Book Review

Gianluca Manzo (ed.), *Analytical Sociology: Actions and Networks*, Wiley (ISBN: 978-1-119-94038-8, 448 pages), April 2014

Analytical Sociology: Actions and Networks is a collection of essays in analytical sociology, edited by Gianluca Manzo and developed from presentations at the 2011 conference of the European Network of Analytical Sociologists – since then renamed the International Network of Analytical Sociologists. The originality of the book is its effort both to clarify theoretically what analytical sociology is, and to illustrate concretely how it is applied. A long and thorough introductory essay by the editor sets the stage, outlining defining principles and bringing them together to form a coherent framework of analysis. The remainder of the book consists of two parts, "Actions" and "Networks", themselves sub-divided into chapters, where authors touch on different topics, from witch-hunting in medieval Scotland and lynching in late nineteenth-century Georgia to the role of online networks in the coordination of street protests, same-sex friendships in schools, and discrimination in the labor market. Methods used are predominantly quantitative but unlike most research in sociology, they make relatively little use of statistics and rather resort to a range of state-of-the-art computer simulation and modelling techniques. Despite diversity of topics, research designs and methods, the painstaking effort of the editor to provide an individual one- or two-page introduction to each chapter ensures the overall consistency of the work: the reader never loses sight of the global picture and is always aware of which analytical sociology principles are being "zoomed in" in each chapter.

What is analytical sociology?

It is often difficult to capture the specificity of a field in one single definition, and analytical sociology has particularly struggled to identify itself unambiguously. Manzo characterizes it as the sociological perspective that seeks to formulate systematically, and to test empirically, micro-founded, mechanism-based explanations of complex macro-level patterns (p. 4). He acknowledges that this very wording may raise issues of narrowness (with the focus on mechanisms) and unoriginality (isn't analytical sociology yet another version of rational-choice-based social science?), which critics have indeed stressed. As debates around programmatic statements failed to bring about a clarification, leaving the identity of the field largely undetermined, Manzo quickly leaves them aside to adopt a different, twofold perspective: on the one hand in his own essay, he proposes an understanding of analytical sociology as a general framework of analysis, comprising a combination of founding principles but not reducible to any of them in particular; on the other hand and perhaps more pragmatically, through the contributed chapters he presents to readers a view of *analytical sociology as what analytical sociologists actually do*, as a way to demonstrate the fecundity and applicability of the approach in practice, beyond statements of principle.

At the heart of Manzo's essay is his Figure 1.1 (p. 8) which illustrates how the different principles of analytical sociology can be combined in an ideal-typical research cycle. Starting from conceptual clarification of the objects of interest, the *explanans* as well as the *explanandum* (principle P1), one moves forward to data description (P2) as preliminary preparation, followed by the formulation of a "generative model" (P3). A model aims at identifying an underlying social "mechanism" – defined as a set of properties and activities that trigger change and generate a connection between two or more happenings with some regularity. The model is "generative" insofar as it reproduces the key features of the hypothesized mechanism and produces outcomes that can be compared to observed reality – and in this sense, it differs from more common, variable-based statistical models (see below). The next step is the definition of the elements of the model, grounded on some form of methodological individualism according to which actors and their activities ultimately generate global patterns,

though it is recognized that actors are embedded in relationships and relational structures, which create opportunities and constraints for action (P4a). This involves the definition of logics of action, which may or may not be based on rational-choice theory (P4b), and of interdependencies, such as those related to advantages and disadvantages that ensue from an actor's position in a network – for example their relative centrality, or their possible intermediary position between otherwise separate sub-groups (P4c). The next step (P5) is the design and implementation of an agent-based model, which uses computer simulation techniques to set up, run and test what has been described above as a generative model of a mechanism. Principles P6 and P7 are the analysis of simulated data and the comparison of empirical and simulated data for validation of the model, whether at the level of the actor (micro-data), to inject realism into the basic assumptions of the model, or at the level of the global pattern (macro-data), to ensure the model generates credible systemic predictions; to achieve this, the researcher may need to go back to P2 (to enhance the data description) and possibly to P5 (revising the model in light of results of the data analysis).

The different principles are amenable to an interpretation as steps in the overall research process, though the figure does not systematically include graphical clues to link them sequentially, which makes interpretation somewhat difficult at first sight. For example, an arrow from P6 to P2 signals the need to go back from simulated data (produced at the end of the process) to empirical data (collected at the beginning); but one would have also expected to see arrows from P1 - P2 to P3, linking initial definitions to the formulation of theories and hypotheses. One reason for this is just graphical parsimony – omitting more intuitive or straightforward linkages to emphasize less trivial ones. Another, perhaps more important, reason must be read between the lines: these different principles/steps are not expected to be all concurrently present in any piece of research in analytical sociology, and are rather to be seen as a path of rules that orient research more generally, so that each individual contribution may include only a few, or even just one of them, and refer to the literature for the others – as is the case for most of the chapters that follow. Indeed the figure fully proves its usefulness later on, as Manzo refers to it in each chapter introduction, as a guide to understand its place within the global framework.

With this general background, the reader is led to continuously move back-and-forth from founding principles to applications in a progressive pattern of discovery of the various facets of the field and their "take" on reality. Besides a meta-theoretical chapter on the relationships between rational choice theory and analytical sociology (Hedström and Ylikoski), and a few theoretical chapters such as one on the effects of network structures on social influence and diffusion of behaviors (Rolfe), most contributions are empirical and showcase the potential of analytical sociology principles as applied to the analysis of diverse types of data – from highly informative experimental data (Grossman and Baldassarri; Tákacs et al.) to more classical surveys (Grund; Wikström), also including less structured "big" data retrieved from online services like Twitter (González-Bailón et al.) and gaming (Gabbriellini), and even historical data inevitably marred by gaps and incompleteness (Mitschele). Agent-based modeling is used extensively, but not ubiquitously, indicating that the above principles are to be seen as supple guidelines rather than strict prescriptions – and that the field cannot be subsumed under one preferred method, being instead capable of availing itself of a range of analytical tools, both classical and cutting-edge.

Among the different guiding principles, P4a (micro-level entities), and especially P4b (activities) and P4c (interdependencies) are by far the most often addressed throughout the contributed book chapters. This confirms the importance of the micro level in explanations along analytical sociology lines, where global (systemic) outcomes cannot be made intelligible without an understanding of actors, their actions and interactions. That there must be a theory of action does not mean, though, that all analytical sociologists uncritically and uniformly apply rational choice theory, as they are sometimes accused to do, and as a matter of fact a variety of stances can be found. In this sense, the range of applied work in analytical sociology mirrors the programmatic statements of the founders of

the field and the theoretical and meta-theoretical debates that have accompanied its development over time, very focused on theories of action and choice. This is also the area within analytical sociology that has been most exposed to ambiguities and misunderstandings (for example, with the tendency of many to conflate analytical sociology and rational choice, as discussed by Hedström and Ylikoski) and subjected to criticisms (to an extent, similar to those directed at rational-choice theory).

Networks

If the micro-level is an essential ingredient of analytical sociology and a powerful attractor for both its supporters and its critics, the micro-macro linkages, establishing how the combination of individual independent actions produce regularities observable at the system level, constitute an area of sociology (and of the social sciences in general) that is still poorly understood, and where the contribution of analytical sociology can be substantial.

Social networks are a meso-level that provides elements for a better understanding of the social structures and processes through which individual behaviors feed into collective outcomes – and in turn, provide insight into how the latter are also affected by the former in a recursive process with feedback. About half the chapters in the book are about networks and indeed analytical sociology shares a common lineage with social network analysis (as stated by Hedström and Ylikoski, p. 57). Remarkably, however, the reader will find no passive use and re-use of classical social network analysis in its sociological manifestation – commonly known as SNA – and a noticeably limited amount of references to its founding concepts and literature. Rather, there is a creative and at times, somewhat metaphorical use of the network notion, borrowing techniques and concepts from game theory, physics and computer science, and preferring the computer simulation of networks through agent-based models to SNA's traditional tools.

One reason for this arguably resides in the limitations of classical SNA, which is mostly a descriptive approach based on metrics that capture empirical properties of network data such as their degree of sparseness, the extent to which one or a few actors control a sizeable proportion of network ties, the fragmentation of the network into sub-groups. While helpful as a first step, these measures are insufficient to build explanatory statements amenable to generalization beyond the specific dataset collected – such as those that analytical sociologists aim to build.

It is a little surprising, though, that recent developments in network analysis that endeavor to overcome these limitations do not figure more prominently in the research featured in the book. Moving away from its descriptive roots, today's networks research is indeed developing models to explain the formation of networks, their dynamics, and the co-evolution of networks and behaviors. Adapted to account for the dependency inherent in network data, the techniques of inferential statistics now enable to draw generalizations from sample observations, to test hypotheses, and to predict the evolution of the relations between network properties. Exponential random graph models (ERGM) and stochastic actor-based models (SAOM), are the most widely used tools in this respect, with SAOM sharing important conceptual features with agent-based models in terms of its emphasis on individual-level choices and its dynamic perspective with feedback. Another frontier area today is multi-level network modeling, best suited to jointly capture the effects of environmental factors together with actor-based choices, in view of representing more accurately micro-macro linkages through a sub-division into micro-meso (actor-network) and meso-macro (network-system) transitions. While the founding principles of these models are occasionally briefly mentioned in the book (for example in Grund's chapter, pp. 301-302), they offer yet unexploited methodological resources that might benefit the future development of analytical sociology.

Causality and mechanisms

Mechanism-based explanation is a major tenant of analytical sociology. It is not to evoke any sort of determinism that this notion is employed, but to move beyond variable-based explanation, common to much quantitative sociology. An explanation, analytical sociologists contend, cannot be content with establishing associations between a social phenomenon of interest *y* and the factors *x* that are present when *y* is observed; rather, one should "open up the black box" and reveal the full chain of connections that, from a change in *x*, trigger further changes step by step, ultimately generating a modification in *y*. In this sense, a mechanism-based explanation is inevitably causal. Manzo illustrates it with the metaphor of reverse engineering, whereby the researcher explains a phenomenon by creating copies of it. This is where agent-based modeling comes in handy: the researcher gets insight into the chain of links that underpin the functioning of a social object by crafting an artificial, *in silico* version of it, and mimicking its operations by simulation.

Manzo makes no mystery of his strong preference for agent-based models over multivariate statistics, the method most often used in variable-based approaches. Whilst other contributors to the book continue to use statistics, he does not see this diversity as an inconsistency but rather as a healthy opportunity to stimulate further reflection (p. 421). But perhaps the opposition between statistics and computer simulation is somewhat misleading, as the real issue is situated at research design level, not at methods level. In itself, a statistical tool such as a regression can only uncover causal linkages loosely – establishing an association between *x* and *y* given some other (observable) factors *z*. But the power of statistics fully unfolds when it is integrated into an overarching empirical strategy that imposes stricter controls onto the confounding (observable *and* non-observable) *z* factors so that the *ceteris paribus* condition applies, and the linkage between *x* and *y* can be identified in isolation from other factors. This is what happens in experimental or quasi-experimental designs, where the statistical analysis of ensuing data can support causal statements. It is not a matter of rejecting statistics, then, but of moving beyond naïve uses of it, and towards a more encompassing approach. In this respect, it is no coincidence that experimental approaches are favored by a number of analytical sociologists (see for example Grossman and Baldassarri's chapter).

Agent-based simulations can also be thought of in experimental terms – they can be defined as experiments performed on a model, rather than directly on the object of study. By changing the values of parameters, one by one and with all other things equal (*ceteris paribus*), it appears how the phenomenon of interest is generated and how changes in assumptions and initial conditions affect outcomes. The dependencies that arise from different sets of conditions are brought to light, and conclusions can be drawn on the basis of this knowledge. In this sense, users of agent-based simulation and of "advanced" statistics as defined above share a common quest for more rigorous causal reasoning to move beyond the limitations of older, "naïve" quantification.

Notwithstanding, it must be acknowledged that agent-based modeling has advantages that particularly suit analytical sociology. While statistics requires large sets of high-quality empirical data, all the more so as it is embedded in a solid empirical strategy in view of establishing causal relationships, agent-based modeling can be informed by less complete datasets and even by qualitative fieldwork, in that simulated data constitute a complement to real-world data and enable to generalize conclusions derived from it. Agent-based modeling can be fruitfully applied when experiments or even surveys would be prohibitively costly, when the population under study is hidden and difficult to reach (for example, owing to marginalization, stigma or deviance), or extinct (for example, in historical studies). It can also be used as a guide for policy-making, simulating possible policy interventions on the computer to substitute for tests in the field that may be unfeasible. In this sense, agent-based modeling offers a powerful tool to explore the applicability, and develop the potential, of analytical sociology in regard to a variety of study objects, including those that more traditional quantitative sociology was hardly able to penetrate.

The way forward

In his concluding remarks (pp. 420 – 426), Manzo submits that analytical sociology is inducing a range of problem shifts in sociology, among other things by promoting a more explanatory way of analyzing social facts, and by englobing state-of-the-art methods and tools such as agent-based models which were previously used only in computer science and physics. The essays contained in the book are evidence of these changes and showcase their potential for further development. They convincingly demonstrate that analytical sociology is acquiring scientific maturity and offer a different, newer perspective on its identity after almost a decade of experience (p. 420).

Directions for further developments that emerge throughout the book are centered on the two pillars of analytical sociology, to which the first and second sets of chapters are dedicated – "actions" and "networks". On the one hand, theories of action and a firm anchoring in the individualistic tradition will undoubtedly remain at the core of analytical sociology, though the filiation from rational choice theory will likely appear more tenuous as bounded rationality approaches finally gain ground. On the other hand, the "networks" dimension has potential to gain in relevance and bring a substantial, much needed contribution to a better understanding of micro-meso-macro linkages. As discussed, dialogue with cutting-edge network science would significantly benefit this process.

Future developments, it can be added, will involve some re-thinking of the positioning of analytical sociology relative to other, more classical traditions within the discipline. While the relationship between analytical sociology and standard quantitative sociology is not an easy one, with vocal criticisms of the former towards the latter, this gap could shrink if more explicitly causal, model-based approaches to use of statistics gain broad popularity in sociology. Conversely, if the formal apparatus of analytical sociology may seem removed from qualitative research, agent-based modeling provides a possible linkage between the two insofar as qualitative data can be used to inform simulations, thereby broadening the reach of analytical sociology, as discussed above.

The relationships of analytical sociology towards other disciplines will also be increasingly important, to the extent that agent-based modeling principles, techniques, and software have been largely developed outside of sociology, notably in computer science, physics, and biology. Despite the obvious gains from cross-disciplinary exchanges, a major challenge is the difficulty to translate the borrowed materials into sociological language – that is, into constructs, ideas and notions that fit with sociological theories and can be used to confirm them, to extend their applicability, or to disprove them. Although analytical sociologists have been remarkably successful in achieving this goal so far, issues will continue to arise.

Finally, it is worth mentioning practical barriers to the development of analytical sociology. A noticeable competence gap separates a minority of highly numerate modelers from a large majority of colleagues trained only in basic statistics or in qualitative, humanities-oriented and fieldwork-based methods. The development of analytical sociology requires significant investments in methodological training for students and early-career researchers, as well as improved dialogue across approaches and specialisms. Yet the material conditions for scholarly activity – access to academic jobs, funding and publication opportunities – are based on traditions that do not always favor innovation. What's more, material and practical differences are often accompanied by a form of cultural dissonance between modelers and non-modelers, which slows down progress and hinders collaboration. Analytical sociology will not blossom unless these bottlenecks are resolved.

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