanisms in an open reality, where these seldom or never appear in a pure form; in principle they are always part of a complex interaction with other mechanisms under more or less specific circumstances. The traditional experiment requires that causal mechanisms can be studied in a closed system.[5] In Chapter 3 we showed why this possibility hardly ever exists in social science. The strategies we shall now present, together constitute powerful alternatives to the traditional experiment. We will examine five (complementary) strategies, which have often been used in research, regardless of whether the research has been in line with critical realism or not. They are: counterfactual thinking, social experiments, studies of pathological cases, studies of extreme cases and comparative case studies. We would like to emphasize that these six strategies are powerful alternatives to the traditional experiment. They are not to be seen as inferior or less satisfactory versions of an ideal which social science has not been able to reach. To the contrary, social science has been able, among other things, by means of these strategies, to produce broad and well-founded knowledge of social structures and mechanisms.

Counterfactual thinking

Counterfactual thinking is fundamental for all retroduction. We ask questions like: How would this be if not … ? Could one imagine X without … ? Could one imagine X including this, without X then becoming something different? In counterfactual thinking we use our stored experience and knowledge of social reality, as well as our ability to abstract and to think about what is not, but what might be.

Counterfactual thinking is fundamental in scientific practice, as we understand what something is in relation to what it is not. In our understanding of the world, presence and absence are constitutive of one another. Correspondingly, we can only discern the necessary, constitutive properties of something by relating these properties to what is not constitutive (but rather an accidental circumstance). To understand the specific and constitutive for X – a social identity, a social ritual, a way of life, an institution, a linguistic genre, etc. – we must also have some idea of what X is not. If we consider presence and absence, the necessary and the contingent, the constitutive and the non-constitutive as opposites, we can say that counterfactual thinking is at the same time dialectic, since in this reasoning we examine something in relation to its opposite.

Here is an example. Counterfactual thinking can serve as a guideline when we examine what properties are constitutive for news journalism as a linguistic genre and institution. Television news would not be what it is if it was not presented in an impartial and unambiguous language by a newscaster in a defined environment. Television news would not be what it is without the set of discursive strategies, by which facts are construed as facts, and the claims of objectivity and neutrality on the part of the news institution are upheld (Heritage and Greatbach 1991; Potter 1996). At the same time, through counterfactual thinking we can arrive at the conclusion that it is not in line with this genre and institution to have a cheering audience in the studio, to enact the contents as a drama, to allow the reporter in the studio to use ironic language or introduce the items by saying, 'Well, we can't be quite sure about this. It could be interpreted in many different ways. Anyhow, my opinion is that … '

Social experiments and thought experiments

In ethnomethodology, a scientific tradition initiated by the American sociologist Harold Garfinkel, a form of experiment has been carried out which could be a fruitful strategy for retroductive inference (Garfinkel 1967). Ethnomethodology in many ways deviates from critical realism. It repudiates analytical dualism, and can scarcely accept the realist notion that structures exist somewhat independently of individual activities. Ethnomethodology focuses on locally situated activities, and claims that structures do not exist outside people's everyday activities but only as intrinsic qualities in these (Zimmerman and Boden 1991). But there are also similarities. One is that ethnomethodology, too, aims at tracing the *conditions* for social interaction to be what it is. What are the constituent properties of everyday conversation? What in people's social interaction and conversation causes social order and stability to be maintained? Why does social interaction hold together?

Ethnomethodologists have explained this by pointing to the mechanisms by means of which people in a day-to-day routine maintain a social order. To be able to interact adequately in different social situations it is necessary for the participants to have access to methodological competence and common, taken-for-granted assumptions of the situation. Conversation constitutes a central part of the social interaction. An example of the mechanism, which has been identified as important in everyday conversations, is repair. Conversational remarks which might disturb the order – misunderstandings or expressed disagreements – are often treated as a joke or met with methods of remedy and repair.

How can we attain knowledge of the taken-for-granted assumptions forming the foundation of ordinary social interaction? How can we attain knowledge of the fundamental rules and mechanisms of conversation? Well, by social experiments, among other things, where we examine what happens when in various ways we break with what is expected of us. The following is an oft-used example: let us say that next time I meet a friend, I will answer his way of starting the conversation in the following manner (quoted from Garfinkel 1967: 44):

> How are you doing?
> How am I regard to what? My health, my finances, my school work, my peace of mind, my … ?

My friend would probably be either very confused, perhaps offended or angry, or he would quickly collect his wits and repair my violation against the order by regarding my answer as a joke. What can we learn by such experiments? Well, that a basic quality of ordinary conversation is that we expect others to understand what we mean when we say something in a certain situation without further explanation, even if we express ourselves vaguely. Ordinary conversations take a common understanding of the situation for granted. From such experiments, where we *provoke* an action by threatening the order of things, we can also examine the methods that are put into practice in everyday conversation to repair that same order.

Garfinkel also shows that in many cases it is enough to imagine what would happen if one acted in a certain way, without trying this in practice. To show that ordinary interaction is based on fundamental and tacit expectations and common understanding, he asked his students, among other things, to spend between fifteen minutes and an hour in their own homes watching what happened, but the whole time on the supposition that they themselves were lodgers. The students saw how difficult this was to do, and this experience confirmed that shared understanding and people's ability to immediately recognize a situation as a particular type of situation is a precondition of meaningful social interaction.

In Chapter 3 we expressed doubt about the possibility of using experiments in social science to study the effects of causal mechanisms. How does this square with the fact that we now consider social experiments to be a successful methodological strategy? Well, first, these examples refer to studies of social mechanisms that are so strong, so fundamental for ordinary conversation, that an experimen-

tally produced violation of order tends to have the same effect in different situations, regardless of the fact that we cannot study the mechanisms in a closed system. Second, it is only in combination with a transfactual argument that these social experiments can provide knowledge of causal mechanisms and their effects. Knowledge of the constitutive conditions for ordinary conversation and social cohesion cannot be obtained solely by observed regularities. Third, traditional experiments are usually performed in a constructed situation (some form of laboratory or the like). In that setting, other social mechanisms specific to the experimental situation will influence the outcome. What we here call social experiments, however, are carried out in natural situations. The experimental element lies in the circumstance that the researcher consciously provokes a situation in order to study how people handle it.

There are, of course, ethical aspects to be considered before putting social experiments into practice. The thought experiment as a type of counterfactual thinking is often preferable. Usually it suffices to consider the consequences of a certain action to understand the conditions for a social order. We can imagine what it would imply if we broke certain rules and rituals in ordinary life. We can imagine the consequences of not showing the expected regard for symbols in a particular situation. It is not least our ordinary social experiences that cause us to know what we cannot do without threatening the social order and to understand how such a break of order would probably be received. Often it is unnecessary to actually carry out an experiment. Ordinary social experience is a necessary resource in much retroductive inference within social science.

The starting point, or the very material, for retroductive inference is usually conditions that are wellknown from social practice. The task of science is not primarily to detect new social events or activities, but to reconstruct (and detect) the preconditions for these well-known social situations to be possible. It is these discoveries we can make through retroduction. This means that in scientific work we can and should use experiences we have acquired both in research practice and in ordinary life. Now and then students ask themselves: Can I use other data besides those which I have collected in this particular investigation? The answer is: Of course! Nobody manages in a single empirical investigation to collect the experience needed for a well-grounded retroduction. Naturally, it is important to collect, by well-reasoned choices, new material for one's procedure and to apply scientific methods in the data collecting. However, scientific method is at least equally concerned with what the researcher makes of her data and her experiences, or more precisely, how she applies different modes of inference and scientific argument.

If we reflect a little we realize that the work of such theorists as Marx, Mead, Goffman, Habermas, Bourdieu and Giddens is pioneering not because it describes empirical situations we did not know about before; on the contrary, it is because we recognize the empirical circumstances that the theories are rendered valid in our eyes. The pioneering part is that they reconstruct the prerequisites, the structural conditions, of what we recognize from social practice. To a large extent the same thing is true of the great discoveries in connection with the

natural science revolution in the seventeenth century, a revolution usually declared to be the starting point for the development of modern scientific methods. Galileo's theories were principally about a physical reality familiar to people. The questions he tried to answer by his experiments were of the kind: What mechanisms constitute the fundamental preconditions for bodies to fall in the way they do?

Studying pathological circumstances and extreme cases

To get an answer to the question 'How is X possible?' we can study various cases where the preconditions for X appear much more clearly than in others. There are at least two types of case where social conditions and mechanisms are very obvious: first, those where the conditions are challenged and the mechanisms are disturbed; and second, extreme cases where mechanisms appear in an almost pure form.

Carrying out what we have described above as social experiments mainly involves challenging the conditions of normality, to remove certain mechanisms and provoke others to appear. But there are also cases where the conditions are challenged without the researcher having to provoke anything. Collier describes this in terms of 'the methodological primacy of the pathological' (see Collier 1994: 165). Collier also quotes the following pertinent description by Bhaskar:

> It might be conjectured that in periods of transition or crisis generative structures, previously opaque, become more visible to agents. And that this, though it never yields quite the epistemic possibilities of a closure … does provide a partial analogue to the role played by experimentation in natural science.
>
> (Bhaskar 1989a: 48)

The point of this kind of case study is that we can learn much about structures and mechanisms by studying pathological or critical situations. Mechanisms, which are usually hidden as they are counteracted by other mechanisms, become very clearly apparent in certain situations. The force of gravity would, as Collier writes, be much more obvious than in normal circumstances if it were brought to act in full force and the ceiling above our heads fell down.

This is also the methodological strategy that Freud employed when he developed a theory of how the human mind is structured, partly in the light of what he had learnt from the study of neurotic patients. In social scientific research practice we can think of many situations where this strategy could be applied. On television, for instance, the assignment of roles, directed by staff, and the structure of a debating programme become obvious when a participant suddenly challenges them by not conforming to the otherwise hidden structure. Norms never become so apparent as when someone breaks them, perhaps because they do not know them. The emotional charge of symbols becomes evident from the fierce reactions aroused when someone violates them. The

conditions for social cohesion become obvious in times of disintegration, and the conditions for the legitimacy of national authorities may well be studied to advantage in situations when that legitimacy is seriously threatened. The difference between what we call pathological cases and social experiments is that the latter are based on the researcher's provoking the pathological situation, while this situation in the former case happens anyway.

Another common methodological device is to go to extremes in order to support a retroductive inference. The strength of experiment in natural science is that you can study, in a constructed laboratory, certain mechanisms as they appear in a purer form. An alternative, employed in social science, is to study real cases where mechanisms manifest themselves in a purer form than usual. For instance, we can study mechanisms connected with a ritual interaction by focusing on some social interaction which is extremely ritualized – a funeral or a baptism – and then examine if the same mechanisms also characterize other forms of social interaction. We can examine an extremely bureaucratic organization to obtain knowledge of mechanisms characterizing other organizations too, but in less obvious ways.

Common to both these types of case – pathological and extreme – is that through them we can learn about the conditions for the normal by studying the abnormal.

Comparisons of different cases

Studies with the aim of describing, by means of retroduction, the fundamental conditions for anything to be what it is may well be organized as comparative studies. The researcher chooses to study a number of cases which are all assumed to manifest the structure she wishes to describe, but which are very different in other aspects. If the researcher wants to develop a theory of the ritual element in social interaction (to hold to the example we used earlier), she will preferably endeavour to compare several completely different interaction situations in order to be able to discern the structure all these cases have in common. In this way it can be possible to distinguish the necessary, constitutive conditions from more accidental circumstances. What makes it so productive to compare different cases is precisely this, that comparison provides an empirical foundation for retroduction, a foundation to sort out contingent differences in order to arrive at the common and more universal.

In other situations where researchers ask the question 'What qualities must there be for X to be what it is?', they can, by comparing different cases, infer that totally different qualities or structures are involved. From case studies of various talk shows on television, for example, researchers have concluded that such programmes can be structured following the pattern of three different genres: a debate, a narrative or a therapy session. In concrete cases it may be difficult to discern these three forms, and it can also happen that they are mixed. Through systematic comparisons and transfactual argument, however, these qualitatively different forms can be distinguished. Each one of them has different constitutive

qualities and presents different conditions for the concrete production. They structure the production in different ways and affect the way events are related, how the talk is conducted and staged, how the host behaves, what guests are invited, and so on (Livingstone and Lunt 1994).

Critical realism has been restricted in a way, as it has to a large extent been occupied with criticizing the experimental science which assumes that social mechanisms can be studied in closed systems, while at the same time saying very little about alternative methodological strategies. We have therefore here demonstrated five powerful alternatives to the traditional experiment. They may well be combined in different ways in concrete research practice. As we have shown, strategically selected case studies are a very important feature of a social science founded on critical realism.

Two models for an explanatory social science

In the introduction to this chapter it was stressed that social science in essence aims at explaining social conditions. In this section we will describe two completely different methods for an explanatory social science. The first one is a model usually presented in the literature of social science method and epistemology. It is called the Popper–Hempel explanatory model after its originators, Karl Popper and Carl Hempel (Popper 1959; Hempel 1965; Keat and Urry 1978). Other designations of the same model are the covering-law model or the deductive nomological explanatory model (Ekström 1992).

The second model has been developed within critical realism, especially by Bhaskar. An essential difference between these models, as we shall see, is that the first mainly builds on deduction and induction, whereas abduction and retroduction constitute the central modes of inference in the second model. There are of course other models, too, for explanatory social science. Our aim in this chapter, however, confines itself to presenting a model developed within critical realism, a model which is an alternative to the very influential, but seriously criticized, Popper–Hempel explanatory model.

Basically the Popper–Hempel model goes back to the empirical definition of causality such as it has been described by David Hume (Hume 1966). Causality has to do with empirical regularities. Hume assumes that causal conclusions are based on observations of how something is repeatedly followed by something else in time, that is to say universal/law-like regularities between events.

According to the Popper–Hempel model, all explanations are based on knowledge of universal conformity to law or at least law-like regularities. The structure of this explanatory model can be described thus (Gilje and Grimen 1992: 135):

Explanans:	Universal law(s)
	Framework condition(s)
	Triggering cause(s)
Explanandum:	Description of what is to be explained

Explanans are the conditions we refer to in order to explain the event (Explanandum). The law expresses a postulation of how two events (Y and X) are connected. The framework condition describes the preconditions for this law to be valid, that is, what is necessary for event Y to be followed by event X. The triggering cause is what makes the event take place, given that the law is true and the framework condition is met. We will illustrate this by a concrete example.

Explanans:	All objects that are dropped will fall to the ground (universal law).
	Sarah is holding a bottle and there is no object which can stop Sarah's bottle from falling to the ground, if she drops it (framework condition).
	Sara drops the bottle (triggering cause).
Explanandum:	The bottle falls to the ground.

An objection that immediately suggests itself in relation to this explanatory model is the fact that there is hardly any conformity to law within social science other than the fact that most regularities between events occur with a certain probability. However, according to Hempel the same model can be applied even when we explain something in relation to statistical probability instead of deterministic laws. The difference is that the conclusion (explanandum) in such cases cannot be inferred by strictly logical deduction from the premise; the conclusion in this case is valid with a certain probability. This can be illustrated by an example from Føllesdal *et al.* (1990):

Explanans:	There is a high probability that patients infected by streptococci will be cured if they are treated with penicillin (statistical law).
	Per had a streptococci infection and was treated with penicillin (triggering cause).
Explanandum:	Per was cured.

In this example we cannot deduce from the premise that Per was cured, only that it is highly probable that he was.

Regardless of whether it is an issue of statistical or deterministic laws, the deductive inference is central in this explanatory model. To explain something is to deduce consequences from premises assumed to be true. But how do we arrive at the law from which the explanation originates? Either it says that event Y is always followed by event X, or that event Y with a certain probability will be followed by event X. It thus expresses an empirical inductive generalization. Inductive inferences are central in the empiricist philosophy of science on which this explanatory model rests. One can imagine that it is through a number of observations of how objects that are dropped will fall to the ground, that the law 'all objects that are dropped fall to the ground' can be formulated; it may also be from a series of observations of patients, who have been treated with the

medication penicillin, that the law of the relation between penicillin and cured streptococci infections can be formulated. But we do not gain knowledge of law-like relations through occasional empirical observation. Both Popper and Hempel argued for a hypothesis-testing method. Since we will discuss this method in Chapter 5, we will here just briefly say something about its basic structure. The method is based on the formulation of hypotheses. From the hypothesis, empirical consequences are inferred. An empirical consequence is something which follows from the hypothesis and which can be ascertained to be true or false by means of observation. If the observation is in correspondence with the empirical consequence, the hypothesis has to some extent been supported (it is not falsified, at least); if the observation is not in correspondence, the hypothesis is falsified. A leading idea in Popper's philosophy of science is that science should be oriented towards falsifications. Hypotheses expressing generalizations or laws should never be regarded as finally proved, according to Popper. On the other hand, their validity increases as they are exposed to still more attempts of falsification without being falsified.

Critical realist questioning of the Popper–Hempel explanatory model is radical and comprises its application in both natural and social science. The most important part of this critique is:

1 That this model is limited since it takes its starting point in an empiricist ontology, which reduces reality to the domains of events and empirical observations; causality is understood as regular connections between observable events.
2 What is said to be an explanation does not actually explain anything; it just describes a law-like/statistical relation and the explanations do not identify any causal mechanisms.

This is very obvious in the examples presented above. In the first example we are told nothing of what makes an object fall to the ground, and in the second example we are not told what it is in penicillin that has the power to cure certain diseases. The critique of the empiricist perspective has been treated at some length in Chapters 2 and 3, and thus there is no need to go into detail here.

Instead it is time for us to present a model of an explanatory social science taking its starting point in critical realism. Such a model should be guiding the research that is trying to attain knowledge of constitutive qualities and causal mechanisms generating events, but also knowledge of how different mechanisms cooperate and, under specific circumstances, contribute to the production of concrete events and processes. Bhaskar (1978, 1989a; see also Collier 1994) has presented two different models (called RRRE and DREI) which can be said to correspond to these types of cognitive interest. Separately they are complicated, and an explanation in this context would lead us too far. Furthermore, we are not fully convinced that the division Bhaskar makes is fruitful. We will therefore instead present a model that claims to integrate the essential parts of Bhaskar's reasoning.

It is important to elucidate a few things before we start examining this model. Compared to the Popper–Hempel explanatory model it represents a more comprehensive approach, pointing at key elements for an explanatory social science. In this approach abduction and retroduction play central roles, instead of induction and deduction. (However, we will once more emphasize that deductive logic can and should be used in analyses of all scientific argument, regardless of what methodology is behind the results presented.) The approach further rests on the presumption that the fundamental structures of explanatory social science can be described as a movement from the concrete to the abstract and back to the concrete. The Popper–Hempel model shows how empirical laws can be related to particular events. The explanatory model of critical realism provides guidelines for how to relate in research practice the concrete to the abstract and the abstract to the concrete.

We especially wish to emphasize that this model (containing six different stages) should be seen as a guideline and not as a template to be followed to the letter. Research processes can and should be structured in different ways. The separate stages can also be intertwined and need not follow each other in a strictly chronological order. In research practice it can often be necessary to switch between the different stages. In a concrete study there may also be reasons for concentrating on certain stages and touching upon the others more lightly. The model we present (Table 4) represents a radically different way of regarding the research process, compared to the models most frequently mentioned in books on social science methods. On the other hand, much of social science research to some extent goes along in practice with precisely the model we present here.

The model describes the research process as a way from the concrete (stage 1) to the abstract (stages 2–5) and then back to the concrete (stage 6). Every stage (except the first) in itself involves such a swing between different levels of abstraction. Abstraction and concretization provide two different types of knowledge about reality, both important but not to be confused or reduced to one another (cf. Chapter 3).

Table 4 The stages in an explanatory research based on critical realism

Stage 1: description

An explanatory social science analysis usually starts in the concrete. We describe the often complex and composite event or situation we intend to study. In this we make use of everyday concepts. An important part of this description is the interpretations of the persons involved and their way of describing the current situation. Most events should be described by qualitative as well as by quantitative methods.

Stage 2: analytical resolution

In this phase we separate or dissolve the composite and the complex by distinguishing the various components, aspects or dimensions. The concept

of scientific analysis usually alludes to just this (analysis = a separating or dissolving examination). It is never possible to study anything in all its different components. Therefore we must in practice confine ourselves to studying certain components but not others.

Stage 3: abduction/theoretical redescription

Here we interpret and redescribe the different components/aspects from hypothetical conceptual frameworks and theories about structures and relations. This stage thus corresponds to what has been described above as abduction and redescription. The original ideas of the objects of study are developed when we place them in new contexts of ideas. Here several different theoretical interpretations and explanations can and should be presented, compared and possibly integrated with one another.

Stage 4: retroduction

Here the different methodological strategies described above are employed. The purpose is for each one of the different components/aspects we have decided to focus on, to try to find the answers to questions like: What is fundamentally constitutive for the structures and relations (X), highlighted in stage 3? How is X possible? What properties must exist for X to be what X is? What causal mechanisms are related to X? In the concrete research process we have of course in many cases access to already established concepts supplying satisfactory answers to questions of this type. In research practice, stages 3 and 4 are closely related.

Stage 5: comparison between different theories and abstractions

In this stage one elaborates and estimates the relative explanatory power of the mechanisms and structures which have been described by means of abduction and retroduction within the frame of stages 3 and 4. (This stage can also be described as part of stage 4.) In some cases one might conclude that one theory – unlike competitive theories – describes the necessary conditions for what is to be explained, and therefore has greater explanatory power (see also Chapter 5). In other cases the theories are rather complementary, as they focus on partly different but nevertheless necessary conditions.

Stage 6: concretization and contextualization

Concretization involves examining how different structures and mechanisms manifest themselves in concrete situations. Here one stresses the importance of studying the manner in which mechanisms interact with other mechanisms at different levels, under specific conditions. The aim of these studies is twofold: first, to interpret the meanings of these mechanisms as they come

into view in a certain context; second, to contribute to explanations of concrete events and processes. In these explanations it is essential to distinguish between the more structural conditions and the accidental circumstances. This stage of the research process is of particular importance in an applied science.

We shall conclude this chapter by presenting an example of how these different stages can permeate a concrete study. It is a sociological study of gender segregation in the labour market (Roman 1994). Roman aims at examining whether, within knowledge companies, there is another relation between the male and female parts of the workforce, besides that found in traditional business. One of the aims of the thesis was to examine whether there are gender-segregating mechanisms in these knowledge companies. With the help of Figure 4 we can illustrate the basic idea of the process.

The first stage of the research process consists in describing the phenomenon. In the example, gendered division of labour in the Swedish labour market is described with the help of extensive studies (though not performed by the author herself). In the second stage the phenomenon (gender segregation in the labour market) is divided analytically into a number of imaginable causal components. A social phenomenon is very seldom unambiguous. As a rule one can analyse a number of dimensions or different aspects. In the example gender-typical lines of action, and negative special treatment, are some such components. These phenomena are the empirical manifestation of a great number of cooperative and counteractive mechanisms – for example, gendered

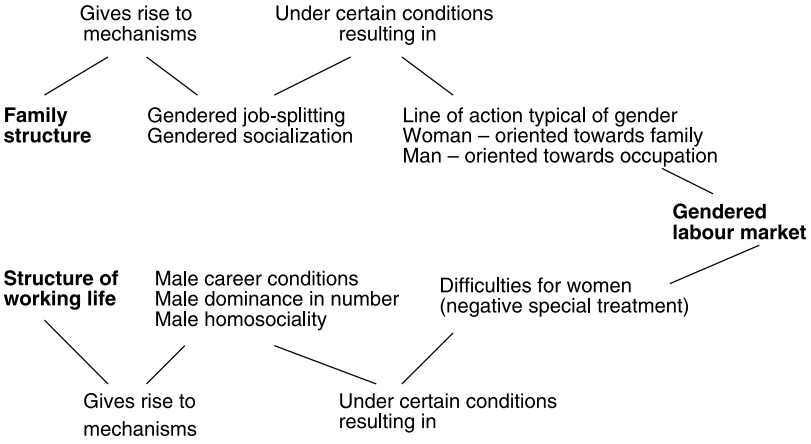

Figure 4 Illustration of conceptualizations in the research process

Source: Roman 1994: 84

division of labour, gendered socialization and male career conditions – which in a specific context together constitute one or more unobservable structures. In this way the studied phenomenon can be described as a result of several causal mechanisms. These mechanisms are located partly in the family structure, partly in the working life structure. It is at the social level that mechanisms arise (emergent powers) and under certain circumstances their effect results in a gender-segregated labour market. What one does in the research process is try to identify these possible causes.

Each such part can then be related to different ideas and causal theories. A redescription of each part is carried out using the respective theories (the third stage). These descriptions make it possible to find a number of possible underlying causes. Plausible explanatory models are discussed. The author points out several possible theories. She rejects, however, theories at non-social levels (particularly biological theories). In critical realist terms we can say that she is looking for the emergent powers at the stratum where her study object is.

As the reader can see, we are moving backwards in the figure. We go from the empirical concrete phenomenon towards the generative mechanisms. (We shall soon turn back from the abstract concepts to the concrete level.) Since we are dealing with open systems, there is a great number of possible mechanisms cooperating. All of them are not, however, equally plausible. Roman writes (1994:37): 'My starting point is that the phenomenon is best explained by reference to the processes producing it. A question which should be asked is thus, *what* in different social structures is it that *can* produce gendered segregation.' We have now come to the fourth stage in the above model. Roman identifies and describes several fundamental generative mechanisms that can explain the phenomenon. At the fifth stage these are weighed against each other regarding, among other things, their relative explanatory power. She argues that some of them are more important than the others (see the figure). Within the frame of the sixth stage she then examines how these mechanisms manifest themselves in the concrete reality.

A central question of the thesis is: Are the previously identified gender-segregating mechanisms operating here, too (for example, we would add, in knowledge companies)? The answer is that these mechanisms manifest themselves in contexts where one would expect to find counteractive mechanisms, such as lack of manpower in the business. As we have pointed out before, it is important to distinguish between structural conditions and contingent circumstances. The author here employs both intensive and extensive designs in her data collection. The emphasis, however, is on the intensive part. The 'test' of the hypotheses of the generative mechanisms is carried out by means of a theoretical and an empirical confrontation. At the same time as Roman establishes that the gender-segregating mechanisms do seem to operate, there are also counteractive mechanisms. These are discussed at length, and their importance is evaluated. She does this by switching between theoretical and empirical arguments.

Conclusion

In this chapter we have considered three central themes in the methodology of social science – generalization, inference and explanation – and within the framework of each one of them we have described important methodological implications of the epistemology and ontology presented in Part I of this book. In discussions about social scientific method, generalization is very often placed on an equal footing with empirical inductive generalization. This will supply a very limited understanding of society, since generality is not just about – and not even in the first place – empirical regularities. The general must also be sought in the structures making up the constituent properties of social relations. Knowledge of these structures requires transfactual argument, or what we have also called retroduction. Retroduction can be seen as a mode of inference or thought operation, beside other forms of inference: deduction, induction and abduction. They should be seen as complementary, and together they constitute the foundation of different scientific working procedures. The four forms of thought operation represent fundamental courses of action we must follow in order to reach the overall goal of social science: to be able to explain conditions in society with true knowledge of reality. At least that is our argument in this chapter. Each one of these modes of inference at the same time represents different ways of relating the specific to the universal and general. By deduction, knowledge of individual phenomena is derived from universal laws. By induction, inference is drawn about larger populations from individual observations. By abduction, individual phenomena are recontextualized with the help of general concepts and categories. By retroduction, accidental circumstances are abstracted in order to arrive at the general and universal. Deduction – unlike the others – is a formalized inference, in which conclusions are drawn in a strictly logical way from premises. On the one hand, deduction has become the hub of some scientific methods in particular, such as the hypothetico-deductive method. On the other hand, deductive logic defines formalized rules that are universal and applicable to the examination of all scientific argument. Scientific inference, where we from something draw conclusions about something else, cannot be reduced either to strictly logical inference (deduction) or to empirical generalization (induction). Scientific inference is not only about applying formal logic; it also involves reasoning, creativity, the ability to abstract, and theoretical language in order to see meanings and structures in the seemingly unambiguous and flat empirical reality. This is obvious, not least if we consider what social science practice in fact looks like. To be able to detect meanings, relations and coherence, to be able to gain knowledge of social structures and transfactual conditions, those modes of inference are required, which we have described in terms of abduction and retroduction. In our view, scientific development and rethinking would hardly be possible without these thought operations. It is through them we alter ordinary ways of reasoning. By abduction and retroduction we can see connections and structures not directly obvious in the empirical

reality. In the last part of this chapter we have also shown how abduction and retroduction can be integrated in a model of explanatory social science. The discourse in this chapter has several times touched upon another central theme – the role of theories in research practice and the relation between theory and empirical data. We shall discuss this in Chapter 5.