

## **Between Mechanism Talk and Mechanism Cult: New Emphases in Explanatory Sociology and Empirical Research**

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**Abstract** The study of mechanisms has received increased attention in recent years and contributed to the formation of so-called ‘analytical sociology’ that has put the idea of social mechanisms at its core. We discuss the crucial characteristics of mechanism-based explanations and their relation to the longstanding tradition of explanatory sociology. Looking at the widespread and growing number of references to ‘mechanisms’ in the current research literature, we identify typical deviations from the ideal of a mechanism-based explanation. Many references come down to mechanism talk insofar as it is not explicated in detail how and why particular inputs tend to result in particular outputs. To this end, researchers have to give a detailed verbal account of how exactly a mechanism is thought to unfold under specified conditions, or to specify a formal generative model which can be analysed analytically or by simulation. This agenda has been at the core of methodological individualism, sociological rational choice theory, and explanatory sociology for some time, but has received a new coat of whitewash by analytical sociology. This more recent theoretical movement offers a fresh problem-centred agenda based on the well-known macro-micro-macro model and could inspire a new generation of research that places greater weight on analysing social dynamics than on developing theories of action. However, we submit that, rather than constituting a competing approach, these impulses should be located within the longstanding and multi-faceted explanatory agenda in sociology. Avoiding any form of mechanism cult and

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choosing from the full toolbox of explanatory/analytical sociology will be crucial to answer key questions in established areas of sociological research.

**Keywords** Analytical sociology · Methodology of the social sciences · Macro-micro-macro scheme · Agent-based models

## **Zwischen Mechanismus-Gerede und Mechanismus-Kult: Neue Schwerpunkte in der Erklärenden Soziologie und empirischen Forschung**

**Zusammenfassung** Das Konzept der Mechanismen hat in den letzten Jahren zunehmende Aufmerksamkeit erfahren. Es bildet den Kern der sogenannten Analytischen Soziologie und hat maßgeblich zu deren Entwicklung beigetragen. Wir diskutieren die Beziehung dieses neueren Ansatzes zur Tradition der Erklärenden Soziologie und arbeiten zentrale Merkmale einer Mechanismen-basierten Erklärung heraus. In der aktuellen Forschungsliteratur wird zwar vermehrt der Mechanismus-Begriff bemüht, es lassen sich aber einige typische Abweichungen vom Ideal einer Mechanismen-basierten Erklärung identifizieren. Viele Verwendungen des Begriffs bleiben floskelhaft, weil sie nicht genau genug explizieren, warum bestimmte Anfangsbedingungen zu bestimmten Ausgängen führen. Dazu sind detaillierte und lückenlose verbale Ausführungen erforderlich oder formale Modelle, aus denen sich analytisch oder durch Simulationsmethoden die zu erklärenden Phänomene ableiten oder generieren lassen. Diese Agenda steht seit geraumer Zeit im Zentrum des Methodologischen Individualismus, der soziologischen Rational-Choice-Theorie und der Erklärenden Soziologie. Die theoretische Bewegung der Analytischen Soziologie verleiht dieser Agenda einen neuen Anstrich und gibt ihr neue Impulse: Im Rahmen des bekannten Makro-Mikro-Makro-Modells plädiert dieser Ansatz für eine neue Generation von Forschungsarbeiten, die das Gewicht und die Aufmerksamkeit von den handlungstheoretischen Grundlagen hin zur Analyse sozialer Dynamiken verlagern. Wir argumentieren, dass diese neue Schwerpunktsetzung nicht als konkurrierendes Programm zur Erklärenden Soziologie angesehen, sondern innerhalb der etablierten und vielschichtigen erklärenden Tradition der Soziologie verortet werden sollte. Anstatt eines Mechanismen-Kults um bestimmte Spezialtechniken ist substanzieller Erkenntnisfortschritt in soziologischen Anwendungsfeldern nur durch eine Ausschöpfung des vollen theoretischen Repertoires einer Erklärenden Soziologie zu erwarten.

**Schlüsselwörter** Analytische Soziologie · Methodologie der Sozialwissenschaften · Makro-Mikro-Makro-Schema · Agenten-basierte Modelle

### **1 Introduction**

In recent years the notion of ‘mechanisms’ has become very popular, if not a buzzword, in sociology. Scanning current research articles this seems visible in almost

all journals; it is well reflected also in the *Kölner Zeitschrift für Soziologie und Sozialpsychologie* (KZfSS). While in 2003 (Volume 55), 14 out of 29 (48%) articles somehow made use of the term, we find that 10 years later (Volume 65) this holds for 17 out of 23 articles (74%).

While the term appears to have been around in the discipline for quite a long time—being used, as so many important concepts in sociology, in a rather vague, inconsistent, and casual way (Mayntz 2004, p. 239; Gerring 2007, p. 178)—some highly influential books, such as ‘Nuts and Bolts’ by Jon Elster (1989) or ‘Social Mechanisms’ edited by Peter Hedström and Richard Swedberg (1998b) moved the concept explicitly to the centre of interest and tried to sharpen its meaning. The programmatic metaphor motivating the explication of the concept is that mechanisms should deliver a proper explanation of facts and regularities by revealing the ‘cogs and wheels’ which bring about the phenomena of interest.

Meanwhile, a distinct and visible theoretical movement, so-called ‘analytical sociology’, has crystallized that has put the idea of social mechanisms at its core. Important milestones of this development are the programmatic book ‘Dissecting the Social’, by Peter Hedström (2005), and ‘The Oxford Handbook of Analytical Sociology’ (Hedström and Bearman 2009a). The movement is attracting an increasing number of researchers, who now have a forum in the ‘International Network of Analytical Sociology (INAS)’. It might be seen as an indicator of analytical sociology’s well-established place in current sociological theory that it is also attracting an increasing number of critiques (e.g., Abbott 2007; Opp 2007; Gross 2009; Diekmann 2010; Kron and Grund 2010; Little 2012; Lizardo 2012; Santoro 2012; Opp 2013b), sometimes even on the part of those who are by no means suspected of not being in favour of the basic ideas of an explanatory approach, analytical methods, and the relevance of mechanisms.

In this article we discuss the principles and implications of this recent theoretical movement. In particular, we ask what suggestion its explicit interest in social mechanisms makes to those who feel committed to an explanatory approach and theory-guided empirical research. While some of its advocates seem to understand a mechanism-based approach and analytical sociology to be a significant turn<sup>1</sup> in theorizing and empirical research, other scholars tend to perceive the whole development to be nothing but old wine in new bottles.<sup>2</sup> We will argue that neither of these extreme views is particularly helpful, nor are recent, more scholastic, debates about which of these views might be more adequate. Rather, it seems most fruitful to perceive of the new attention given to social mechanisms as a re-emphasis on specific aspects and tasks that have been recognized before, but have been somewhat neglected, or at least have not been addressed systematically enough in prior theoretical and empirical work. In particular, the principles of analytical sociology can be read as a plea to forcefully invest in methodologies that allow sociologists to study social dynamics, even though this might mean to let go of a unifying action-theoretic agenda.

<sup>1</sup> See the notion of a ‘complexity turn’ in the description of ‘analytical sociology’ at the website of the International Network of Analytical Sociology’ (INAS) at <http://analyticalsociology.com/about/>.

<sup>2</sup> Most poignantly, eminent Raymond Boudon characterized analytical sociology as not referring to something different than methodological individualism (MI) but “offering a PowerPoint-style presentation of MI” (Boudon 2013, p. 26).

To develop this argument, we will start by explicating the relation between the more recent notion of social mechanisms and previous conceptions of an explanatory approach in sociology (section II). Despite seemingly fundamental disagreement in meta-theory, especially on the status of the covering-law model, or Hempel-Oppenheim scheme, there is a great deal of overlap between these programmes that even justifies regarding them as a single approach in sociology. Their common denominator is that collective phenomena have to be explained according to the macro-micro-macro scheme and in such a precise way that it becomes possible to analytically derive the explanandum. And this is exactly how analytical sociology proposes to flesh out the idea of mechanism-based explanations in the social sciences (for other positions, see, e.g., Mayntz 2004; Cardona 2013).

Then (section III), we will briefly review to what extent the concept of social mechanisms is already driving current research. The above-mentioned trends in the journals could be seen as a (good) sign that empirical researchers are increasingly occupied with identifying and testing mechanisms, and that the days of merely relating variables and telling stories are over. However, while the use of the concept in current research indeed might partly reflect such a trend, there is also still a lot of *mechanism talk* that is only paying lip service to a truly explanatory agenda. Most importantly, even those scholars whose understanding and usage of mechanisms is in line with the refined concept seem to remain attached to types of research questions and methods that use only a part of the potential of the social mechanisms idea.

This will lead us back to a closer look at what exactly can be seen as the new impulses stemming from analytical sociology *within* the longstanding explanatory tradition in sociology (section IV). Most importantly, it focuses on the social dynamics that produce collective phenomena, rather than conceiving of them as a simple aggregation of individual behaviour, and thus corrects for a certain bias to invest foremost in the micro-foundations of sociological explanations. This emphasis on social dynamics is likely to improve our understanding of key social processes in many fields of sociology off the beaten tracks. Not least, it invites deviation from routines in empirical research, the asking of different and fresh kinds of questions, and more creativity in choosing adequate data and empirical methods.

At the same time, care should be taken that the attempt to establish analytical sociology as a new approach to theorizing and research does not mean to pre-commit to a too narrow set of techniques. As we will outline in the last section (V), such a *mechanism cult* would unnecessarily limit and divide the longstanding search for social mechanisms. This might become particularly visible when analytical sociology leaves the settings of occasionally and deliberately chosen empirical examples and makes substantive contributions to key open questions in major fields of sociology.

## 2 Social mechanisms, explanations, and the macro-micro-macro scheme

The concept of social mechanisms is one way to flesh out the agenda of an explanatory sociology. This agenda has been a particularly vibrant strand of European sociology for more than five decades. While it was closely intertwined with sociological rational choice theory, the approach was also articulated under an epistemological

label that signifies substantive openness: ‘explanatory sociology’. This label has been especially common and is meanwhile well-established in Dutch and German sociology (Verklarende sociologie, Erklärende Soziologie, see, for example, Ganzeboom and Lindenberg 1996; Hill et al. 2009; Maurer and Schmid 2010). As we will show, many of the ideas underlying analytical sociology already have been core ingredients of the tradition of explanatory sociology. It is even more remarkable then that a debate has developed between advocates of explanatory sociology and analytical sociology on the meaning and essential elements of an explanation (Opp 2013a, b; Ylikoski 2013). In particular, Hedström and Ylikoski (Hedström 2005; Hedström and Ylikoski 2010) have developed the idea of mechanism-based explanations in sharp opposition to the covering-law model, or Hempel-Oppenheim scheme, which explanatory sociology has traditionally taken as the very starting point to argue that explanations in sociology should and can be as scientific as those in other sciences (e.g., Lindenberg 1977; Wippler and Lindenberg 1987; Esser 1993). We show that this seemingly fundamental disagreement largely vanishes when taking the macro-micro-macro scheme into full and proper account. Explanatory and analytical sociology agree on the most important features of mechanism-based explanations. At the same time, however, analytical sociology offers a new emphasis in theorizing and research and this shift is already laid out in its sharp opposition to the covering-law model.

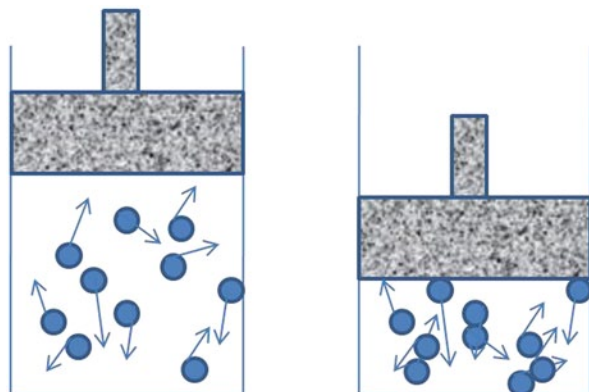
In its most simple form the covering-law model (or Hempel-Oppenheim scheme) of an explanation requires that a particular fact ( $B_i$ ), the explanandum, can be logically deduced from another particular fact ( $A_i$ ) via a general law (if A then B). Analytical sociology rejects this concept of explanation for two main reasons: First, empirically, such covering laws simply do not seem to exist; at least there is not a single convincing example of any truly general law in sociology by now (Hedström 2005, p. 15). This assessment is uncontroversial with respect to Durkheimian ‘sociological laws’ that directly relate macro-level phenomena (Lindenberg 1983). To be sure, sociology should be concerned with ‘social facts’, i.e., phenomena at the collective or macro level, but relations on the macro level can hardly be regarded as general laws, as they are not stable enough across time and space.

The second important objection against the covering-law model is even more fundamental. Even if sociological laws existed, a covering-law explanation would not be satisfactory because it would essentially constitute a ‘black box’ in need of understanding (Boudon 1998). As this argument points to the core of the mechanism idea, it is worth illustrating it with a simple example from physics: The regularity that the pressure of a gas ( $p$ ) is proportional to its density ( $\rho$ ) is stable enough under regular conditions to be considered a law. Density, by definition, is mass ( $m$ ) per unit volume ( $V$ ), so that the law can be written as  $p = cm/V$ , with  $c$  being a constant which needs no further elaboration here. Using this law, we could employ the covering-law scheme to ‘explain’ why the pressure of a gas in a given cylinder has doubled by tracing this back to the changed condition that the volume of the cylinder was reduced to half of its size by keeping the mass inside constant. The logic is sound ( $p_2 = cm/V_2 = cm/(1/2 \cdot V_1) = 2 \cdot cm/V_1 = 2p_1$ ) and the law can be used for valid predictions and successful interventions. Nevertheless, there is a feeling that we do not really ‘understand’ what is going on here, and the question of why the pressure has really doubled still feels unanswered.

As nicely described in the famous lectures of Nobel laureate Richard Feynman (Feynman et al. 1963, pp. 1–5), this black box can be opened up by recognizing that a gas consists of molecules (their weights making up the mass) that are constantly in more or less erratic movement (the velocity depending on the temperature). They therefore occasionally bounce against the walls of the cylinder and this is what leads to pressure (like bouncing tennis balls would exert pressure on a blackboard, eventually pushing it away). If we now reduce the volume of the cylinder to half of its size (keeping other things, like mass and temperature, constant) the likelihood that any molecule will bounce against a cylinder wall doubles; thus the overall pressure doubles (see Fig. 1). This insight into the cylinder immediately leads to a satisfying feeling of ‘Aha, this is *why!*’, a feeling that we now really *understand* the reasons behind the relation between volume and pressure. Moreover, this sense of understanding, while fallible in general (Ylikoski 2009), goes along with the ability to derive a great number of further implications: why increasing temperature leads the pressure of a gas to increase and water to evaporate, why the volume increases when water freezes, why clothes dry better in the wind, and many other regularities. All this becomes possible by identifying and understanding the ‘cogs and wheels’ inside the black box and this is exactly what analytical sociology regards as an ideal mechanism-based explanation.

Paying attention to the smaller elements inside is constitutive for the refined concept of mechanism. It is clearly reflected, for example, in Hedström’s definition, according to which “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.” (Hedström 2005, p. 24; original emphases). Analytical sociology stresses the need to open up black boxes by decomposing or ‘dissecting’ the social phenomena of interest into their constituent parts and processes. Hedström (2005, p. 34) makes an illuminative reference to Fodor (1994), catching up on the idea that a mechanism supposed to explain a phenomenon on a certain level L will be located at a lower level L-1 (see also Gross 2009; Demeulenaere 2011, p. 21). In our example from physics, one can consider the gas to be on level L, while the molecules and their activities are on level L-1. Referring also to example of gases and

**Fig. 1** Molecule movement and pressure of a gas. (based on Feynman et al. 1963, p. 3)



molecules, already Hempel (1965, p. 259) spoke of various ‘levels of explanation’ and expressed a similar view within the concept of a covering-law explanation: “It is often felt that only the discovery of a micro-theory affords real scientific understanding of any type of phenomenon, because it gives us insight into *the inner mechanism* of the phenomenon, so to speak” (Hempel 1965, p. 259; emphasis added).

Both arguments—the non-existence of general sociological laws and the need to refer to relationships on the micro level to attain a real understanding of phenomena—motivate the doctrine of methodological individualism and the famous three-step scheme which now goes under the names of ‘the macro-micro-macro scheme’, ‘the Coleman boat’, or ‘the model of sociological explanation’ (McClelland 1961; Coleman 1986; Wippler and Lindenberg 1987; Esser 1993; Hedström and Swedberg 1998a). In order to account for the exceptions of robust macro-level relationships and to uncover the underlying causal processes, one has to step down from the level of social phenomena to that of individual actors.<sup>3</sup> In other words, sociological explanations need micro-foundations.

Analytical sociology and explanatory sociology share this assessment and, consequently, the dismissal of a pure macro-sociology. In explanatory sociology, the lack of generality of macro-sociological laws and their black-box character have sometimes been called the problems of ‘incompleteness’ and ‘meaninglessness’ (see, e.g., Esser 1996; on the latter, see already Weber’s concepts of ‘Verstehen’/understanding and ‘Sinn’/meaning). The disagreement between analytical and explanatory sociology concerns what all this implies for the covering-law model of scientific explanations. For most advocates of explanatory sociology the macro-micro-macro scheme *saves* the covering-law model and justifies its use in sociology despite the obvious problems of macro-sociological laws: The micro level is able to provide the general-laws request by the covering-law model, in form of a theory of action. Accordingly, the action theory is also referred to as the ‘nomological core’ of sociological explanations (Lindenberg 1981, p. 20; Esser 1999, p. 14) or, in other terms, it is seen to contain “*general assumptions about human nature*” (Wippler and Lindenberg 1987, p. 148, emphasis added). In contrast, analytical sociology avoids any reference to laws, even on the micro level of individual behaviour (Demeulenaere 2011, pp. 16–17). This difference might seem negligible at first sight as programmatic statements about analytical sociology also emphasise the role of theories of action. However, recognising it and identifying its implications is key to fully understanding the programme of analytical sociology and its implications for sociological theory and research.

Making the difference between the two approaches most poignant, explanatory sociology can be said to aim at a coherent body of knowledge unified by and reducible to law-like propositions about human behaviour (the theory of action), while analytical sociology attempts to set up a toolbox of social mechanisms based on different (not necessarily compatible or related) behavioural assumptions, each of them being more or less useful depending on the explanatory task at hand.

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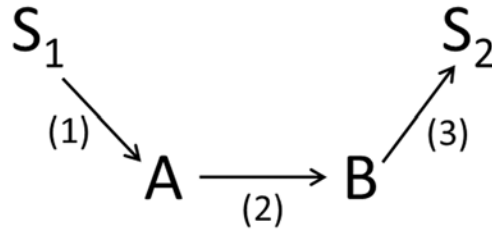
<sup>3</sup> While this is true in most cases, there can be instances where an adequate mechanism-based explanation might be possible by going down to entities larger than individuals. Under rare circumstances it can be justified to analyze the interaction among collective or corporative actors such as states, firms, political parties, or social movements without disaggregating these entities to the level of individual actors.

This difference in emphasis has hardly been recognised in the debate between proponents of analytical sociology and major figures of explanatory sociology and rational choice theory. The ensuing misunderstandings have partly prevented a more pragmatic discussion about different theoretical and methodological strategies. This becomes most evident in Opp's criticism that analytical sociology provides no comprehensive or fully specified theory of action (similarly, see Diekmann 2010). What seems most irritating to Opp is Hedström's proposal to use 'DBO theory' as the theory of action within analytical sociology (Hedström, 2005, p. 38–66). The acronym refers to desires (D), beliefs (B), and opportunities (O), whose interplay is assumed to determine action (see already Elster 1979). Opp criticizes that DBO theory is either not a theory at all or, if more fully specified, equivalent to a wide version of rational choice theory. Indeed, from the perspective of rational choice theory, settling for the orientating hypothesis that desires, beliefs, and opportunities shape behaviour seems a huge step backwards and ignorant of what has been achieved in the struggle for precise explanatory micro-foundations over the last decades. However, this is not the issue at stake. The real question underlying Hedström's action-theoretical proposal is not action-theoretic but rather concerns the overall theoretical strategy of explaining *collective* phenomena. The superficial character of DBO theory is indicative of analytical sociology's different emphasis that favours social dynamics (and the social networks on which they take place and which they produce) over action-theoretic details. Most recently, this point has now been made much more explicit: "Although the mechanism-based approach emphasizes the importance of action in the explanation of social phenomena, it does not subscribe to an axiomatic vision according to which a specific action theory should be used for all purposes" (Hedström and Ylikoski 2014, p. 64).

We will return to and elaborate on these different priorities and their implications in section IV when discussing new impulses stemming from analytical sociology. For the moment, we focus on the huge overlap between both approaches in order to explicate a shared understanding of mechanisms and mechanism-based explanations. Indeed, on the side of analytical sociology, the above-given definition of a mechanism likewise assumes that there are some 'regularities' in the activities of the entities. If we wouldn't accept that 'buzzing around' is what molecules of a gas 'usually do' we wouldn't accept the Feynman explanation above. Or, in Hedström and Swedberg (1998a, p. 19)'s own words: "It is important to note that the mechanisms (...) are mechanisms of some generality, and it is this generality that gives them their explanatory power." So while no reference is made to laws, analytical sociology likewise rests on the assumption of regularities in human behaviour and aims to identify mechanisms that are of 'some generality'. At the same time, on the side of explanatory sociology, most scholars would not insist that the assumptions about human behaviour must be general laws in a strict sense of the word (and this pertains even to physics, as the molecule movements would not appear under extreme conditions). This holds especially true, if we acknowledge that explanations are never final but a matter of degree and adequacy (Lindenberg 1992). In many publications, the argument in favour of methodological individualism simply refers to the fact that regularities on the micro level are *more* stable than the phenomena to be explained on the macro level (Wippler and Lindenberg 1987).



**Fig. 2** The macro-micro-macro scheme



So leaving aside meta-theoretical terminology, it is easily possible to identify a common ground for all those who work in the tradition of an explanatory or analytical agenda: We can improve our understanding of a (time-space dependent) fact or regularity on a given level, and thus contribute to its explanation, if we can analytically derive it from regularities of larger stability (less time-space dependency) on a lower level. And if we are interested in social facts or regularities, an explanation requires that it be derived from assumptions about relatively stable patterns of human behaviour and interaction.

Hence, the well-known macro-micro-macro scheme as depicted in Fig. 2 provides a telling representation of the idea of a mechanism-based explanation in sociology. Such an explanation must always somehow contain *all three* steps of this scheme: (1) Macro-micro links, aptly called ‘bridge assumptions’ by Lindenberg (1981; Wippler and Lindenberg 1987), explicating how the social conditions  $S_1$  on the macro level influence actors  $A$ . (2) Micro-micro links, i.e., action-theoretical assumptions about what kind of conditions on the micro level will lead a typical actor  $A$  to show what kind of behaviour  $B$ . (3) Micro-macro links, also called ‘transformation’ rules, explicating how individual behaviour  $B$  transform into the macro phenomenon  $S_2$  of interest.<sup>4</sup>

At least implicitly, the macro-micro-macro scheme meanwhile underlies a great variety of sociological approaches (Esser 1993). What sets analytical sociology and explanatory sociology apart is, amongst others, the requirement that it must be possible to *derive* the consequences  $S_2$  from the causes  $S_1$ . This is constitutive for the concept of a mechanism-based explanation. Proponents of analytical sociology would preferably avoid the term ‘derivation’ because of its connotation of the idea of deduction and would rather stress that the activities of the entities are able to *generate* the outcomes of interest; to stay in the metaphor: It is not enough to lay the cogs and wheels on the table; one also has to make sure that they smoothly mesh, so that

<sup>4</sup>The same holds, by the way, for the physics example. In order to explain the explanandum, i.e. answer why the pressure has increased [to double its size] ( $S_2$ ), we need the structural cause ( $S_1$ ), in this case the fact that the volume has been decreased [by half], and the complete (!) causal chain. In verbal terms this would require an argument like: Holding temperature and number of molecules (mass) constant, decreasing the volume [by half] means decreasing the space for each individual molecule to move [by half] ( $S_1 \rightarrow A$ ); as the molecules buzz around erratically ( $A \rightarrow B$ ) this makes it [two times] likely that an individual molecule will bump into the wall of a cylinder ( $S_1 \rightarrow A \rightarrow B$ ), as each crash of an individual molecule into the wall increases pressure on it by the same amount ( $B \rightarrow S_2$ ); this is why decreasing the volume [by half] leads to an increase in pressure [to double its size] ( $S_1 \rightarrow A \rightarrow B \rightarrow S_2$ ).

the whole machinery works. Accordingly, both explanatory sociology and analytical sociology place great emphasis on the criterion of precision. It therefore has to be explicated in detail how and why particular inputs tend to result in particular outputs.

### 3 Mechanisms and mechanism talk in current empirical research

Having sharpened our understanding of the concept of social mechanisms and its role in the general enterprise of sociological explanation, we briefly turn to its use in current sociological research articles. At first sight, the wide and growing reference to the concept seems to indicate that the view of theory as merely giving interpretations and vague ideas, and the view of empirical research as merely relating variables or giving narratives have been overcome. However, looking more closely into how the term ‘mechanism’ is employed, one finds considerable variation and still major deviations from the ideal-typical understanding developed above.

Given that the concept of social mechanisms is intrinsically tied to the concept of an explanation, previous work on ‘incomplete explanations’ may also serve as a natural starting point to classify typical deviations from the ideal of a mechanism-based explanation. Common forms of ‘incomplete explanations’ have been outlined by Hempel (1965, 415 ff.) and been further elaborated, for example, by Stegmüller (1969, p. 144 ff.), Opp (2014, p. 63 ff.), and Esser (1993, p. 56 ff.). Accordingly, we can distinguish at least four typical deviations from the refined concept in practical usage. The reason for identifying these types within the current literature<sup>5</sup> is not to point a finger, but to sensitise researchers to the fact that just using the term ‘mechanism’ does not solve well-known and notorious problems of incompleteness of explanations.

#### 1. Pseudo mechanisms: Definitions and labels

One of the most problematic ways of talking about mechanisms—fortunately rare, but still existing—is to mix them up with the (macro-level) relations that are actually to be explained, examples being that the increase in inequality is explained by ‘mechanisms of social closure’ or that lower pay for women is explained by ‘mechanisms of devaluation’. Looking more closely, what is offered as the mechanism is just another word for the phenomenon of interest; the explaining ‘mechanism’ is set equal to the explanandum by definition, which is called a tautology or *pseudo explanation*. The most generous interpretation of such a practice might be that using the term ‘mechanism’ at least expresses the implicit need to learn about the cogs and wheels underlying the phenomenon, and in the very best cases the label itself might give some associative hints about the rough direction of where to find them.

<sup>5</sup>The examples we give were inspired by scanning the latest volumes of the KZfSS as well as comparable journals like the *Zeitschrift für Soziologie (ZfS)* or the *European Sociological Review (ESR)*. However, we decided against providing more detailed references to specific articles because usage often varies even within a single article and since when giving some examples we consciously exaggerate a bit to make the types very clear.

## 2. Ad hoc mechanisms: Descriptions, story-telling, and interpretations

Other forms of referring to mechanisms are analogous to what has been called *ad hoc explanations*. While their structure resembles that of true explanations, they miss an important criterion of adequacy, namely empirical corroboration (or even empirical accessibility). In the context of mechanism-based explanations, such ad hoc reasoning comes in different forms. Under the title ‘mechanism’, some authors tell a more or less comprehensive story about how particular events came about, thereby occasionally providing speculations about which micro-level processes could have generated them; but as long as there is no evidence that the processes indeed show some *generality* and do indeed *apply* under the given conditions, this misses an important aspect of the whole mechanism idea. In a sense, the case of using the label ‘mechanism’ to give a pure description of what actually led to a certain event can be seen as a sub-type of such ad hoc mechanisms, because it is tacitly assumed that the micro-level activities apparent in this particular case have some generality.

## 3. Elliptically formulated or rudimentary mechanisms: Concepts and variables

In the covering-law model an explanation is said to be elliptically formulated if it lacks some parts of the deductive argument, especially the explicit mentioning of the underlying law. In the context of mechanism-based explanations, this could mean missing (important details of) the generating regularities at the micro level. In the gas example from section II, for instance, the explanation could be said to be elliptically formulated when stating that the underlying mechanisms are ‘volume (change)’ and/or ‘(movement of) molecules’. Likewise, in sociological research articles we frequently find the term ‘mechanism’ used purely in reference to concepts, for example ‘interest’, ‘power’, ‘social capital’, ‘homophily’ etc., while further details on the bridge hypotheses, the action theory, and the transformation rules are missing.

While Hempel sees elliptically formulated explanations as being incomplete “in a rather harmless sense” (Hempel 1965, p. 415), Stegmüller (1969, p. 145) points out that the problem can also be more severe. It is harmless if the generating regularities are obvious and just left out for the sake of brevity; it is problematic, however, if the exact generating regularities are basically unclear—to the author, or even to anybody. The most frequent use of the term ‘mechanism’ in the current research literature also falls into this broad category: ‘mechanisms’ as intervening variables that are mistakenly seen to ‘explain’ the presumed causal effect of an independent variable on a dependent one.<sup>6</sup> Of course, mediation analysis can be suited to (partially) test mechanism-based explanations, but this presumes that the mechanisms have been clearly spelled out theoretically; in other words: Mechanisms should not be confused with potential indicators for potential concepts within potential mechanisms.

<sup>6</sup>This particular usage of the term might have been encouraged by graphical representations that place a ‘mechanism’ as a box in the middle of a causal diagram between input and output (Hedström and Swedberg 1998, p. 9; see also: Opp 2013, p. 332).

#### 4. Partial mechanisms: Broader theoretical models and approaches

Another typical way of using the term ‘mechanism’ in the research literature is to refer to broader theoretical models or approaches. For example, authors try to explain patterns of inequality by the ‘mechanism of statistical discrimination’, the ‘market mechanism’, or the ‘mechanisms of social reproduction by Bourdieu’. While many of these approaches indeed contain assumptions about micro-level regularities that are necessary and able to generate the phenomenon of interest, the problem is often that these assumptions, or additional assumptions which are also contained in the approaches, could likewise generate alternative phenomena; the mere reference to the broad approach is therefore simply not precise enough to spell out a mechanism-based explanation of the specific case. This type of incomplete explanation has been called a *partial explanation*; the statements are able to identify a set of facts in which the explanandum is contained, but they are not specific enough to single out the explanandum within this set. Again, the problem can be relatively harmless or more severe, as can be seen by comparing the first and the last examples just given: While some theoretical approaches are very precise, so that the necessary specification might be obvious and would be easy to add, other so-called theories are much too vague to allow this.

When criticizing current references to mechanisms, it has to be kept in mind that explanations, and thus the mechanisms serving within them, are never perfect and final, but a matter of degree and relative adequacy. Hence, some remnant of incompleteness is unavoidable. The first two types of references to ‘mechanisms’, however, have little to do with what is actually meant by this concept. The latter two types seem somewhat more ‘forgivable’, but, as has been mentioned, they come in many shades of grey: While most talk about mechanisms along these lines in the research literature still seems far removed from making a significant contribution to an explanation in the narrower sense, some references to concepts and theoretical models may adumbrate the generating mechanisms already sufficiently well.

Mechanism-based explanations that come close to the ideal concept can basically appear in two principle ways. Many pieces of sociological research that clearly belong to an explanatory tradition explicate the set of relevant actors, their action alternatives, and the ways in which these actors are related to each other, and continue by giving a verbal account of how their interaction produces the phenomenon of interest. Some research articles explicate mechanisms by making use of formal models that can be analysed analytically or by simulation. In terms of analytical power, such models are best suited to arrive at mechanism-based explanations because they allow an explicit analytical or computational derivation of the implications. Whatever form, verbal, formal, or a mixture of both, is chosen, the main heuristic to check whether the spelled out mechanisms might be adequate is the ability to derive as specifically as possible, and hence as informatively as possible, hypotheses for empirical tests.

Among those contributions that use formal generative models and hence often come closest to the ideal of mechanism-based explanations, it is remarkable that most articles we found in recent journal volumes focus on situational or action-formation mechanisms (within volume 55 of the KZfSS, see Berger 2013; Siegert and

Roth 2013; Weingartner 2013). For example, rational choice models of educational decision-making are used to derive hypotheses about the impact of expected costs and benefits on choosing among different educational tracks. Meanwhile much survey data is specifically collected to test such models by including direct measures of these action-theoretic concepts. Even here, however, the way this research is set up does not fully realise the potential of the programme to study social mechanisms. Most strikingly, the micro-macro transition is almost always conceptualised in a very simple fashion and merely involves aggregating educational choices by social origin and reporting the resulting association. So, although all three steps of the macro-micro-macro scheme are somehow covered, the emphasis of current research clearly lies on the first and second steps, e.g., how social origin affects the determinants of educational decisions and how individuals arrive at these decisions.

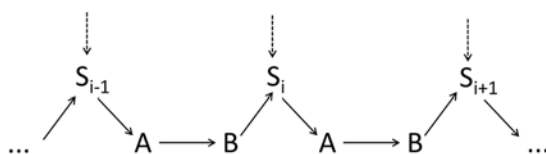
As we will show in the subsequent section, one of the most important impulses of the programme of analytical sociology is the call to go beyond this kind of analysis. This claim is also not new, as demands to pay more systematic attention to the problem of aggregation/transformation have also been made before (Lindenberg 1977; Coleman 1986). But, still, this advice has largely been ignored in practice. So, analytical sociology and the concept of social mechanisms provide a fresh and especially insistent reminder that sociological explanation is not only about bridge hypotheses and action theories.

#### 4 Renewed emphases and accentuations

Even where the usage of the term in current empirical research comes relatively close to the refined concept of social mechanisms, the disarming charm of the prominent role models cited when outlining the programme of analytical sociology is rarely matched. Among those prototypes are Granovetter's threshold models of collective behaviour (Granovetter 1978), Coleman's explanation of the diffusion of an innovation among physicians (Coleman et al. 1957), and Schelling's famous models of segregation (Schelling 1971). What sets these famous examples apart from sociological mainstream research is that they explain social phenomena of considerable emergence and deal with dynamic social processes—which is why they also involve some formalism and math.

So, while our discussion in section II has already revealed the core idea and elements of social mechanisms, there is an important further step to be made in order to arrive at a comprehensive understanding of the concept: Most of the interesting social phenomena are dynamic in nature and can only be adequately explained when taking their process character explicitly into account. It thus has to be stressed that

**Fig. 3** Social processes



the macro-micro-macro scheme is by no means restricted to static one-shot situations. Rather, specifying a mechanism-based explanation will in many cases involve reiterating the scheme several times, as depicted in Fig. 3 (Boudon 1986, p. 30; Esser 1999, pp. 17–18).

Remarkably, the importance of dynamic processes and the role model character of the above-mentioned contributions has been recognized since decades within sociological rational choice theory and explanatory sociology (Esser 2000, pp. 269–352). So it is somewhat puzzling that relatively few contributions have succeeded in following the footsteps of the famous examples and that these references still dominate recent programmatic expositions. This holds all the more as this part of sociology generally favours substantive progress over a cult of classic writers.

The major reasons for this state of affairs lie in the trade-offs that scholars who work within the macro-micro-macro-model face and the way these have been solved predominately in the past. As explicated above, in the attempt to meet the requirements of the covering-law model, explanatory sociology has put considerable emphasis on the theory of action as the nomological core of sociological explanations. This has generated considerable progress as regards the first two steps of the macro-micro-macro model. More recent theories of action make much more realistic assumptions about actors' beliefs and preferences and often incorporate additional cognitive mechanisms, such as framing or dual processes (see Kroneberg and Kalter 2012).

On the empirical side, the emphasis on developing a general theory of action has motivated prioritising primary and secondary data that allow for a close dialogue between action-theoretic arguments and empirical analysis. In particular, sociologists' interest in large-scale collective phenomena and social processes as well as the need to legitimate rational choice social research as genuinely sociological has favoured the use of representative surveys. Indeed, surveys have proven suitable to test whether choices on average respond to variations in incentives or other action-theoretic determinants of behaviour. The alliance between rational choice theory and large-scale survey data analysis (Goldthorpe 1996) has generated new insights in key areas of sociological research and considerably advanced the methodology of theory-guided survey research, elaborating both direct and indirect test strategies (see Kroneberg and Kalter 2012).

No doubt, this research tradition has generated important findings and will continue to do so. However, the use of large-scale random samples has come at a price which has already been noted some time before the recent outlines of analytical sociology, most notably by Coleman (1986, p. 1316): “The statistical tools of survey design and analysis began in the 1940s to make possible quantitatively precise statements about samples of independent individuals and the populations (again of independent individuals) they represent, as well as analysis of factors affecting individual behavior. There was no comparable development of tools for analysis of the behavior of interacting systems of individuals or for capturing the interdependencies of individual actions as they combine to produce a system-level outcome”.

Coleman's major path to solving this problem is well known and still dominates economics and sociological rational choice theory: By making strong assumptions about actors' rationality and information one mathematically derives equilibria of

complex social interactions in exchange models and game theory. For example, Coleman's 'linear system of action' (Coleman 1990, pp. 667–700) takes as inputs actors' interest in and control over a set of resources and allows to derive the equilibrium distribution of control (as well as the value of resources and the power of actors). This ability to derive macro-level implications from the interdependencies among actors stems from a number of strong assumptions. Among other things, actors are assumed to have preferences that follow a Cobb–Douglas utility function and to demand control over resources proportional to their interests, while taking into account their prices and their own budget (Coleman 1990, pp. 682–684). Beyond such micro-level assumptions the model also makes rather strong assumptions about social dynamics: It is based on the idea of centralised exchange among all actors under the condition of full information and the absence of externalities or transaction costs.

Likewise, solution concepts of traditional game theory rest on strong assumptions that allow derivation of macro-level outcomes from a description of the strategic interdependencies among actors. Far beyond the usual assumptions behind individual rationality, the common prediction that actors will play mutually best responses (i.e., the well-known Nash equilibrium) is based on the assumption of mutually consistent expectations, i.e., one has to assume that players *know* what the others will do (Osborne and Rubinstein 1994, p. 53). Again, it is through these assumptions that it becomes possible to formally derive the macro-level outcomes of complex interactions.

Analytical sociology tackles similar kinds of questions, but suggests a different general strategy to answer them: Schelling's and Granovetter's models provide good examples of this; these models show that it is often possible to construct mechanism-based explanations without making strong rationality assumptions (Macy and Flache 2009). The actors in Schelling's segregation models or the more general threshold models studied by Granovetter merely respond to the fraction of other individuals in their neighbourhood (or in the global population) that have a particular attribute (e.g., race) or engage in a particular action (e.g., participate in a riot). Specifically, these models do not detail action-theoretic mechanisms and do not assume that actors strategically anticipate the impact of their choices on the behaviour of other actors in order to derive emergent macro-level consequences. Rather these models place emphasis on another objective: In contrast to many traditional game theoretic and exchange or market models, they explicitly describe the process as gradually unfolding over time. It is the social dynamic of interaction that leads to the characteristics of the macro phenomenon that cannot be anticipated from the initial configuration of actors and their attributes.

Analytical sociology thus promotes a specific elaboration of the macro-micro-macro model or mechanism-based explanations: a combination of *simple* and *realistic* micro-level assumptions with a focus on a social *process* that is driven by the dynamic interactions among actors. The formal modelling technique particularly suited for this kind of theoretical analysis is agent-based modelling, which occupies a central place in the programme of analytical sociology (Hedström 2005; Hedström and Ylikoski 2010; Manzo 2014). An agent-based model (ABM) is a computational model of multiple autonomous agents that interact with each other and/or with their environments over time (Epstein 2006). In contrast to solving sets of equations math-

ematically as in other formal models, ABMs are programmed in a computer language and analysed inductively: By iterating the assumed agent behaviour in the context of many other agents dynamically over time, ABMs allow to investigate the macro-level consequences of this interaction. As stressed by proponents of analytical sociology, there is a natural affinity between ABMs and the concept of social mechanisms (Manzo 2007, pp. 5–6; Hedström and Ylikoski 2010, p. 63; Manzo 2010, p. 147): The objects and procedures that make up an ABM correspond to the components of mechanisms, that is “*entities* (with their properties) and the *activities* that these entities engage in, either by themselves or in concert with other entities” (Hedström 2005, p. 24; original emphases). And simulating an agent-based model means to activate “an artificial computing mechanism whose specific content is designed to mimic the detailed functioning of the real-world mechanism” (Manzo 2014, p. 31). As analytical tractability is no concern, ABMs are highly flexible and therefore particularly suited to accommodate the complexities that elude most equation-based mathematical models, such as heterogeneity of agents and spatial and network structures.

Importantly (and in contrast to the exuberant work on ‘artificial societies’), analytical sociology not only favours ABMs as the theoretical modelling strategy of choice but aims to closely intertwine them with empirical research. This is done by empirically calibrating major parameters or functions of an ABM. In his analysis of youth unemployment in the Stockholm metropolitan area, Hedström (2005) uses logistic regression of register data to estimate how strongly the unemployment rate in one’s district affects one’s own chances to find a job. He then uses this estimate in an agent-based model of unemployment dynamics that is run on agents whose attributes mirror those of the cases in the empirical data. Bruch and Mare (2006) use vignette data on black and white respondents’ neighbourhood preferences in order to estimate how these vary with the percentage of out-group members. Using empirically calibrated preference functions in their ABM allows the authors to contrast the resulting equilibria with those under the theoretical ideal-typical preferences assumed by Schelling in his classic original work. Such empirically calibrated ABMs promise to leave behind in the most uncompromising fashion the mechanism talk prevalent in many fields of sociological research. And it is by placing this research strategy at its core that analytical sociology becomes, contrary to many observers’ assessment, an “original and distinctive proposal in sociology” (Manzo 2014, p. 39).

## 5 The principles of analytical sociology and the danger of mechanism cult

As has become clear, it is justified to regard “analytical sociology” and the tradition of “explanatory sociology” as parts of the same scientific endeavour. At the same time, analytical sociology offers a number of important suggestions on how to advance this agenda in certain respects. We now turn to a recent, particularly comprehensive statement of the principles of analytical sociology that allows us to summarize these conclusions and discuss the value and potential pitfalls of this movement. Building on previous outlines (Hedström 2005; Hedström and Bearman 2009b; Hedström and Ylikoski 2010), Manzo (2014, pp. 7–9) has characterized the principles of analytical sociology as follows:



- “P1: use concepts that are as clear and precise as possible to describe both the facts to be explained and the explanatory hypotheses/facts mobilized to explain them, while avoiding all linguistic obscurity and convolutedness;
- P2: mobilize the best quantitative and qualitative empirical information available and use the technical tools best suited to describing the facts to be explained;
- P3: in order to explain the social outcome(s) described, first formulate a ‘generative model’, i.e. a model of a (set of) mechanism(s), where a mechanism is a set of entities and activities likely to trigger a sequence of events (i.e. a process) likely to bring about the outcome(s);
- P4: in order to formulate the ‘generative model’, provide a realistic description of the relevant micro-level entities (P4a) and activities (P4b) assumed to be at work, as well as of the structural interdependencies (P4c) in which these entities are embedded and their activities unfold;
- P5: in order rigorously to assess the internal consistency of the ‘generative model’ and to determine its high-level consequences, translate the ‘generative model’ into an agent-based computational model;
- P6: in order to assess the generative sufficiency of the mechanisms postulated, compare the agent-based computational model’s high-level consequences with the empirical description of the facts to be explained;
- P7: in order to prove that the hypothesized micro- and network-level assumptions are not only generative sufficient but also empirically grounded, inject as much individual- and relational-level, quantitative, qualitative and/or experimental data as possible into the agent-based computational model and re-analyze its behavior and high-level consequences.”

This set of principles has been proposed to answer questions about analytical sociology’s originality and to describe the research sequence that is characteristic of the programme, but also to map “analytical sociology’s internal heterogeneity” (Manzo 2014, p. 10). It allows us to clarify, again, the common denominator of explanatory and analytical sociology, as scholars in both traditions generally agree on principles P1–P4: emphasising clarity and precision, carefully establishing the explanandum, and formulating a generative model of the underlying mechanisms along the lines of structural individualism. Notably, these principles set apart this tradition from other sociological approaches, most notably variable-centred empiricism, collectivism and exercises in social philosophy. The meta-theoretical principles P1–P4 therefore implement already a specific understanding of the concept of mechanisms that rejects notions of macro-level mechanisms (in contrast to, e.g., Mayntz 2004; Cardona 2013).

By adding the principles P5–P7, Manzo moves from meta-theoretical principles to methodological ones, as they are all about agent-based models and their empirical testing and calibration. This specific understanding is effective in demonstrating that analytical sociology combines meta-theoretical and methodological elements (Manzo 2010, p. 162) and is an “original and distinctive” approach (Manzo 2014, p. 39). At the same time, these additional principles introduce a “main dividing line (...) between those who accept the entire set of principles and those who restrict analytical

sociology to P1–P4” (Manzo 2014, p. 10). We therefore deem it crucial to preserve a truly foundational status as regards the meta-theoretical principles P1–P4 while relegating the additional principles to the much more pluralistic realm of methodological questions *within* analytical and explanatory sociology. This not only acknowledges that there are “analytical sociologists with different understandings of the analytical sociology research program” (Manzo 2014, p. 37), but also helps to locate analytical sociology within the longstanding tradition of explanatory sociology. In this view, analytical sociology offers a fresh problem-centred agenda that avoids old debates (Demeulenaere 2011, p. 10) and provides new priorities and methodological tools to analyse micro-macro transitions. Clearly, empirically calibrated ABMs belong to these new tools and constitute a major development in theory-guided research that enriches the toolbox of analytical sociology. However, game theory, decision theory, exchange/market models and several other models remain important tools as well, as do empirical test strategies that use lab experiments, survey data or network analysis—even if they are not used in a close dialogue with an ABM. Depending on the research setting and data situation, alternative theoretical models might even be better suited to study the relevant causal mechanisms.

To back this claim, it might suffice here to elaborate two arguments that point to limitations of empirically calibrated ABMs. The first argument relates to analytical sociology’s criticism of rational choice theory for its lack of realism. As has been correctly pointed out, there is no such thing as the rational choice approach but a great variety of theories and models, and the question of their realism therefore deserves a differentiated assessment (Opp 2013b). Still, a major and reasonable argument for the superiority of ABMs over alternatives such as game theory or market models is the greater realism they would allow due to their higher flexibility. However, ABMs often replace unrealistic assumptions about choice behaviour with similarly stylised assumptions about social structures and dynamics, so that it is not straightforward to identify analytical sociologists’ mission as one of increasing realism. In general, the more aspects of a phenomenon a theoretical model tries to capture, the greater is the potential to make unrealistic assumptions. As an example, consider how market models abstract from the network among exchange partners, assuming that a central auctioneer sets prices by matching demand and supply. No doubt, this is a greatly simplifying and unrealistic assumption. However, when replacing this assumption with a detailed ABM one has to specify the network structure (i.e., who exchanges with whom), the schedule of exchanges (i.e., the temporal order of exchanges), the way information about prices is transmitted among trading partners, and many more things. Whether the resulting model is more realistic overall, can be difficult to tell. And in research settings where data on these various details are missing or scarce, it might be preferable to use a simplifying assumption that gets rid of this additional complexity. In historical sociology, for example, where the scarcity of data is often particularly obvious, it can make sense to use more abstract equilibrium models and surround the conclusions with all the necessary caveats (see, e.g., Kroneberg and Wimmer 2012). And as always in such methodological affairs, which assumptions seem reasonable ultimately depends on explanatory relevance, i.e., on what a model is meant to achieve.

Secondly, even when replacing simplifying assumptions with more realistic and complex ones is worthwhile, there are alternative research agendas that sometimes allow an even closer dialogue between formalised theories and data analysis, most notably behavioural economics and experimental game theory (Camerer 2003; Fehr and Gintis 2007). Many economic experiments involve relatively sizable groups of interacting subjects so that social mechanisms and the impact of institutions can be studied systematically (see, e.g.; Gürer et al. 2006). And their parsimonious models of choice often allow to analytically derive macro-level predictions and to fully calibrate the parameters that capture individual heterogeneity, for example in social preferences. This is obviously an advantage compared to the empirical calibration of ABMs, which often remains highly incomplete due to the paucity of data generated or collected outside the laboratory. Of course, among other problems, the issue of external validity remains, and the combination of game-theoretic models with lab experiments therefore seems most powerful if the aim is to test general propositions about social order, social norms, trust, and similar generic phenomena (Kroneberg and Kalter 2012).

In sum, the choice among research designs and modelling strategies will continue to remain a contingent and complex one and the continued pluralism of strategies to study the micro-macro transition seems most suited for theoretical and empirical progress in analytical/explanatory sociology. Elevating particular modelling or research techniques to foundational principles would yield a research agenda that is too narrow when measured against the overarching aim to develop and test generative models of social mechanisms. The movement to study social mechanisms could then easily develop into a mechanism cult that overemphasizes particular methodological tools at the expense of others.<sup>7</sup> The limitations of such an agenda would be especially visible when viewed from the perspective of established fields of sociological research. Empirically calibrated ABMs can make important contributions to these fields, but addressing the full spectrum of research questions and relevant dimensions (e.g., cross-country institutional or legal differences) will most likely necessitate the continued employment of more-mainstream methods and research designs.

## 6 Summary and outlook

While references to social mechanisms in current empirical research abound, there is a lot of mechanism talk that uses the term as a synonym for ‘cause’, ‘explanation’, ‘intervening variable’, or ‘theoretical interpretation’ but fails to explicate in detail how and why particular inputs tend to result in particular outputs. The movement of analytical sociology has put a much more specific and informative understanding of mechanisms to the core of its agenda. As we have shown, there is a great deal of overlap between analytical sociology and the longstanding explanatory tradition in

<sup>7</sup>This is certainly not the intent of Manzo’s expositions of the principles of analytical sociology: “Far from simply, and naively, relying exclusively on agent-based computational modelling (for this objection, see Abbott 2007b, p. 1; Lucchini 2007, pp. 236–240, 2008, pp. 9–12; Sawyer 2007, p. 260), this strategy establishes a complex interface among multivariate statistics, computational methods, mathematics, and experiments in which each method is mobilised to accomplish specific tasks” (Manzo 2014, p. 37).

sociology. Both argue for the macro-micro-macro scheme of sociological explanations and for generative models of social mechanisms: To explain social phenomena or (time-space dependent) regularities on the macro level, one needs to analytically derive them from regularities of larger stability (less time-space dependency) on the micro level. This process entails identifying the cogs and wheels that produce the phenomenon and therefore amounts to a mechanism-based explanation.

At the same time, analytical sociology offers something new both in terms of meta-theory and, relatedly but more importantly, in terms of the practice of model building and research. In its foundations, ‘explanatory sociology’, well established in Dutch and German sociology, has always been an essentially action-theoretic research programme. The theory of action is seen to satisfy a crucial requirement of the Hempel-Oppenheim, or covering-law, model of scientific explanations: the usage of general laws. It followed naturally that ideally all research and theorising should be based on the same underlying theory of action. Major advocates of analytical sociology do not share this view, although they likewise allocate an important role to theories of action, and reject the covering-law model altogether. Against the backdrop of the ensuing meta-theoretical debates among proponents of both approaches, we have stressed that it is crucial to recognize both (a) the common core of these explanatory efforts that justify regarding them as a single approach to sociology and (b) the important new accentuations and tools that analytical sociology offers within this shared approach.

The common explanatory agenda consists of formulating generative models of social mechanisms along the lines of structural individualism. Analytical sociology not only provides this longstanding agenda with a new meta-theoretical suit, but it entails a certain shift in emphases at the level of actual research practices. Due to the special role attributed to a general theory of action and to the successful alliance between rational choice theory and large-scale survey data analysis (Goldthorpe 1996), most empirical work in explanatory sociology has predominately focused on situational and action-generating mechanisms. As a side effect, it has often missed out on social dynamics by focusing on simple aggregation of individual behaviour in the micro-macro link or it subscribed to at times highly unrealistic assumptions that allow a mathematical derivation of macro-level consequences.

Analytical sociology is first and foremost yet another call and attempt to shift the main focus on the micro-macro transition, by getting the priorities right and by providing new tools that allow a more realistic modelling of dynamic social processes. Being freed from the meta-theoretical demands to work with general laws, the priority is to build up a toolbox of social mechanisms while making much more pragmatic use of various behavioural assumptions. It is therefore only consequential and might help to remove misunderstandings of its mission if “programmatically, compared to the initial insistence of Hedström (2005) on the desire–belief–opportunity scheme, analytical sociology is increasingly explicit in endorsing a pluralistic stance” (Manzo 2014, p. 22).

At the same time, this clarification provides the ground for a more worthwhile debate: Rather than arguing about DBO theory, it has to be discussed whether or not it is premature to let go of the vision of common behavioural micro-foundations that united rational choice theory with its action-theoretic rivals. In contrast to Hedström’s

and Ylikoski's strategic disinterest in a general theory of action, there is a number of recent attempts to arrive at psychologically richer micro-foundations (Boudon 2003; Esser 2009; Lindenberg 2013; Kroneberg 2014; Wikström 2014; see our discussion in Kroneberg and Kalter 2012). These theories partly overlap and partly differ in the concepts and action-formation mechanisms assumed to drive human behaviour. But they are united by the aspiration to develop a general theory of action that is able to hold together and guide diverse explanations and models of social phenomena (Opp 2013b, p. 344 f.). It remains to be seen how much convergence will result from continued efforts to test and refine these theories and to identify ways of integrating them. This integrative action-theoretic agenda at least motivates such efforts and therefore yields somewhat different research priorities than Hedström's and Ylikoski's plea for pluralism. At the same time, this difference and potential debate does not imply different sociological approaches but should be seen as taking place within a shared explanatory and analytical agenda—united not least by a shared quest for realistic micro-foundations.

Keeping these qualifications and open questions in mind, we want to conclude by quickly pointing out a number of advantages that come with subscribing to a merely epistemological agenda, i.e., an agenda that does not commit a priori to a specific theory of action, theory of social order, and the like.

1. Often detailed data on the determinants of action are not available, making the subscription to a specific formal model of action practically irrelevant. For example, sociological analyses of learning processes often use survey data to test how far actors learn from information in their neighbourhoods, friendship networks, and so on (Matsueda et al. 2006). As these data hardly allow researchers to adjudicate among different models of learning it makes little sense to commit oneself to a particular model, such as rational Bayesian updating. Likewise, Hedström's (2005) analysis of unemployment dynamics distinguishes three different ways in which unemployment among one's peers can affect one's own chances to find a job, but data restrictions do not even allow him to operationalise these different mechanisms. Choosing among different formalised theories of action that would allow further elaboration of these mechanisms might therefore again seem a waste of time. More than that, narrating the causal story in the terminology of rational choice theory would unnecessarily detract attention from the core mechanisms of interest.
2. In many fields of sociological research, the debate about rational choice theories has resulted in a stalemate (see Kroneberg and Kalter 2012). One strategy is to develop integrative theories of action that allow one to integrate key insights from different approaches and that yield new explanations and hypotheses (see, e.g.; Kroneberg et al. 2010). Hedström and Ylikoski's (2014) disinterest in action-theoretic details can be seen as an alternative way to break the stalemate, namely through avoiding the debate altogether. By drawing rough sketches of action-generating mechanisms, the focus directly switches to social dynamics and their structural conditions and consequences.
3. Understood as a plea for other questions, analytical sociology calls for investing in other types of data that allow a study of micro-macro transitions that escape mainstream survey research. A major innovation in this regard is the increasing

collection of longitudinal data on complete networks that offers unprecedented possibilities for testing hypotheses about social mechanisms in more applied fields of sociological research. Given the close relationship between social dynamics and the network on which they take place or which they form, network analysis is a natural choice of method for analytical sociologists. As the actor-oriented statistical models for the co-evolution of networks and behaviour (Snijders 2001) are themselves agent-based simulation models, they can be used to implement the generative models supposed to produce a particular social regularity.

While our article has been led by the intention to recognise the new impulses stemming from analytical sociology, we have also pointed to the danger of a mechanism cult that would unnecessarily limit and divide the longstanding search for social mechanisms. While empirically calibrated ABMs are a major new impulse of analytical sociology and allow researchers to investigate dynamic processes both theoretically and empirically, the choice of this technique should not be ascribed the status of a foundational principle on the same level as subscription to the macro-micro-macro scheme and model building. Rather, choosing from the full toolbox of explanatory/analytical sociology will be crucial for the most important task ahead: to answer key questions in established areas of sociological research. Analytical sociology has in some way codified and intensified a stream of theorising and research that will greatly help us to go beyond the routines of survey data analysis. But the new questions, tools, and data that will grow out of this movement will most likely have to supplement, rather than replace, established methodologies of theory-guided research on the basis of the macro-micro-macro model. Thus, treating the new development as an important impulse to advance an established and so far successful agenda, and neither as a menace nor as a cult, seems to be the most promising way to make progress in sociology.

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## References

- Abbott, Andrew. 2007. Mechanisms and relations. *Sociologica* 2:1–22.
- Berger, Roger. 2013. Altruistische Reziprozität. Theoretische Überlegungen und experimentelle Evidenz. *Kölner Zeitschrift für Soziologie und Sozialpsychologie* 65:31–48.
- Boudon, Raymond. 1986. *Theories of social change: A critical appraisal*. Cambridge: Polity Press.
- Boudon, Raymond. 1998. Limitations of rational choice theory. *American Journal of Sociology* 104:817–828.
- Boudon, Raymond. 2003. Beyond rational choice theory. *Annual Review of Sociology* 29:1–21.
- Boudon, Raymond. 2013. *Sociology as science: An intellectual autobiography*. Oxford: The Bardwell Press.
- Bruch, Elizabeth E., and Robert D. Mare. 2006. Neighborhood choice and neighborhood change. *American Journal of Sociology* 112:667–709.
- Camerer, Colin F. 2003. *Behavioral game theory*. Princeton: University Press.
- Cardona, Andrés. 2013. *The programmatic bias in the discussion on social mechanisms in sociology*. SFB 882 Working Paper Series 23. Bielefeld: DFG Research Center.
- Coleman, James S. 1986. Social theory, social research, and a theory of action. *American Journal of Sociology* 91:1309–1335.
- Coleman, James S. 1990. *Foundations of social theory*. Cambridge: Belknap Press of Harvard University.

- Coleman, James S., Elihu Katz, and Herbert Menzel. 1957. The diffusion of an innovation among physicians. *Sociometry* 20:253–270.
- Demeulenaere, Pierre. 2011. Introduction. In *Analytical sociology and social mechanisms*, ed. Pierre Demeulenaere, 1–30. Cambridge: University Press.
- Diekmann, Andreas. 2010. Analytische Soziologie und Rational Choice. In *Die Analytische Soziologie in der Diskussion*, ed. Thomas Grund and Thomas Kron, 193–204. Wiesbaden: VS Verlag für Sozialwissenschaften.
- Elster, Jon. 1979. *Ulysses and the sirens. Studies in rationality and irrationality*. Cambridge: University Press.
- Elster, Jon. 1989. *Nuts and bolts for the social sciences*. Cambridge: University Press.
- Epstein, Joshua M. 2006. *Generative social science: Studies in agent-based computational modeling*. Princeton: University Press.
- Esser, Hartmut. 1993. *Soziologie. Allgemeine Grundlagen*. Frankfurt a. M.: Campus.
- Esser, Hartmut. 1996. What is wrong with “Variable Sociology”? *European Sociological Review* 12:159–166.
- Esser, Hartmut. 1999. *Soziologie. Spezielle Grundlagen, Band 1: Situationslogik und Handeln*. Frankfurt a. M.: Campus.
- Esser, Hartmut. 2000. *Soziologie. Spezielle Grundlagen, Band 4: Opportunitäten und Restriktionen*. Frankfurt a. M.: Campus.
- Esser, Hartmut. 2009. Rationality and commitment: The model of frame selection and the explanation of normative action. In *Raymond Boudon: A life in sociology, vol. 2, part 2: Toward a general theory of rationality*, ed. Mohamed Cherkaoui and Peter Hamilton, 207–230. Oxford: Bardwell Press.
- Fehr, Ernst, and Herbert Gintis. 2007. Human motivation and social cooperation: Experimental and analytical foundations. *Annual Review of Sociology* 33:43–64.
- Feynman, Richard P., Robert B. Leighton, and Matthew L. Sands. 1963. *The Feynman lectures on physics*. Reading: Addison-Wesley Pub. Co.
- Fodor, Jerry A. 1994. Jerry A. Fodor. In *A companion to the philosophy of mind*, ed. Samuel D. Guttenplan, 300–307. Oxford: Husserl.
- Ganzeboom, Harry, and Siegwart Lindenberg, eds. 1996. *Verklarende sociologie. Opstellen voor Reinhard Wippler*. Amsterdam: Thesis Publishers.
- Gerring, John. 2007. The mechanistic worldview: Thinking inside the box. *British Journal of Political Science* 38:161–179.
- Goldthorpe, John H. 1996. The quantitative analysis of large-scale data-sets and rational action theory: For a sociological alliance. *European Sociological Review* 12:109–126.
- Granovetter, Mark. 1978. Threshold models of collective behavior. *American Journal of Sociology* 83:1420–1443.
- Gross, Neil. 2009. A pragmatist theory of social mechanisms. *American Sociological Review* 74:358–379.
- Gürek, Özgür, Bernd Irlenbusch, and Bettina Rockenbach. 2006. The competitive advantage of sanctioning institutions. *Science* 312:108–111.
- Hedström, Peter. 2005. *Dissecting the social: On the principles of analytical sociology*. Cambridge: University Press.
- Hedström, Peter, and Peter Bearman, eds. 2009a. *The Oxford handbook of analytical sociology*. Oxford: University Press.
- Hedström, Peter, and Peter Bearman. 2009b. What is analytical sociology all about? An introductory essay. In *The Oxford handbook of analytical sociology*, ed. Peter Hedström and Peter Bearman, 3–24. New York: University Press.
- Hedström, Peter, and Richard Swedberg. 1998a. Social mechanism: An introductory essay. In *Social mechanisms. An analytical approach to social theory*, ed. Peter Hedström and Richard Swedberg, 1–30. Cambridge: University Press.
- Hedström, Peter, and Richard Swedberg, eds. 1998b. *Social mechanisms. An analytical approach to social theory*. Cambridge: University Press.
- Hedström, Peter, and Petri Ylikoski. 2010. Causal mechanisms in the social sciences. *Annual Review of Sociology* 36:49–67.
- Hedström, Peter, and Petri Ylikoski. 2014. Analytical sociology and rational-choice theory. In *Analytical sociology: Actions and networks*, ed. Gianluca Manzo, 57–70. New York: Wiley.
- Hempel, Carl G. 1965. *Aspects of scientific explanation and other essays in the philosophy of science*. New York: Free Press.
- Hill, Paul, Frank Kalter, Johannes Kopp, Clemens Kroneberg, and Rainer Schnell, eds. 2009. *Hartmut Essers Erklärende Soziologie: Kontroversen und Perspektiven*. Frankfurt a. M.: Campus.

- Kron, Thomas, and Thomas Grund, eds. 2010. *Die Analytische Soziologie in der Diskussion*. Wiesbaden: VS Verlag für Sozialwissenschaften.
- Kroneberg, Clemens. 2014. Frames, scripts, and variable rationality: An integrative theory of action. In *Analytical sociology: Actions and networks*, ed. Gianluca Manzo, 97–123. New York: Wiley.
- Kroneberg, Clemens, and Frank Kalter. 2012. Rational choice theory and empirical research. Methodological and theoretical contributions in Europe. *Annual Review of Sociology* 38:73–92.
- Kroneberg, Clemens, and Andreas Wimmer. 2012. Struggling over the boundaries of belonging. A formal model of nation building, ethnic closure, and populism. *American Journal of Sociology* 118:176–230.
- Kroneberg, Clemens, Meir Yaish, and Volker Stocké. 2010. Norms and rationality in electoral participation and in the rescue of Jews in WWII: An application of the model of frame selection. *Rationality and Society* 22:3–36.
- Lindenberg, Siegwart. 1977. Individuelle Effekte, kollektive Phänomene und das Problem der Transformation. In *Probleme der Erklärung sozialen Verhaltens*, ed. Klaus Eichner and Werner Habermehl, 46–84. Meisenheim am Glan: Hain.
- Lindenberg, Siegwart. 1981. Erklärung als Modellbau: Zur soziologischen Nutzung von Nutzentheorien. In *Soziologie der Gesellschaft*, ed. Werner Schulte, 20–35. Bremen: Universität.
- Lindenberg, Siegwart. 1983. Zur Kritik an Durkheims Programm für die Soziologie. *Zeitschrift für Soziologie* 12:139–151.
- Lindenberg, Siegwart. 1992. The method of decreasing abstraction. In *Rational choice theory. Advocacy and critique*, ed. James S. Coleman and Thomas J. Fararo, 3–20. Newbury Park: Sage.
- Lindenberg, Siegwart M. 2013. Social rationality, self-regulation, and well-being: The regulatory significance of needs, goals, and the self. In *Handbook of rational choice social research*, ed. Rafael Wittek, Tom Snijders, and Victor Nee, 72–112. Stanford: University Press.
- Little, Daniel. 2012. Analytical sociology and the rest of sociology. *Sociologica* 1:1–47.
- Lizardo, Omar. 2012. Analytical sociology's superfluous revolution. *Sociologica* 1:1–12.
- Macy, Michael, and Andreas Flache. 2009. Social dynamics from the bottom up: Agent-based models of social interaction. In *The Oxford handbook of analytical sociology*, ed. Peter Hedström and Peter Bearman, 245–268. New York: University Press.
- Manzo, Gianluca. 2007. *Comment on Andrew Abbott*. *Sociologica* 2:1–8.
- Manzo, Gianluca. 2010. Analytical sociology and its critics. *European Journal of Sociology* 51:129–170.
- Manzo, Gianluca. 2014. Data, generative models, and mechanisms: More on the principles of analytical sociology. In *Analytical sociology: Actions and networks*, ed. Gianluca Manzo. New York: Wiley.
- Matsueda, Ross L., Derek A. Kreager, and David Huizinga. 2006. Detering delinquents: A rational choice model of theft and violence. *American Sociological Review* 71:95–122.
- Maurer, Andrea, and Michael Schmid, eds. 2010. *Erklärende Soziologie: Grundlagen, Vertreter und Anwendungsfelder eines soziologischen Forschungsprogramms*. Wiesbaden: VS Verlag für Sozialwissenschaften.
- Mayntz, Renate. 2004. Mechanisms in the analysis of social macro-phenomena. *Philosophy of the Social Sciences* 34:237–259.
- McClelland, David. 1961. *The achieving society*. New York: Irvington Publ.
- Opp, Karl-Dieter. 2007. Review of: P. Hedström's *Dissecting the Social*. *European Sociological Review* 23:115–122.
- Opp, Karl-Dieter. 2013a. Rational choice theory, the logic of explanation, middle-range theories and Analytical Sociology: A reply to Gianluca Manzo and Petri Ylikoski. *Social Science Information* 52:394–408.
- Opp, Karl-Dieter. 2013b. What is analytical sociology? Strengths and weaknesses of a new sociological research program. *Social Science Information* 52:329–360.
- Opp, Karl-Dieter. 2014. *Methodologie der Sozialwissenschaften. Einführung in Probleme ihrer Theoriebildung und praktischen Anwendung*. Wiesbaden: Springer VS.
- Osborne, Martin J., and Ariel Rubinstein. 1994. *A course in game theory*. Cambridge: MIT.
- Santorio, Marco. 2012. The whole and the parts. Or: Is analytical sociology analytical enough about sociology, and itself? *Sociologica* 1:1–32.
- Schelling, Thomas C. 1971. Dynamic models of segregation. *Journal of Mathematical Sociology* 1:143–186.
- Siegert, Manuel, and Tobias Roth. 2013. Söhne bevorzugt? Geschlechtsspezifische Unterschiede beim Gymnasialbesuch türkischstämmiger Schülerinnen und Schülern. *Kölner Zeitschrift für Soziologie und Sozialpsychologie* 65:49–72.
- Snijders, Tom A. B. 2001. The statistical evaluation of social network dynamics. *Sociological Methodology* 29:361–395.



- Stegmüller, Wolfgang. 1969. *Probleme und Resultate der Wissenschaftstheorie und der Analytischen Philosophie, Band I*. Heidelberg: Springer.
- Weingartner, Sebastian. 2013. Hochkulturelle Praxis und Frame-Selektion. Ein integrativer Erklärungsansatz des Kulturkonsums. *Kölner Zeitschrift für Soziologie und Sozialpsychologie* 65:3–30.
- Wikström, Per-Olof H. 2014. Why crime happens: A situational action theory. In *Analytical sociology: Actions and networks*, ed. Gianluca Manzo, 74–94. New York: University Press.
- Wippler, Reinhard, and Siegwart Lindenberg. 1987. Collective phenomena and rational choice. In *The Micro-Macro-Link*, ed. Jeffrey C. Alexander, Bernhard Giesen, Richard Münch, and Neil J. Smelser, 135–152. Berkeley: University of California Press.
- Ylikoski, Petri. 2009. The illusion of depth of understanding in science. In *Scientific understanding: Philosophical perspectives*, ed. Henk W. De Regt, Sabina Leonelli, and Kai Eigner, 100–119. Pittsburgh: University of Pittsburgh.
- Ylikoski, Petri. 2013. The (hopefully) last stand of the covering-law theory: A reply to Opp. *Social Science Information* 52:383–393.

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