

## CHAPTER 1

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# WHAT IS ANALYTICAL SOCIOLOGY ALL ABOUT? AN INTRODUCTORY ESSAY\*

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PETER HEDSTRÖM  
PETER BEARMAN

## INTRODUCTION

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ANALYTICAL sociology is concerned first and foremost with explaining important social facts such as network structures, patterns of residential segregation, typical beliefs, cultural tastes, common ways of acting, and so forth. It explains such facts not merely by relating them to other social facts—an exercise that does not provide an explanation—but by detailing in clear and precise ways the mechanisms through

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which the social facts under consideration are brought about. In short, analytical sociology is a strategy for understanding the social world.

Understanding the social world is also the project of sociology in general, but the strategies used in the mainstream of the discipline differ in important respects from the analytical strategy. This book brings together some of the most prominent analytical sociologists in Europe and the United States in an effort to clarify the distinctive features of the approach and to further its development. The overarching purpose of the book is to move sociology in a more analytical direction.

In this introductory chapter we focus on some of the fundamentals of the analytical approach. Two interrelated aspects are of particular importance: the explanatory principles guiding the approach and the type of explanatory factors being evoked. Analytical sociology explains by detailing mechanisms through which social facts are brought about, and these mechanisms invariably refer to individuals' actions and the relations that link actors to one another.<sup>1</sup>

The chapter is organized as follows. We start by briefly describing what is to be meant by a 'mechanism' and a 'mechanism-based explanation.' These questions have more to do with philosophy of science than with sociology proper, but they have important implications for sociology. Once the explanatory principles are applied to the social world, we arrive at a position which may be referred to as 'structural individualism.' Structural individualism is a methodological doctrine according to which social facts should be explained as the intended or unintended outcomes of individuals' actions. Structural individualism differs from traditional methodological individualism in attributing substantial explanatory importance to the social structures in which individuals are embedded (see Udehn 2001: 318–19). In this chapter we explicate the details of this doctrine and we present various examples based on our own research and that of others to make the abstract principles more concrete. We conclude the chapter with a brief overview of the book.

## 1.1 MECHANISM EXPLANATIONS

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Detailing in clear and precise ways the mechanisms through which social facts are brought about is one of the pillars of the analytical approach. During the last decade there has been a growing interest in mechanisms and mechanism-based explanations, not only in the social sciences but also in philosophy of science, particularly philosophy of biology.<sup>2</sup>

In philosophy, the traditional view used to be that an explanation of a phenomenon consists in showing that it is expected given a general and applicable causal

law (e.g. Hempel 1965). This by now rather outdated view never played any serious role in sociology, however. Sociological explanation is all about mechanisms and statistical associations and has been so for decades.<sup>3</sup>

Although many sociologists use the word ‘mechanism,’ they often use it in an offhand casual sense without any commitment to the type of mechanism-based explanatory strategy focused upon here. The core idea behind the mechanism approach has been expressed as follows by Elster (1989: 3–4): ‘To explain an event is to give an account of why it happened. Usually . . . this takes the form of citing an earlier event as the cause of the event we want to explain. . . . [But] to cite the cause is not enough: the causal mechanism must also be provided, or at least suggested.’

As observed by Mahoney (2001), there is no consensus on what is to be meant by a ‘mechanism.’ In fact, there appears to be almost an overabundance of definitions, and Table 1.1 describes some of the most frequently cited definitions.

These definitions differ a great deal from one another, but underlying them all is an emphasis on making intelligible the regularities being observed by specifying in detail how they were brought about. Bechtel and Richardson have expressed this core idea as follows:

By calling the explanations mechanistic, we are highlighting the fact that they treat the systems as producing a certain behavior in a manner analogous to that of machines . . . A machine is a composite of interrelated parts . . . that are combined in such a way that each contributes to producing a behavior of the system. A mechanistic explanation identifies these parts and their organization, showing how the behavior of the machine is a consequence of the parts and their organization. (1993: 17)

Although one should not take the machine metaphor as such particularly seriously, the idea that mechanism explanations identify component parts that jointly produce the collective outcome to be explained is at the very heart of the approach.

The currently most satisfactory discussion of the mechanism concept is found in Machamer, Darden, and Craver (2000). Following their lead, mechanisms can be said to consist of entities (with their properties) and the activities that these entities engage in, either by themselves or in concert with other entities. These activities bring about change, and the type of change brought about depends upon the properties and activities of the entities and the relations between them. A mechanism, thus defined, refers to a constellation of entities and activities that are organized such that they regularly bring about a particular type of outcome, and we explain an observed outcome by referring to the mechanism by which such outcomes are regularly brought about.

This implies that explanations should refer to the types of entities and activities through which the outcome to be explained is believed to have been brought about. As will be discussed in detail below, if we believe that actors, their properties, actions, and relations to one another are what explain social change, we should

Table 1.1 Alternative mechanism definitions

Author	Definition	Reference
Bunge	A mechanism is a process in a concrete system which is capable of bringing about or preventing some change in the system.	Bunge (1997)
Machamer, Darden, and Craver	Mechanisms are entities and activities organized such that they are productive of regular changes from start to finish.	Machamer, Darden, and Craver (2000)
Elster (I)	A mechanism explains by opening up the black box and showing the cogs and wheels of the internal machinery. A mechanism provides a continuous and contiguous chain of causal or intentional links between the explanans and the explanandum.	Elster (1989)
Elster (II)	Mechanisms are frequently occurring and easily recognizable causal patterns that are triggered under generally unknown conditions.	Elster (1999)
Hedström and Swedberg	A social mechanism is a precise, abstract, and action-based explanation which shows how the occurrence of a triggering event regularly generates the type of outcome to be explained.	Hedström and Swedberg (1998)
Stinchcombe	A mechanism is a piece of scientific reasoning which gives knowledge about a component of another, ordinarily higher-level, theory.	Stinchcombe (1991)

formulate our explanations in such terms and not in terms of various social abstractions and their relationships to one another.

This view of appropriate explanations as generative models differs in important respects from the explanatory principles used in mainstream sociology, where the emphasis rather is on statistical associations (see also Epstein 2006). As is evidenced throughout this volume, the mechanism-based approach is not in opposition to traditional experimental and nonexperimental approaches. Such methods are essential for adjudicating between rival mechanisms and for distinguishing the relevant activities and relations of a mechanism from the irrelevant ones. The difference instead centers on whether one should rest with establishing statistical associations or whether one should follow the analytical strategy and aim for models which show how a proposed mechanism generates the outcome to be explained.

The analytical agenda also embraces the idea of sociological theory as a toolbox of semigeneral mechanisms. As Hedström and Udehn discuss in their chapter, analytical sociology is firmly anchored in the Mertonian tradition. At the core of this tradition is a strong emphasis on the importance of semigeneral middle-range theories, and an equally strong skepticism towards the idea of general sociological theory.

Although there exist some celebrated examples of semigeneral mechanisms, much work remains to be done. The basic idea of theories as semigeneral mechanisms is fairly clear, however, and is related to Kitcher's idea (1981) of 'argument patterns' (but not to his idea of what an explanation entails; see also Machamer, Darden, and Craver 2000). Hedström (2005) uses the notion of an abstract mechanism scheme to highlight the defining features of various types of mechanisms. The following scheme is at the heart of Merton's theory of a self-fulfilling prophecy, for example:

$$B_i \rightarrow A_i \rightarrow B_j \rightarrow A_j \rightarrow B_k \rightarrow A_k \rightarrow \dots \quad (1)$$

$A$  represents a specific action,  $B$  a belief, and the subscripts identify different actors. That is to say, in (1) the beliefs of actor  $i$  are such that they make  $i$  perform a certain action;  $i$ 's action influences the beliefs of actor  $j$  in such a way that  $j$  also decides to act; and  $j$ 's action in turn influences the beliefs of  $k$ , and so on.

This mechanism scheme has limited scope in that it only is relevant for explaining certain types of phenomena, but it is general in the sense that it makes no reference to time, place, identity of actors, content of beliefs, or type of actions. The abstract symbols should be thought of as placeholders for different concrete phenomena (different kinds of actions, different kinds of beliefs, different individuals, etc.) and what identifies it as a particular type of mechanism is the specific *pattern* linking the types of entities to one another. Merton (1968: 475–90) showed how the same self-fulfilling pattern could be used for partially explaining phenomena as different from one another as runs on banks and racial prejudices. (See Biggs's chapter in this volume for additional examples.)

To bring home the notion of a mechanism schema, let's use one additional example—that of a selection mechanism. Selection mechanisms have been suggested to be central for explaining a range of different phenomena such as the ecology of organizational populations (Hannan and Freeman 1989) and the evolution of individual behavior (Skryms 1996), to mention just two sociology-related examples. There are numerous subtle distinctions involved, but for our purpose it is sufficient to present the selection mechanism in its most basic form. As such it is a type of mechanism which links the property of an entity to its reproductive success in a specific environment.<sup>4</sup> The core scheme for the selection mechanism may be summarized as follows:<sup>5</sup>

1. A set of entities,  $e_1$  to  $e_N$ , vary with respect to a property,  $p_i$ .
2. In a certain environment the benefit,  $b_i$ , bestowed on entity  $i$  is a function of its property  $p_i$ .
3. The value of  $b_i$  influences the relative frequency of entities with different properties at subsequent time periods. (Properties that perform better in the environment will become more frequent.)<sup>6</sup>

This mechanism can explain how and why the relative frequency of entities with different properties changes over time. As in the previous example, the abstract symbols should be thought of as placeholders for more concrete phenomena (such as individuals, organizations, organizational strategies, etc.). Because of the wide scope of the selection mechanism, it constitutes an important part of the sociological toolbox.

## 1.2 STRUCTURAL INDIVIDUALISM

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The basic explanatory principle behind the mechanism approach thus is that proper explanations identify the entities, activities, and relations that jointly produce the collective outcome to be explained. When we apply this idea to the explanation of social facts it implies a form of structural individualism. As we define the term, structural individualism is a methodological doctrine according to which all social facts, their structure and change, are in principle explicable in terms of individuals, their properties, actions, and relations to one another. It differs from traditional notions of methodological individualism (e.g. Elster 1982) by emphasizing the explanatory importance of relations and relational structures.

We want to emphasize that structural individualism is a *methodological* position which has nothing to do with political individualism or any other form of normative position outside the scientific domain. It simply is a view of what acceptable explanations in the social sciences are all about, and it has been embraced by scholars as different as Merton, Coleman, and the analytical Marxists of the 1980s.<sup>7</sup>

Although structural individualism emphasizes the importance of action-based explanations, it is essential to note that it does not imply a commitment to any specific type of motive or intentional state that is assumed to explain why individuals act as they do. Thus, it does not imply a commitment to any form of rational-choice theory and in its barest form it may not make any reference to mental or intentional states whatsoever (see the chapter by Rolfe). Structural individualists share two important concerns, however, and these are the Weberian concern with action oriented towards others and the mechanism-based concern with causal depth.

## 1.3 ACHIEVING CAUSAL DEPTH

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By causal depth we mean the explicit identification of the microfoundations, or the social cogs and wheels, through which the social facts to be explained are

brought about. The central cogs and wheels of social life are actions and relations. Actions are important because all the things that interest us as sociologists are the intended or unintended outcomes of individuals' actions. Individuals' actions typically are oriented towards others, and therefore relations to others are central when it comes to explaining why individuals do what they do. In addition, as demonstrated most clearly in the literature on diffusion processes (e.g. Strang and Soule 1998), social relations are central for explaining why, acting as they do, individuals bring about the social outcomes they do. That relations are important for explaining outcomes does not mean that they are independent of individuals and their actions, however. As emphasized above, in principle all relational structures are explainable as intended or unintended outcomes of individuals' action.

Consider, for example, the case of vacancy chains as analyzed by White (1970). A retirement, motivated perhaps by a desire for a more leisurely life, creates an opportunity for others, i.e. a vacancy waiting to be filled by a new occupant. The vacancy generated by the retirement is filled by another individual whose reason for taking the job, perhaps, is to attain more status, or a higher salary, or just a change in venue, but this creates another vacancy in this person's old job, and in this way vacancy chains create social interdependencies which are important for explaining mobility. Individuals' desires—for retirement, for promotion, for status, or for a change in venue—motivate the system. Without such orientations, people may not move. But the essential cogs and wheels are not solely found in the intentions of actors. Causal depth is achieved by recognizing that action takes place in social structures that in this case channel mobility opportunities and thereby explain why we observe what we observe.

## 1.4 THE MICRO–MACRO LINK

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Some sociologists and many traditional economists would find it attractive if all explanations were 'rock-bottom explanations' (Watkins 1957) that start from an idealized state of nature in which no social relations are assumed to exist or to matter. Such thought-experiments can be challenging and entertaining and they can be of use in normatively oriented theory, but we do not see them as serious contenders for explanations of what is observed here and now. Of course, many essential components of sociological explanations—such as norms, and networks—often are the results of long and intricate social processes. If we aim for rock-bottom explanations, such components must either be ignored, which to us seems unacceptable, or they must be endogenized, which, given the current state of social theory, is in many

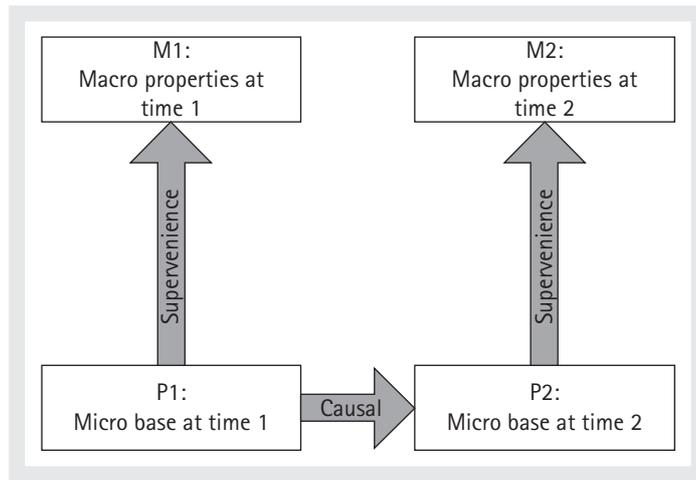


Fig. 1.1 Micro–macro relations as supervenience relations

cases impossible. For this reason, the realism and the precision of the proposed explanation will be greatly improved if we take certain macro-level properties such as relational structures as given and incorporate them into the explanation.

Making sense of the relationship between micro and macro thus emerges as a central concern of analytical sociology, and this raises the question of what we mean by a macro property. As we define the term, macro properties are properties of a collectivity or a set of micro-level entities that are not definable for a single micro-level entity. Important examples of such macro-level properties include typical actions, beliefs, desires, etc. among members of the collectivity as well as distributions and aggregate patterns characterizing the collectivity such as inequality, spatial segregation, and networks.

Our view of the relation between micro and macro is similar to what in philosophical analyses of the mind–body problem sometimes is referred to as ‘supervenience’ (e.g. Kim 2005), and is depicted in Figure 1.1.

Using the language of supervenience, a macro property, *M*, supervenes on a set of micro-level properties, *P*, if identity in *P* necessarily implies identity in *M*. If the macro property is supervenient upon the micro it means that, if two collectivities or societies are identical to one another in terms of their micro-level properties, then their macro-level properties also will be identical. It also implies that two collectivities that differ in their macro-level properties will necessarily differ in their micro-level properties as well. But it does *not* imply that two collectivities with an identical macro-level property will necessarily have identical micro-level properties, because identical macro-level properties can be brought about in different ways.

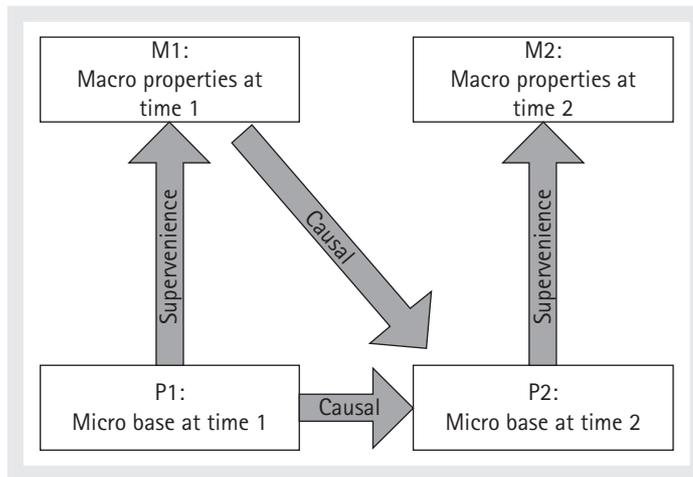


Fig. 1.2 Macro dynamics from a supervenience perspective

Although macro is dependent upon micro, micro-to-macro or P-to-M relations should not be viewed as causal relations. Macro properties are always instantiated at the same time as the micro properties upon which they supervene, and a group or a society has the macro properties it has in virtue of the properties and relations of its micro-level entities. The micro-to-macro relationship is a parts-to-a-whole relationship rather than cause-to-an-effect relationship. For example, if a set of dyadic relations exists between the members of a group, these dyadic relations do not cause the network structure linking the individuals to one another; they constitute it. Similarly, the properties of the individuals residing in different spatial locations do not cause the extent of residential segregation; they constitute it.

Yet another important implication of the supervenience perspective is that if a macro or micro property at an earlier time period, P1 or M1, causally influences a macro-level property in the present, M2, it must do so by influencing its supervenience base, P2 (see Fig. 1.2). Sociological examples of causal relations of the M1-to-P2 kind include processes that operate ‘behind the back’ of individuals, such as various socialization processes, but macro-level properties also can have causal efficacy by being components which individuals consciously take into account when deciding what to do. One such example is when an individual’s decision of whether or not to join a social movement is influenced by the number of other individuals who already have joined the movement (see e.g. Hedström 1994). Other examples of such decisions discussed elsewhere in this volume are those of whether to kill someone, whether to vote, whether to move to a new neighborhood, whether to buy the latest best-seller, and whether to express an opinion about wine quality.<sup>8</sup>

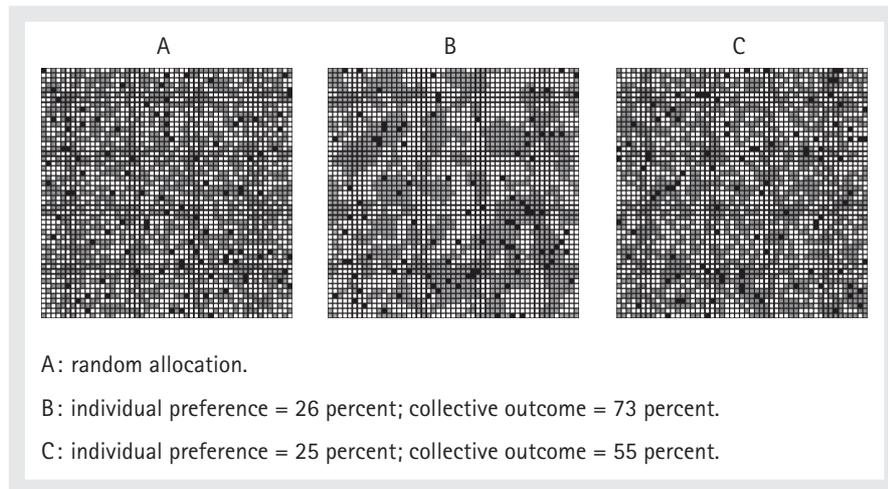
Although systematic regularities can be observed at the *M* level, such associations typically say little about why we observe what we observe. From this perspective such associations are surface phenomena arising from and requiring explanations in terms of deeper underlying processes. The important point is that at each instance of time, macro, *M*, is supervenient on micro, *P*, and in order to explain changes in *M* we must explain changes in this micro base. Until very recently we did not have the analytical tools needed for analyzing the dynamics of complex systems that large groups of interacting individuals represent. Powerful computers and simulation software have changed the picture—so much so that it is possible to have some confidence that agent-based computer simulations will transform important parts of sociological theory because they allow for rigorous theoretical analyses of large and complex social systems. (See the chapter by Macy and Flache for an overview.)

Although the social dynamics observed at the *M* level typically are extremely complex and hard to understand, the basic cogs and wheels of these social processes may be possible to describe with rather simple models. Thomas Schelling's segregation model (1978) is a particularly nice illustration of this. In the Schelling model we have two kinds of individuals, who we may refer to as Whites and Grays, and who are distributed on a lattice. Each individual decides where to live on the lattice, but the decision is influenced by the past decisions of others. Some constraints are present—most importantly, individuals only can move to vacant positions, and they prefer to live near at least some of their own kind. If the Whites and the Grays are randomly distributed throughout the social space represented by the lattice many of them will be dissatisfied, since they will have too few neighbors of their own kind (see Panel A of Fig. 1.3). This will prompt them to move to new locations, but on entry into the new locations they may tip the balance of the local population there, making others leave. If a few Grays move into an area, the local Whites might leave, and when they arrive at their new areas they might prompt Grays to leave, and so on.

Schelling demonstrated that even if individuals have strong preferences for mixed neighborhoods, segregation often arises as an unintended consequence. For example, if the Whites and the Grays want at least 26 percent of their own kind in their neighborhood in order to stay, they typically bring about a collective outcome where the average neighborhood consists of more than 70 percent of the same kind. (See Panel B in Fig. 1.3 for a typical example.)<sup>9</sup>

Schelling also showed that small and seemingly trivial differences at the micro level can make huge differences at the macro level. If the individuals inhabiting the lattice had wanted at least 25 instead of 26 percent of their own kind in their neighborhoods, we would observe a macro structure like the one in Panel C—a considerably less segregated pattern than the one in Panel B.

If we were presented with these macro-level patterns only, it is very likely that we would draw the conclusion that because the society pictured in Panel B is more



**Fig. 1.3 Individual preferences and neighborhood segregation**

highly segregated, those who generated this pattern must have been much more prejudiced than those who generated the pattern observed in Panel C, although the differences between the individuals in the two societies are in fact negligible and without social significance in and of themselves.

This is a very important result that extends far beyond this stylized example. It has been produced many times in many different contexts; for example, in Granovetter's work (1978) on collective action. The point is not that things tip, however interesting that may be. The point is that macro-level outcomes and relationships tell us very little about why we observe the macro-level outcomes and relationships we observe. Trying to make causal inferences on the basis of macro-level data is highly error prone.

Another important point also should be noted. If we view these simulations in the light of Figure 1.2 we can see that the complex and unexpected results do not have anything to do with the complexity of the micro-to-macro link or with any mysterious form of 'emergence'; at each instant of time the link from micro to macro simply is a supervenience relation. The complexity exclusively is due to the complex dynamics of the micro base.

An important methodological point follows from this: In order to understand collective dynamics we must study the collectivity as a whole, but we must not study it *as* a collective entity. Only by taking into account the individual entities, and most critically the relations between them and their activities, can we understand the macro structure we observe. Predicting and explaining macro-level dynamics is one of the most central goals of analytical sociology and the main focus of several chapters in this volume.

### 1.4.1 More complex and empirically calibrated models

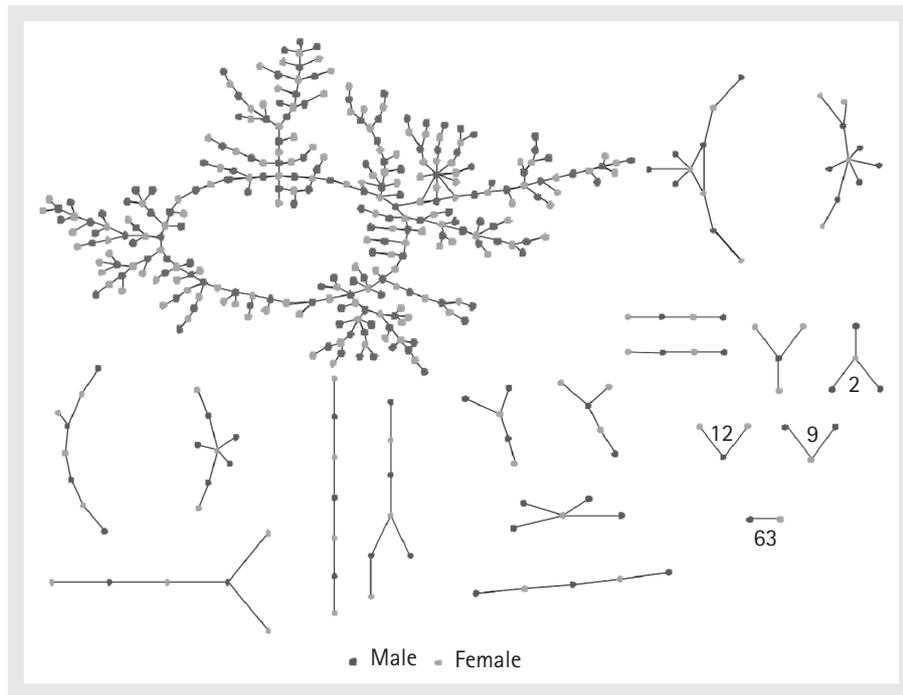
When discussing macro-to-micro or M1-to-P2 relations we made a distinction between two types of relations. Macro properties can influence what individuals do either through processes that operate behind their backs or by being social facts which they consciously take into account when deciding what to do. Schelling's model is of the latter kind. Individuals observe the composition of their local environments and this is one of the key components influencing their actions. Preferences and neighborhood compositions form an interactive process that induces segregation, even if the actors are not overtly segregationist. As an example of the other kind of process, here we consider a study of the sexual and romantic networks of adolescents undertaken by Bearman, Moody, and Stovel (2006). In this case, individuals' actions are systematically influenced by norms whose existence the individuals themselves would not be able to articulate. The example also illustrates how one can go about testing alternative mechanisms by examining their degree of 'generative sufficiency' (Epstein 2006); that is, by investigating the extent to which the micro-level mechanisms can generate the type of social fact which is to be explained.

The context is a single high school of roughly a thousand students in the Midwestern United States. The macrostructure to be explained is the surprising discovery that the sexual and romantic network structure of students in the school resembles a spanning tree. Figure 1.4 reports the observed structure of relationships over eighteen months.

The observed structure is a network of relationships, some sexual, most affective, and many involving the exchange of fluid, an important factor for understanding disease diffusion. The focus is on the giant component linking 286 of the 500 or so students active in the network, and the question is simple: What is the micro-level explanans that accounts for the puzzling macro-level explanandum?

One possibility is that the spanning tree arises from a purely random process. This is not the case, however. If the degree distribution is fixed to the observed distribution, the resulting graphs bear no relationship to the structure being observed. In fact, they look significantly different. Whatever is going on in the dating world is not the outcome of a purely random process.

Another possibility is that the observed network reflects structured preferences. Students selecting partners may do so for lots of reasons. One student prefers girls who are preferred by others, another likes boys with spiky hair, a third has an aversion to acne, a fourth only selects partners with a higher (or lower) grade-point average, and so on. Despite these idiosyncrasies, there may be some characteristics of a pair that suggest increased likelihood of matching. (For matching processes in more detail see the chapter by Stovel and Fountain in this volume.) And in fact there are. It turns out that boys prefer (or have access to) girls who are younger than them and girls prefer (or have access to) boys who are older than they are. In



**Fig. 1.4** The structure of a sexual network in an American high school

addition, nonsmokers have a strong aversion to smokers. The joint effect of these structured preferences on the macrostructure can be simulated. Fixing the degree distribution to the observed distribution, and modeling the probability of partner selection based on the observed preferences yields a network structure of course, but not one resembling the spanning tree being observed.

The characteristic features of the spanning-tree structure are the absence of a network core and that cycles are rare. (For more detail on networks and dynamic network models in general see the chapter by Moody in this volume.) A core would arise in a heterosexual network of the kind considered here if the partnerships that were formed generated cycles. The shortest possible cycle in a heterosexual network of this kind has a length of four. A cycle of length four would mean, from a boy's point of view, that he formed a partnership with his prior girlfriend's current boyfriend's prior girlfriend. If there were to be a norm prohibiting such relationships, the resulting structure would approximate a spanning tree.<sup>10</sup>

If one were to ask high-school students if there was such a norm, it is unlikely that the answer would be confirmatory. But the logic of the high-school context in which status loss would be associated with such relationships (not to mention the so-called yuck factor that arises from too much closeness) implies an avoidance of four-cycle relationship partners. This hypothesis is directly testable. Fixing the degree distribution as before and modeling the formation of the network under the

restriction that cycles of length four should be avoided generates macrostructures that almost exactly correspond to the observed spanning-tree structure.

It seems therefore that a simple and plausible explanation at the micro level is the likely explanation for the observed structure at the macro level. The students imagine that they are freely choosing their partners on the basis of their preferences and beliefs. This is partially true, but they are just not ‘free’ to choose everyone because they are constrained by past actions of others and by their desire not to lose status in the eyes of their peers, and these constraints explain the spanning-tree structure of the network.

The explanatory strategy can be described as follows (see also Epstein 2006):

1. We start with a clearly delineated social fact that is to be explained.
2. We formulate different hypotheses about relevant micro-level mechanisms.
3. We translate the theoretical hypotheses into computational models.
4. We simulate the models to derive the type of social facts that each micro-level mechanism brings about.
5. We compare the social facts generated by each model with the actually observed outcomes.

In the case of the adolescent sexual network this method produced rather clear-cut results. Of the various mechanisms, only one was able to generate the social fact to be explained. Obviously this is not always the case, but the generative methodology is generally applicable and it is a crucial part of the analytical toolbox.

## 1.5 A BRIEF OVERVIEW OF THE BOOK

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In the limited space that follows we briefly provide a road map to the volume and the chapters in it. The volume is organized into four parts. The second chapter in this first part continues the introductory focus of the first chapter by locating analytic sociology in the Mertonian tradition of middle-range theory, a theory tradition in which the focus is on partial explanation of phenomena observed in different social domains through identification of core causal mechanisms. The subsequent eight chapters in ‘Part II: Social Cogs and Wheels’ focus on the role of action and interaction in explaining diverse social processes. In ‘Part III: Social Dynamics,’ fifteen chapters explore the macroscopic dynamics brought on by the activation of the cog-and-wheel mechanisms. In Part IV we ask authors from other areas of social science to consider how analytic sociology relates to their programs. Consequently, we have chapters that identify the foundations for the development of game theory and new developments in experimental economics, analytic ethnography, survey research, and comparative history.

The terrain covered in this volume is vast. Below, and very briefly, we provide a rough guide to each chapter. There are many different ways the reader can move across the terrain of analytic sociology. Thus, while we believe all of the chapters should be read, the order in which one reads them is flexible. The descriptions below are designed to provide the reader with enough information to design their own path through the volume.

### 1.5.1 Social cogs and wheels

In the first chapter in Part II, *Emotions*, Jon Elster argues that while emotions governing action are often thought to be inaccessible to analytic social-science inquiry, this need not be the case. Even if emotions, which are occurrent events (e.g. a fit of rage), trigger actions and reactions discontinuous with prior action streams, emotions do not make the rational-actor model fail. Elster argues that emotions can determine belief, and urgency-based emotions (where urgency is the preference for earlier action over later action, as distinct from impatience, which is the preference for earlier rather than later rewards) can determine outcomes. In this regard, emotions are not inconsistent with a rational-actor model, though they may and often do induce temporary preference shifts, especially for interaction-based emotions—which are likely to yield stronger reactions than comparison-based emotions.

Jens Rydgren considers *beliefs* in the second chapter. For Rydgren, beliefs are defined as ‘proposition(s) about the world in which a person is at least minimally confident.’ Here Rydgren considers in depth the multiple mechanisms by which beliefs are formed—briefly, from observation, influence/socialization, induction, deduction from other beliefs, adaptation to desire (wishful thinking), and dissonance-reduction mechanisms—and identifies both the conditions under which each obtains and the characteristic processes (and problems) associated with each. For example, conformity processes occur more frequently in repeated-interaction groups and generate snowball effects on others; dissonance reduction occurs only when beliefs are part of the same belief system; and so on. While beliefs are slippery and difficult to nail down, Rydgren shows that they need to be considered in any explanation of action.

In the third chapter Jeremy Freese considers *preferences*. He shows that preferences can lead to actions that appear not to reflect the original preferences, that preferences about preferences can and often do stand at odds with abstract preferences, and that the fact of preference change means that our accounts of action need to acknowledge how actors manipulate their own (or others) preferences in subtle, not easily enumerated, and complex ways. The fluidity and manipulability of preferences carries significant implications for explanations of action, challenging rational-actor models and forcing deeper consideration of the dynamics of preference formation and expression.

In the fourth chapter Trond Petersen considers *opportunities*, and shows how opportunities, defined as the set of choices available to actors once social context is taken into account, confront actors. In considering the relationship between opportunity and inequality (broadly construed), Petersen considers how actors can both expand the opportunities that confront them and restrict the opportunities that confront others. Central to our understanding of opportunity dynamics are the ways in which opportunities shape preferences, which in turn shape the pursuit of outcomes through interaction.

Next, Dan Goldstein considers the role of *heuristics* in driving social action and argues that the focus on heuristics, which involves our rethinking ‘the mind’ as an effort-minimizing machine, will yield stronger explanatory theories than models of action that presume that actors weigh and assess alternative strategies for achieving outcomes. The discussion focuses on the simple heuristics that people use in their everyday lives. Goldstein shows how their different heuristics lead to different modes of inference, and why some heuristics fare better in some contexts than others. Key factors that determine whether a heuristic will be successful, from cue validity to network structure, are discussed, as are the conditions that give rise to actors’ switching heuristics.

The first five chapters of this second part can be seen to focus most attention on explanations of action that are ego-centered, broadly conceived. Ego-centered explanations of actions typically refer to reasons, heuristics, emotions, or other mental states that explain why individuals do what they do in a given social situation. This is in contrast to alter-centered explanations, that primarily focus on causes that center on the actions of others. The next three chapters consider such alter-focused explanations. Of course, as all eight chapters reveal, ego- and alter-centered explanations are not mutually exclusive, and explanation is often best achieved by considering both frameworks simultaneously.

Diego Gambetta discusses *signaling* theory in Chapter 8. First, Gambetta cautions against promiscuous use of the idea of signaling, often introduced to account for actions not directly beneficial to actors—and thus deployed to explain too much. Showing that careful design of empirical studies that allows for the incorporation of signal cost and benefit is possible, Gambetta reveals how signaling theory provides a robust analytic framework for accounting for behaviors otherwise seen as irrational, from spending habits to the actions of cab drivers, prisoners, and others in complex and uncertain social contexts.

Jon Elster considers *norms* and their relationship to action in the next chapter, where he distinguishes between social and moral norms and other quasi-moral and legal norms. He defines social norms as non-outcome-oriented injunctions to act or to abstain from acting, sustained by the sanctions that others apply to norm violators. Elster suggests that avoidance of shame plays an important role in this context.

In the final chapter of this first part of the book, on *trust*, Cook and Gerbasi focus on the role trust plays as a determinant of cooperative behavior, and the conditions

under which trust is a key element in our understanding of action. Cook and Gerbasi note that, like signaling, trust as a foundation for action has been ‘oversold,’ and that trust is just one mechanism of many for motivating cooperation—and hence inducing social order. Here they discuss how trust intercalates in formal control mechanisms, and whether trust substitutes, undermines, or supports such mechanisms. Of deep interest are the macro-level consequences of trust, especially the oft-noted decrease in trust (of persons and institutions).

### 1.5.2 Dynamic processes

In Part III, fifteen chapters consider dynamic processes that generate characteristic features of social structure, all of which build from elements of the basic cogs and wheels identified in Part II. Each chapter covers a vast terrain, from segregation to status, from matching to diffusion, and while each one serves to introduce readers to core issues in these subdisciplines, the central focus is on demonstration of an analytical approach to making sense of dynamics. In the first chapter Macy and Flache provide an introduction to *agent-based modeling in the social sciences*. The central intuition is that social order is built up from the unscripted actions of individual agents who constitute the social system and act in relation to others, and their actions. Macy and Flache show how an agent-based computational approach (ABC) can reveal how ‘if everyone is flying by the seat of their pants, social order is possible.’

Bruch and Mare investigate *segregation dynamics*, with a special focus on the relationship between identity-based individual choices and the constraints on those choices due to others’ identity-based choices. They describe various mechanisms likely to be at work and derive how they are likely to influence the extent of segregation.

Biggs focuses his lens on *self-fulfilling processes*; that is, processes in which actors, ‘mistakenly think that their belief follows reality when in fact their belief creates it’ (p. 299). As an unintended consequence actors thereby make an initially false belief come true.

Salganik and Watts, building on experimental studies of *social influence*, in turn explain why some cultural goods (novels, songs, movies, and so on) turn out to be successful, whereas others with equivalent attributes fail to sell, why successes are often wildly successful, and those responsible for producing such blockbusters (such as this book) have absolutely no ability to predict whether or not they will be successful.

Åberg also focuses on social influence, but her approach is nonexperimental and she is concerned with the *contagiousness of divorce*. She shows how divorces among co-workers influence individuals’ divorce risks, and she reveals important gender differences in social influence.

Using an agent-based simulation approach, Stovel and Fountain focus on *matching* processes, specifically two-sided matching contexts such as marriage and job

markets. Both are central for understanding macro-level social inequality and segregation outcomes in which variation in preferences and information affects the timing of matches, the sequencing of matches, and ultimately social-structural outcomes (for example extreme segregation) in the context of different network structures through which information about jobs, partners, etc. diffuses.

In the next chapter, on *collective action*, Baldassarri shifts away from traditional foci and, in an attempt to develop new links between the empirical research on movements and the analytical literature on collective action, attends to the role of social interactions and interpersonal-influence dynamics (especially dynamics relevant for polarization) in shaping collective identities and interests—that is, the core of the problem of collective action.

*Conditional-choice* dynamics are explored in the next chapter, by Rolfe, where the focus is on identifying model frameworks for the analysis of threshold processes in which initial states and conditional-decision rules generate observed outcomes. Attention is devoted to the ways in which outcomes are shaped by differing interaction behaviors, the location of key actors, and network size (among other factors).

In almost every chapter networks and diffusion have been central concerns; Moody attacks both *network dynamics* and diffusion directly. He examines models for how networks evolve and discusses why network-evolution dynamics matter for diffusion. The central focus concerns how the timing of relations shapes diffusion across networks by introducing switches in pathways across which goods of various sorts—ideas, diseases, beliefs, and so on—can flow.

*Threshold models of social influence* are taken up directly in the next chapter, where Watts and Dodds explore the consequences of simple heuristics in the context of social influence on collective decision-making processes and demonstrate how the structure of influence networks shapes the roles of individual actors (prominent or not) in the generation of collective behavior, including wild cascades of influence.

*Time* is the focus of the next chapter, where Winship explores *scheduling* dynamics. Noting that scheduling conflicts arise from the simple fact that if one thing is scheduled at a specific time (and place) another cannot be, Winship explores why such scheduling conflicts exist and why they are often enormously difficult to resolve. He then turns to the macro-level social outcomes arising from such conflicts, focusing attention on hierarchy, segregation, and boundary-maintenance dynamics.

In a similar manner, Feld and Grofman focus on *homophily*, but instead of simply arguing that homophily is a fixed preference (persons prefer to flock with similar persons), they show that characteristic features of social structure—the fact of multiple foci of activity—induce network autocorrelation more than expected, while at the same time providing a balance against dynamics inducing pure segregation.

*Status* and *dominance hierarchies* are the focus of the next two chapters. Podolny and Lynn highlight status dynamics grounded in tangible constraints and opportunities available to actors (in contrast to conceptualizations of status as a property

of individuals). Similarly, Chase and Lundquist propose an array of new models (from observation of dynamics amongst animals) for understanding the generation of dominance hierarchies that explicitly reject the idea that positions achieved in hierarchies arise from, or can be linked to, characteristics of individuals.

The final chapter of this section considers *conflict* and action. Here Kalyvas focuses on the causes and consequences of interpersonal and group conflict, with special attention to the microfoundations of conflict and peace; specifically, the role of individual preferences and actions in producing conflict and the role of conflict in shaping preferences, identity, and actions.

### 1.5.3 Perspectives from other fields and approaches

As noted earlier, it is our hope that the analytical-sociology framework will emerge as the central template for a renewed sociology for the twenty-first century. That at present most analytical sociologists arise from the social-network and/or mathematical- and computational-modeling traditions, while not accidental, does not mean that future work will be tied as tightly to these methods. The next five chapters, written by leading experts in their fields (none of whom would necessarily identify themselves as an analytical sociologist) consider how surveys, ethnography, historical sociology, game theory, and experimental economics currently are, or could be, organized to relate to the research program described in the other chapters that comprise this volume. At the same time, each author also considers how an analytical approach could drive, and fits well with, the leading edges of their research traditions. In many respects, these five chapters collectively point to the future of analytical sociology and begin to answer the most critical question: Where do we go from here?

The first two chapters consider theoretical approaches more often thought to be akin to the analytical-sociological viewpoint, game theory and experimental economics. Breen's discussion of *game theory* shows how it can be simultaneously deployed as a tool for framing questions and for formal analytical investigation of the relationship between micro-level decisions and macro-level outcomes, and suggests that evolutionary game theory may provide an especially fecund tool for sociologists. Bohnet considers *experiments* in the lab and field that provide a framework for the study of how norms operating at the micro level can be causally linked to macro level outcomes.

The final three chapters focus in turn on surveys, ethnography, and historical sociology. Hannah Brückner first considers *surveys*, as a research-design strategy extremely well suited to allow researchers to reveal complex mechanisms at play in social life. Here Brückner shows, for example, how surveys can be used to determine motivations of actors, even motivations not seen by the respondents themselves. Likewise, Vaughan suggests that developments in *analytical ethnography* fit nicely

with the goals of analytical sociology, as both focus on mechanism-based explanations of observed outcomes, thus bridging the micro and macro levels of analysis. In a similar vein, Barkey carefully investigates the use of different methods employed in *historical sociology* through which historical macro social outcomes are analyzed—comparative, institutional, relational, and cultural—and considers the enduring tension revealed by the meso-level structures that often shape outcomes. In all three chapters, new analyses and new strategies are proposed as exemplary models for historical, ethnographic, and survey-based analytical sociology.

## NOTES

1. The focus on actors and actions suggests to some that analytical sociology is a variant of rational-choice theory. This is not the case, however. Although some analytical sociologists are rational-choice theorists, most are not.
2. As an example of this see the special issue of *Studies in History and Philosophy of Science Part C: Studies in History and Philosophy of Biological and Biomedical Sciences*, 36 (2) (June 2005).
3. Examining all articles published in the two leading sociology journals, *American Journal of Sociology*, for the years 1895–2001, and *American Sociological Review*, for the years 1936–2004, one finds only 40 articles which refer to ‘scientific law(s),’ ‘social law(s),’ ‘covering law(s),’ and the like in their titles or abstracts, and only 8 of these were published after 1950.
4. A property here is broadly defined to also include relevant relational properties of the entities.
5. This characterization builds in part on Sober (1984) and Darden and Cain (1989).
6. As far as the third item is concerned it often is essential to further distinguish between learning-by-doing processes and evolutionary processes where the number of ‘offspring’ depends upon the properties of their *b*-values.
7. See the chapter by Hedström and Udehn for a discussion of Merton’s form of structural individualism, Coleman (1986) for a programmatic statement of his form of structural individualism, and Roemer (1986) for examples of analytical Marxism.
8. In the philosophical literature on the mind–body problem, mental states correspond to our macro states (**M**) and the neural or physical level corresponds to our micro level (**P**). In that literature, mental causal claims and claims that attribute causal efficacy to neural or physical processes are often seen as being in competition with each other, with the former being undercut by the latter. (Kim 2005 defends such a position.) The heart of their argument is that **M**’s causal powers cannot be anything beyond the causal powers of its supervenience base, **P**, and hence **M** is superfluous from a causal standpoint once **P** has been taken into account. Since we have no expertise in neuroscience we do not wish to comment on that literature, but we want to note that such arguments carry no force in the social sciences. In the social world we observe causal relations of the P1-to-P2 kind as well as causal relations of the M1-to-P2 kind, and although there may be practical difficulties involved in empirically distinguishing

between the two (see Manski 2000), both types of causation are likely to be operative in most social processes.

9. The simulations are done using the NetLogo software (see Wilensky 1997). These particular simulations are based on a 52\*52 grid (torus), with 1,250 Whites and 1,250 Grays, and with a neighborhood defined as the eight squares surrounding each actor. Vacant positions are colored black.
10. Prohibitions and prescriptions governing partner choice are not unusual of course. In classificatory kinship systems in which we observe generalized exchange, marriages are prescribed with one's mother's mother's brother's daughter's daughter (or MMBDD). Under such a kinship system, for example, different clans would exchange women in a perfect cycle, preventing tendencies towards splitting and opposition within the group (see Bearman 1997).

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