Boudon Reexamined

Nuts and Bolts for Contemporary Sociological Science

Gianluca Manzo (Ed.)

SORBONNE UNIVERSITÉ PRESSES

L'intelligence du social

Boudon Reexamined presents a selection of short essays by leading scholars from several generations who critically engage and enter into dialogue with the work of Raymond Boudon. Each chapter focuses on a specific topic from his extensive writings. Readers will follow this intellectual trajectory through analyses of early correspondence with Lazarsfeld and Merton, his typology of sociological styles, and his contributions to contemporary analytical sociology, including the notion of middle-range theory. In addition to already well-discussed aspects of Boudon's work, namely his understanding of methodological individualism and the theory of ordinary rationality, the book also explores less frequently discussed topics, including his early interest in formal modeling in sociology and his understanding of the link between interdependence structures and social change. Included in the following pages are new assessments of Boudon's well-known analyses of the inequality of educational opportunity and intergenerational social mobility, as well as his lesser-known substantive contributions to the study of relative deprivation and his early dialogue with game theory. The book also outlines Boudon's study of classical authors, especially Tocqueville, before two final chapters conclude by examining how Boudon's works can be used to teach sociology at the undergraduate and master's levels. Our hope is that *Boudon Reexamined* provides readers with a fresh assessment of his legacy – how his work can be applied to conduct theoretical and empirical research in contemporary sociology, as well as to promote high-quality scientific standards for new generations.

Gianluca Manzo is Professor of Sociology at Sorbonne University and a Fellow of the European Academy of Sociology. His research applies computational models and social network analysis to the study of social stratification and diffusion dynamics. He is the author of *La Spirale des inégalités* (PUPS, 2009) and of *Agent-based Models and Causal Inference* (Wiley, 2022). He also edited *Analytical Sociology: Actions and Networks* (Wiley, 2014) and the *Research Handbook on Analytical Sociology* (Edward Elgar, 2021). More information is available on his webpage: www.gemass.fr/member/manzo-gianluca/.

FONDATION SIMONE ET CINO DEL DUCA INSTITUT DE FRANCE 1975

sup.sorbonne-universite.fr

Chapter 6

Formal Models in Raymond Boudon's Work

—

Lucas Sage

ISBN : 979-10-231-5273-9

L'intelligence du social

Book series directed by Pierre Demeulenaere

The great books of the sociological tradition are either works of theory and epistemology or empirical studies structured by a profound theoretical or epistemological reflection. Émile Durkheim's first three books, *The Division of Labour in Society*, *The Rules of Sociological Method*, and *Suicide*, each fall into one of these three categories. This heritage represents an impressive growing legacy of authors and works that foster an understanding of social life through the formation of new concepts, models, and interpretations, thereby providing a pathway to deciphering the thickness and chaotic nature of human societies.

Gianluca Manzo (Ed.)

Boudon Reexamined

Nuts and Bolts for Contemporary Sociological Science

SORBONNE UNIVERSITÉ PRESSES
Paris

With the support of Sorbonne University
and of the Fondation Simone et Cino Del Duca – Institut de France.

Sorbonne Université Presses is the publishing house of Sorbonne University,
affiliated with the Faculty of Arts and Humanities.

Print version ISBN: 979-10-231-4019-4
Epub ISBN: 979-10-231-4587-8
Full pdf ISBN: 979-10-231-4588-5

Page layout: Laurent Tournier
PDF: Emmanuel Marc Dubois/3d2s

SUP
Maison de la Recherche
Sorbonne Université
28, rue Serpente
75006 Paris - France

Phone: 33 (0)1 53 10 57 60

sup@sorbonne-universite.fr
< sup.sorbonne-universite.fr >

TABLE OF CONTENTS

PART IV
RELATIVE DEPRIVATION, GAME THEORY AND SOCIAL INTERDEPENDENCY

PART V
METHODOLOGICAL INDIVIDUALISM AND RATIONALITY

PART VI
TRAINING THE NEW GENERATION

CHAPTER VI

FORMAL MODELS IN RAYMOND BOUDON'S WORK

Lucas Sage
Toulouse School of Economics, Université Toulouse Capitole, France

This chapter discusses Raymond Boudon's use of formal models in sociological research. By formal model, I refer to models that are not statistical, such as computer simulations and game theory. To the best of my knowledge, Boudon fully developed and systematically analyzed formal models in three pieces of work. Each model is of a different type. In chronological order, they include a computer simulation (Davidovitch and Boudon 1964), a numerical simulation (Boudon 1974, chs. 4, 6), and a game theoretical model (Boudon 1977, ch. 5). The first part of this chapter describes and summarizes these three models. The second part analyzes the originality and strengths of Boudon's approach. The final section discusses its limitations and proposes ways to address them.

A few preliminary remarks are necessary. Mathematics, statistics, and simulations are deeply interconnected in Boudon's work. However, I will focus primarily on simulation models because they align more closely with my personal interests. Another reason for this emphasis is that other contributions to this book explore his game-theoretical and statistical models in greater depth. This chapter reflects my perspective, but it does not intend to be exhaustive, and other insights could complement it. Finally, beyond the works where Boudon applied formal modeling, I will draw on his writings discussing the epistemology of these models.

FORMAL MODELS FOR EXPLANATORY SOCIOLOGY

CASE 1: ABANDONMENT OF LEGAL PROCEEDINGS

Davidovitch and Boudon's (1964) article presents a simulation model analyzing the mechanisms behind the abandonment of legal proceedings in the

Funding from the French Agence Nationale de la Recherche (under the Investissement d'Avenir Programme, ANR-17-EURE-0010) is gratefully acknowledged.

French judicial system between 1879 and 1931. The study explains variations in abandonment rates by examining the interplay between judicial capacity, crime characteristics, and magistrates' decision-making processes. The model is built around two key decision criteria for magistrates: the likelihood of a case leading to conviction and the perceived gravity of the offense. The likelihood of a case leading to conviction (success) is determined by factors such as the availability of evidence, the identifiability of the perpetrator, and the feasibility of proving the offense. The gravity of an offense is defined as the extent of social harm it causes, which Boudon quantifies using the actual penalties imposed in historical cases, such as fines or prison sentences.

Judicial capacity is central to the model, as the system's ability to process cases is constrained and does not scale proportionally with reported crimes. Thresholds based on the likelihood of success and gravity determine which cases are pursued, with those falling below the thresholds classified as abandoned. These thresholds are adjusted annually in response to changes in crime rates and workload.

The model also takes into account the frequency and gravity of offenses. It posits that offenses considered more frequent in the judicial caseload or more severe in their social consequences influence magistrates' evaluations of which cases to pursue. For example, offenses with higher gravity may be prioritized even if their likelihood of success is relatively low. Conversely, offenses that are frequent and less socially harmful are more likely to be abandoned when resources are limited.

The model uses two main parameters: one representing the weight of offense severity and another representing offense frequency. These parameters are estimated by minimizing the distance between simulated outcomes and empirical data. The results of the simulation align closely with historical data, reproducing observed patterns of abandonment rates for different offense types over time. Boudon demonstrates that the increasing rates of abandonment can be attributed to rising crime volumes combined with relatively stable judicial resources.

From a technical perspective, it is worth noting that Boudon in Appendix III (Davidovitch and Boudon 1964, pp. 240-244) gives some details about the algorithm he encoded in the programming language Fortran. One can see the different decisions that the hypothetical judge has to take in different conditions. In this sense, the model is studied at the individual level, and one could say that the method used is *algorithm-based*.

CASE 2: EDUCATION OPPORTUNITY AND SOCIAL INEQUALITY

In Education, Opportunity, and Social Inequality (Boudon 1974), Boudon constructs two models to analyze the relationship between education and social inequality. The first model examines how social origins influence educational achievement. Boudon distinguishes between primary and secondary effects of social origins. Primary effects are differences in academic performance influenced by family background factors, such as linguistic skills, cognitive development, and learning support, which favor children from higher socioeconomic backgrounds. Secondary effects occur when children with equivalent academic results make different educational choices based on their social origins. This is explained through mechanisms such as opportunity cost, where continuing education imposes a heavier financial burden on lower-income families, and reference group effects, where aspirations are shaped by norms typical of one's social environment. Together, these effects generate educational inequalities.

The second model focuses on how educational credentials are converted into occupational positions. The labor market is modeled as a queuing system with a dominance effect: individuals with higher educational qualifications are prioritized, and among those with equal qualifications, individuals from higher social origins have an advantage. The labor market has a finite number of hierarchically ranked positions. As access to education expands, the supply of highly educated individuals increases, but the number of high-status positions does not follow. Consequently, the absolute value of educational credentials decreases, while their relative value remains.

In the first model, Boudon obtains fictitious educational credential distributions by multiplying an educational achievement distribution with a distribution of survival chances at each bifurcation point – both being dependent on social class of origin. He proceeds in a similar fashion in the second model, where he uses educational credential distributions obtained in the first model and allocates this in a distribution of social positions. Again, he creates a probability distribution of obtaining the different positions as a function of the educational credential and the social class of origin (reflecting the dominance effect). Positions in the top category are filled first until there is no more space, and the second-highest positions are opened, and so on.

It is worth noting that, although the model is formulated at the individual level, it is analyzed at a higher level of aggregation: the group level (Manzo 2014). The transition from one distribution to another does not require going down to the individual level; thus, one could qualify the method used to analyze this model as *distribution-based*.

CASE 3: THE LOGIC OF RELATIVE FRUSTRATION

Boudon's model of relative frustration (Boudon 1977, ch. 5, Boudon 1979) explains how competition generates dissatisfaction using a lottery framework. The model assumes a limited number of rewards, with the probability of winning decreasing as more participants enter, as winners are chosen randomly from the participants.

Boudon compares two scenarios. In the first scenario, there are many winners, and the expected gains from participating always exceed those from abstaining, making participation the dominant and rational strategy. This leads to universal participation, with more winners but also more losers. These losers, who rationally chose to play, are assumed to experience significant frustration. In the second scenario, there are fewer winners, and the expected gains from playing and not playing are equal. Without a dominant strategy, individuals decide randomly, leading to about half the group participating. This scenario results in fewer winners and losers, and less frustration among losers, as their decisions were based on randomness in the absence of a dominant strategy.

The model shows that situations with more winners and participants can paradoxically generate greater frustration among losers compared to those with fewer winners and lower participation, a phenomenon observable in various historical contexts according to Boudon.

To study the model, Boudon identifies the conditions under which the model is able to produce the paradoxical outcome he is interested in. From a methodological point of view, it is a game theoretical model where the mathematical analyses are mixed with some specific numeric examples.

STRENGTHS OF BOUDON'S MODELING APPROACH

FORMAL MODELS AS A TOOL FOR EXPLANATORY SOCIOLOGY

Boudon employed three distinct modeling techniques, which I have labeled algorithm-based, distribution-based, and game-theory. The trajectory of his work is noteworthy. His first formal model was closely tied to empirical data, involving parameter estimation by minimizing the distance between simulated and observed data. For a project conducted in the 1960s, this approach was ambitious given the technical limitations. The explanandum was specific and concrete. In his second application (Boudon 1974), while still engaging with empirical data, Boudon aimed for a higher level of abstraction. As he explained later in his debate with Hauser (Boudon 1976), the model was not intended to fit a particular data set or replicate a specific situation. Technically,

the models were simple numerical simulations. The goal was to reflect general characteristics of educational systems and labor markets, providing an abstract explanation for common empirical patterns. The last application is even more abstract (Boudon 1977, ch. 5, Boudon 1979). The model aimed to explain qualitative patterns drawn from sociological literature, particularly Tocqueville and Stouffer. It sought to capture shared features across disparate concrete situations, such as pre-1789 France and the US police and military forces in the 20th century. The explanandum was qualitative, and the game-theoretical structure served to generalize insights across cases. Whether the paradox Boudon addressed actually exists has been debated (Berger and Diekmann 2015).

In my opinion, this shows that Boudon's use of formal models was instrumental: he selected modeling techniques based on the specific purpose of each study rather than adhering to a single type. In this sense, Boudon was more pragmatic than dogmatic, and it probably reflects the idea that a model's value depends on its purpose. Boudon's trajectory moved from concrete models explaining specific phenomena to more abstract models applicable across multiple contexts. However, common to all applications is Boudon's view of formal models as tools for explaining puzzling social phenomena. Two words are central here: puzzling and explaining. He championed sociology as an explanatory science, contrasting it with descriptive, critical, or expressive forms of sociology (Boudon 2002). Yet, he recognized the foundational role of descriptive sociology, evident in his careful engagement with literature and empirical data sets in his first two applications. He treated statistical and formal models as complementary, with statistical models aiding description and formal models providing generative explanations: "We must go beyond the statistical relationships to explore the generative mechanisms responsible for them. This direction has a name: theory. And a goal: understanding" (Boudon 1976). Boudon also emphasized the importance of addressing puzzling and intriguing topics which do not always have an immediately apparent explanation. His selected topics – relative frustration, social inequality and mobility, and judicial processes – demonstrate his interest for significant and challenging sociological questions.

FORMAL MODELS AS A COUNTERFACTUAL TOOL

One of the strengths of Boudon's approach is to use formal models as a counterfactual tool. To illustrate this, let us revisit his first model from Boudon (1974). As discussed earlier, the model identifies two channels through which social origin affects students' educational attainment: the primary effect, which

directly influences academic performance, and the secondary effect, where students from different social backgrounds but with equal academic results have unequal probabilities of continuing their studies. While these effects can be statistically estimated, Boudon's model allows for the quantification of their macro-level consequences, something hard to achieve given the dynamic nature of the inequality-generating process.

Notably, Boudon simulates a scenario in which the primary effect is eliminated and demonstrates that significant inequalities in educational attainment would persist. The simulation highlights the dynamic nature of the secondary effect: unlike the primary effect, which occurs only once, the secondary effect operates at multiple bifurcation points in the educational system. This repeated operation leads to multiplicative consequences, amplifying inequalities over time.

The strength of this method lies in its ability to manipulate generative mechanisms – defined as entities, activities, and their interactions in a dynamic system – within the model (although I will stress below that interactions are largely missing in Boudon's work). Assuming the model accurately captures the essential components of the real-world system, one can isolate and deactivate specific mechanisms to study their macro-level impact. This allows Boudon to conclude that erasing the primary effect alone would not resolve educational inequalities.

As I have argued elsewhere (Sage 2022), this approach represents a distinct form of counterfactual reasoning from the notion of counterfactuals used in statistical literature and the potential outcome framework (Morgan and Winship 2014). To understand why, let us assume the existence of a 'true' model that is responsible for the real-world phenomenon we want to study. Let us refer to this as the real-world data-generating process, composed of a set of mechanisms. Now, if we believe that: first, individuals are interdependent because they interact, share information, and influence each other; and, second, that they react to changes in their environment, then we admit that the mechanisms' effects are interdependent: changing the strength of one will change the effects of others. Crucially, this means that the relationships between variables are not fixed but are themselves the product of a dynamic process. When one element in an interconnected system changes, it doesn't just have a direct effect – it ripples through the system and changes how other elements relate to each other. The empirical data and the relationships between variables that they contain are only one realization of the real-world data-generating process, at one point of the true parameter space. Thus, one understands that the interdependence of the mechanisms poses fundamental challenges to the potential outcome approach to counterfactual reasoning

which amounts to asking "What would happen if we had changed X in the system?" To overcome this issue, the potential outcome framework proposes to leverage exogenous variations that submit some individuals to the change (also called the treatment) of interest and not others, and then to compare the average outcome of the two groups, with the underlying assumption that everything else remains constant. Certain formal models (that I will detail below) can offer another possibility: explicitly mimicking the generative mechanisms purported to be at play in the real-world data-generating process with its interdependencies, to then intervene on the system and derive the consequences. This alternative approach directly models the interdependent mechanisms rather than trying to work around them. Boudon's counterfactuals are a first attempt in this direction (for a deeper discussion of the different understandings of mechanisms, see Manzo 2022, ch. 1).

OVERCOMING THE "GENERATIVE SUFFICIENCY IS NOT SUFFICIENT" CRITIC

A major problem that formal models face is the question of their external validity. How can we ensure that what occurs in the model reflects aspects of the real-world data-generating process? A frequent critique faced by formal modelers is captured by the statement: "generative sufficiency is not sufficient"[1] (León-Medina 2017). In other words, how can we establish that the mechanisms within the model resemble those in the real-world system the model aims to mimic? Critics argue that modelers can freely adjust their models to produce the desired outcomes, unlike statistical methods, which are more constrained by externally given data and the relationships between variables within it. This is a significant critique, and although Boudon did not explicitly address the degree of similarity between a model's mechanisms and real-world mechanisms, his work offers some answers to mitigate this critique. Boudon emphasizes building models with micro-level behavioral assumptions that are plausible and grounded in existing knowledge. This involves injecting as much accumulated empirical and theoretical knowledge as possible into the model. It is not the model's role to prove the existence of its mechanisms; rather, it is the modeler's responsibility to draw on the existing literature and evidence.

1 I here quote León-Medina (2017) because he coined this expression. However, the point he actually makes is rather different: he insists on the necessity to understand the way in which an agent-based model produces the outcome of interest, that is to understand its internal dynamic. However, my point is more that several models with a diversity of mechanisms can produce the same outcome, and that the question is about understanding which mechanisms were actually at play in producing the outcome in the real world.

Boudon (1974) and Davidovitch and Boudon (1964) exemplify this approach. In both cases, the authors engage deeply with their subject matter, discussing expert knowledge and carefully analyzing empirical data before proceeding to simulation. For example, Boudon (1974) discusses mechanisms responsible for primary and secondary effects in depth, and reviews multiple sources of evidence and literature that support them. Similarly, in the article on legal proceedings, Boudon explicitly states his assumptions about the behavior of magistrates and the context, showing how these assumptions are incorporated in the model.

Boudon's clarity and transparency in model construction are exemplary. He begins by articulating and justifying the assumptions, proceeds to their formal representation in the model, and then examines their dynamic interactions. This meticulous process ensures the plausibility of the mechanisms modeled and enhances the credibility of their results.

Overall Boudon's work offers several lessons that remain relevant today: formal models can illuminate important and puzzling topics by formally modelling their underlying mechanisms. Interdependencies between model mechanisms should be taken into account for models to serve as counterfactual tools. Empirical and expert knowledge should inform the selection of mechanisms.

LIMITATIONS

INTERACTIONS VS. INTERDEPENDENCE

After having stressed the strengths of Boudon's approach to formal models, I would now like to turn to some of its blind spots. A key interest in Boudon's second (Boudon 1974) and third (Boudon 1977) formal models lies in their ability to generate unintended emergent effects, or composition effects as Boudon called them. Composition effects occupy a central place in Boudon's work (Boudon 1977, 1981) and they can be defined as macro-level consequences of individual actions that no single individual intended or desired to create. In this section, I would like to point out that Boudon only considered one form of composition effects deriving from broad interdependence between individuals and disregarded composition effects stemming from local interaction structure. In Boudon's 1974 model, which examines the link between the distribution of diplomas and occupations, interdependence arises because the occupational structure is predefined, meaning there are not enough positions for everyone. Similarly, in the relative frustration model, the number of winners is exogenously fixed. In both cases, rewards are limited,

which is what creates the interdependence: an individual's chances of obtaining a reward depend on how many others succeed or fail. All individuals' outcomes are interconnected in this sense.

However, another form of interdependence is absent from Boudon's models: local interdependencies. This notion can be illustrated using Schelling's model of residential segregation (Schelling 1971). In this model, individuals of two ethnic groups are distributed randomly on a grid. Each individual is content with their location, so long as a certain proportion of their direct neighbors belong to the same group. If this condition is unmet, then they move to a vacant spot. Patterns of segregation emerge even when individuals have mild preferences for diversity. This is caused by the following phenomenon: although most agents are originally satisfied, it is always the case that, by chance, a few agents will find themselves in a neighborhood with an overrepresentation of out-group members. Those agents will thus be unsatisfied and move. Yet, by doing so, they change the ethnic composition of the neighborhood they leave as well as the one they move to. This can make agents living in their previous and new neighborhoods passing from originally satisfied to dissatisfied because of the change in ethnic compositions. The new and old neighbors can, in response to these changes, move again, changing even more neighborhoods compositions and so on. The cascade toward high levels of segregation is inevitable, even though nobody desired it, and agents could have been equally satisfied in a non-segregated world.

This phenomenon highlights an important difference: the composition effect in Schelling's model is not due to limited rewards, as there exist configurations where everyone could be satisfied, and yet there would be no segregation. Instead, the composition effect is due to local interdependencies. If agents considered the entire grid's ethnic composition rather than their local neighborhood, a cascade towards segregation would not arise. Local interactions, not scarcity, drive the emergent effects.

It is interesting to compare Boudon and Schelling, as they were contemporaries, and Boudon was aware of Schelling's work. In his response to Hauser, Boudon compared his approach to Schelling's (Boudon 1976): "My purpose in this respect was similar to Schelling's: to show that equalization of opportunity does not necessarily mean equalization of results in an ideal-typical world, one reduced to some basic mechanisms similar to those which can be observed in the real one." He also cited Schelling's model as a typical example of a composition effect (Boudon 1981, ch. 4). However, Boudon did not appear to recognize the difference between the sources of composition effects in the two models. He seemed less concerned with the local structure of agent interactions, as social networks are absent from his work. In a late

article, he even noted: "Networks are today a popular topic of sociological research. However, they are often treated in a merely descriptive or mechanical fashion, while a connection with the theory of ordinary rationality would make network research more fruitful, as many classical and modern sociological works suggest" (Boudon 2012).

This is surprising because early in his career, Boudon (1965), in an article derived from his doctoral dissertation, highlighted the potential of computer simulations to make mathematical models more realistic. He specifically mentioned diffusion models, noting that simulations could replace the assumption of random encounters with more realistic interaction structures, referencing Hägerstrand (1965). This is a crucial point: compared to mathematical models, simulations allow researchers to relax simplifying assumptions and move toward greater realism, but Boudon did not implement this possibility himself.

WHERE ARE THE INDIVIDUALS AND HOW DO THEY ACT IN BOUDON'S MODELS?

In the second part of his career, Boudon moved away from formal modeling and focused on developing a theory of action consistent with his version of methodological individualism (MI), which he called "cognitive" or "ordinary rationality" (Boudon 1998, 2012). Boudon's MI principles can be summarized into two key points: first, aggregate phenomena must be explained as the product of individual actions; and second, individuals act based on subjective "good reasons" that can be shaped by their context. It is instructive to assess whether Boudon's formal models adhere to these principles.

Boudon's game-theoretic model of relative frustration (Boudon 1977, ch. 5, Boudon 1979) incorporates individual behaviors through a representative agent, but it employs a narrow definition of rationality, focusing on dominant strategies with higher expected payoffs.

In Davidovitch and Boudon (1964), the presence of individual actors is less clear. One could argue that the model implicitly includes a representative judge making decisions for the entire system. The decision-making rules incorporate forms of good reasons, as the model allows the representative judge to adjust decisions based on changes in context, such as an increase in case volume.

In his most influential work (Boudon 1974) the models are formulated at the individual level but are analyzed at the aggregate level of groups, as noted by Manzo (2014). The primary and secondary effects described in the model are not mechanisms themselves but outcomes of underlying mechanisms. For instance, the secondary effect arises because families from different socio-

economic backgrounds evaluate education differently and have unequal resources. These mechanisms are condensed into probabilities of educational transitions, which serve as the only explicit behavioral rule in the model. Actions are highly abstracted and do not explicitly represent the decision-making processes or reasons behind them.

One could argue, provocatively, that the explanatory power of Boudon's second model in Education, Opportunity, and Social Inequality (1974) stems more from its structure – where individuals are represented as marbles moving into boxes with limited spaces – than from individual actions or their reasons. The explanation relies on systemic constraints, such as the dominance principle and the predefined number of spaces, rather than emergent phenomena from individual interrelations. In essence, actors are moved by external rules rather than acting themselves.

This abstraction affects the robustness of conclusions drawn from counterfactual scenarios. In an interdependent system, changes to the rules of the game, such as altering the number of educational transition points, would likely cause agents to adapt their behaviors differently based on their socio-economic backgrounds. This adaptation, absent from the model, limits the reliability of its counterfactual predictions.

Boudon, a careful student of classical sociologists, often highlighted the gap between Durkheim's methodological recommendation to "explain the social by the social" (Durkheim 1982) and Durkheim's actual practice, which Boudon saw as a precursor to MI. To some extent, the same critique applies to Boudon's formal models: they do not always align with the principles of MI he advocated. More precisely, although they are sometimes formulated at the actor level and conform with ordinary rationality principles, the analyses of the model move on to another level where actors are no longer explicitly present.

DISCUSSION

Boudon is widely regarded as a pioneer of analytical sociology and modern sociological science (Goldthorpe 2021). According to Goldthorpe, Boudon once declared having the feeling of having written only one book (Goldthorpe 2021, ch. 9). While there is an undeniable continuity in his oeuvre, it is reasonable to divide his career into two phases. In the first, Boudon developed influential formal models that earned him international recognition. In the second, he focused on establishing the principles of his version of MI and his theory of ordinary rationality, which he saw as intrinsically linked. Unfortunately, Boudon abandoned formal modeling during this later period. As I have argued, none of his earlier formal models fully aligned with the

MI framework he later championed. Boudon never achieved a synthesis between his early work as a modeler and his later theoretical developments in ordinary rationality.

Interestingly, Boudon (1965) had early insights into the potential of realistic simulation models for quasi-experimentation, or counterfactual analysis. A model that incorporates agents' cognitive decision-making processes could allow for adaptive agents who react dynamically to changes in the game's rules. Boudon's theory of ordinary rationality could serve as a foundation for modeling such behaviors. While some scholars doubt the feasibility of a predictive and useful theory of individual action (Hedström 2021; Watts 2014), advocating for influence-response functions instead of cognitive models (Lopez-Pintado and Watts 2008, for a critical response to these ideas (see, e.g., Opp 2024), Boudon believed ordinary rationality could fulfill this role, but never fully integrated it into his models. Adding locally structured interactions within realistic social networks to these models would also further enhance their power as quasi-experimental tools.

Agent-Based Models (ABMs) offer a promising avenue for achieving this synthesis. ABMs' flexibility and capacity to model diverse behaviors make them ideal for integrating Boudon's theory of action into individual-based models with local interactions. Unfortunately, Boudon neglected ABMs, just as he overlooked the distinction between composition effects stemming from global interdependencies and those arising from local interactions. This neglect is surprising given his early familiarity with ABMs. Boudon referenced Hägerstrand (1965) and Schelling (1971) in his early work (Boudon 1965, 1976) and developed a sophisticated simulation in Davidovitch and Boudon (1964).

Boudon's lack of interest in ABM is evident in his discussion of Manzo's (2009) ABM of educational inequalities. Boudon (2010) mentions Manzo's work as merely adding a social network component and a France-Italy comparison to his own model. He fails to recognize that Manzo's ABM moved beyond mere technical refinements. Thanks to the ABM approach, in Manzo's work, the micro-mechanisms are modeled at the level of the actors themselves – actors who can be heterogeneous, proceed to cost-opportunity calculations, make autonomous decisions, and influence each other. In other words, the probabilities of transitioning at various bifurcation points emerge endogenously, unlike the exogenously set probabilities in his own model. The lack of interest for ABMs is revealed in Boudon's (2012) critical assessment on the development of analytical sociology: "I have the impression, though, that the handbooks on 'analytical sociology' insist on secondary technical details and fail to clearly identify the common paradigm that underlies many

illuminating sociological works [...]" (Boudon 2012). He categorized ABMs as such secondary details, which is surprising for someone who ardently advocated for MI.[2] It is interesting to note that unlike Boudon, Tom Fararo, another pioneer of analytical sociology from the same generation, recognized the methodological value of ABMs, and did this even before the analytical sociology movement popularized their potential (Manzo 2024).

REFERENCES

Berger J. and Diekmann A., 2015, "The Logic of Relative Frustration: Boudon's Competition Model and Experimental Evidence," *European Sociological Review*, 31, 6, pp. 725-737, DOI: 10.1093/esr/jcv071.

Boudon R., 1965, "Réflexions sur la logique des modèles simulés," *European Journal of Sociology*, 6, 1, pp. 3-20, DOI: 10.1017/S0003975600001119.

Boudon R., 1974, *Education, Opportunity, and Social Inequality: Changing Prospects in Western Society*, New York, Wiley.

Boudon R., 1976, "Comment on Hauser's Review of Education, Opportunity, and Social Inequality," *American Journal of Sociology*, 81, 5, pp. 1175-87, DOI: 10.1086/226278.

Boudon R., 1977, *The Unintended Consequences of Social Action*, London, Palgrave Macmillan.

Boudon R., 1979, "Generating Models as a Research Strategy," in *Qualitative and Quantitative Social Research: Papers in Honor of Paul F. Lazarsfeld*, edited by R. K. Merton, J. S. Coleman and P. H. Rossi, New York, The Free Press.

Boudon R., 1981, *The Logic of Social Action: An Introduction to Sociological Analysis*, London, Routledge Kegan Paul.

Boudon R., 1998, "Social Mechanisms without Black Boxes," in *Social Mechanisms: An Analytical Approach to Social Theory*, edited by P. Hedström and R. Swedberg, Cambridge, Cambridge UP.

Boudon R., 2002, "Sociology That Really Matters: European Academy of Sociology, First Annual Lecture, 26 October 2001, Swedish Cultural Center," *European Sociological Review*, 18, 3 pp. 371-378, DOI: 10.1093/esr/18.3.371.

Boudon R., 2010, *La sociologie comme science*, Paris, La Découverte.

Boudon R., 2012, "'Analytical Sociology' and the Explanation of Beliefs," *Revue Européenne des Sciences Sociales*, 50, 2, pp. 7-34, DOI: 10.4000/ress.2165.

2 One could argue that his game-theoretic application met the criteria of MI. Game theory is obviously another valuable methodological tool but as explained above, it is more appropriate to ideal-typical situations than to more concrete ones.

Davidovitch A. and Boudon R., 1964, "Les Mécanismes Sociaux Des Abandons de Poursuites: Analyse Expérimentale Par Simulation," *L'Année Sociologique*, 15, pp. 111-244.

Durkheim É., 1982, *The Rules of Sociological Method*, 1st American ed., New York, The Free Press.

Goldthorpe J. H., 2021, *Pioneers of Sociological Science: A Genealogy of the Statistical Study of Human Populations*, 1st ed., Cambridge, Cambridge UP.

Hägerstrand T., 1965, "A Monte Carlo Approach to Diffusion," *European Journal of Sociology/Archives Européennes de Sociologie*, 6, 1, pp. 43-67.

Hedström P., 2021, "Coda-The Past and Future of Analytical Sociology," in *Research Handbook on Analytical Sociology*, London, Edward Elgar.

León-Medina F. J., 2017, "Analytical Sociology and Agent-Based Modeling: Is Generative Sufficiency Sufficient?" *Sociological Theory*, 35, 3, pp. 157-178, DOI: 10.1177/0735275117725766.

Lopez-Pintado D. and Watts D. J., 2008, "Social Influence, Binary Decisions and Collective Dynamics," *Rationality and Society*, 20, 4, pp. 399-443, DOI: 10.1177/1043463108096787.

Manzo G., 2009, *La Spirale Des Inégalités. Choix Scolaires En France et En Italie Au XXe Siècle*, Paris, Presses de l'université Paris-Sorbonne.

Manzo G., 2014, "Potentialities and Limitations of Agent-Based Simulations," *Revue Française de Sociologie*, 55, 4, pp. 653-88, DOI: 10.3917/rfs.554.0653.

Manzo G., 2022, *Agent-Based Models and Causal Inference*, Hoboken, Wiley Blackwell.

Manzo G., 2024, "Antecedents of Generative Thinking in Analytical Sociology: The Contribution of Tom Fararo," *The Journal of Mathematical Sociology,* pp. 1-22, DOI: 10.1080/0022250X.2024.2423946.

Morgan S. L. and Winship C., 2014, *Counterfactuals and Causal Inference: Methods and Principles for Social Research*, 2nd ed., Cambridge, Cambridge UP.

Opp K.-D., 2024, "The Recent Turn in Analytical Sociology: The Dismissal of General Theories, Mental States, and Analytic Philosophy-and the Old Issue of Mechanism Explanations," *Social Science Information*, 63, 2, pp. 131-154, DOI: 10.1177/05390184241247724.

Sage L., 2022, "So Similar but so Different. Explaining Wage Differences between Observably Similar Individuals," PhD diss., Sorbonne Université/Università degli studi, https://theses.fr/2022SORUL049.

Schelling T. C., 1971, "Dynamic Models of Segregation," *The Journal of Mathematical Sociology*, 1, 2, pp. 143-86, DOI: 10.1080/0022250X.1971.9989794.

Watts D. J., 2014, "Common Sense and Sociological Explanations," *American Journal of Sociology*, 120, 2, pp. 313-51, DOI: 10.1086/678271.

NOTE ON THE AUTHOR

Lucas Sage is a Research Fellow at the Toulouse School of Economics, Université Toulouse Capitole. As a Sociologist, he works on social inequality, examining both its micro-level generating mechanisms and its consequences, including how inequality affects cooperation in addressing climate change. As an analytical sociologist, he practices theory-guided empirical research using diverse quantitative methods, including statistical modeling, agent-based simulation, and experimental approaches. His research has appeared notably in *PNAS* and *PLoS One*.

Latest titles

Des tribus et des empires. Essai sur quelques variantes des relations entre les morphologies sociales et les ordres politiques
Mohamed Cherkaoui

La Frustration salariale. À quoi servent les primes ?
Élise Penalva-Icher
"Sociologie économique" sub-series

L'Économie au pari de la sociologie. Autour des travaux de Philippe Steiner
Sidonie Naulin, Melchior Simioni & Marie Trespeuch (eds.)

Aux côtés des artistes. Producteurs de cinéma et administrateurs du spectacle vivant
Laure de Verdalle
"Sociologie économique" sub-series

Compensation carbone. La fabrique d'un marché contesté
Alice Valiergue
"Sociologie économique" sub-series

Perspectives de sociologie historique. Mélanges en l'honneur de Jean Baechler
Pierre Demeulenaere & Thierry Tirbois (eds.)

Une contre-mondialisation audiovisuelle ou comment la France exporte la diversité culturelle
Romain Lecler
"Sociologie économique" sub-series

Les start-up, des entreprises comme les autres ? Une enquête sociologique en France
Michel Grossetti, Jean-François Barthe & Nathalie Chauvac
"Sociologie économique" sub-series

Essai sur l'islamisation. Changements des pratiques religieuses dans les sociétés musulmanes
Mohamed Cherkaoui

La France des inégalités.
Réalités et perceptions
Olivier Galland (ed.)

Les Sciences sociales, la guerre et l'armée.
Objets, approches, perspectives
Bernard Boëne

Herméneutique naturaliste
Chrysostomos Mantzavinos

Le Juste et l'Inacceptable.
Les sentiments d'injustice contemporains et leurs raisons
Caroline Guibet-Lafaye

Le Travail sociologique.
Du concept à l'analyse
Charles-Henry Cuin & Patrice Duran (eds.)

La Sociologie analytique de Talcott Parsons
François Chazel

La Spirale des inégalités.
Choix scolaires en France et en Italie au XX^e^ siècle
Gianluca Manzo

ACCLAIMS

This remarkably well-structured volume accomplishes two feats at once. It offers a critical engagement with the multiple facets and contributions of Raymond Boudon's sociological oeuvre, for example: the modeling of relative deprivation, the generative approach to social stratification, the plea for methodological individualism, the analysis of unintended consequences and social change, the epistemology of sociological investigations, and the reflection on rationality and belief formation. Through this critical engagement – here is the second feat – this volume tackles substantive and methodological issues central to contemporary developments in the discipline of sociology, whether the focus is on formal models, simulation work, counterfactual reasoning, social mobility and its measurements, the significance of Rational Choice, or our understanding of processual dynamics.

Ivan Ermakoff, Professor of Sociology,
University of Wisconsin-Madison

Without indulging in praise, this collective volume – bringing together 18 substantial chapters – aims to shed light on the enduring legacy of Raymond Boudon's sociology. It addresses a notable gap: the lack of a detailed, multifaceted examination of the work of one of the foremost figures in both French and international sociology. The reader will find not only an assessment of Boudon's intellectual contributions but also a critical appraisal of their limitations and the avenues they open for further research into contemporary issues. The book will appeal both to specialists familiar with the evolution of Boudon's thought over time and to those wishing to discover it, explore it in greater depth, or draw upon it for teaching purposes.

Gérald Gaglio, Professor of Sociology,
Université Côte d'Azur

This book is a splendid tribute to Raymond Boudon, one of the most important sociologists of the second half of the 20th century. The contributions, in their appreciative and critical aspects alike, clearly bring out the intellectual depth and challenging nature of Boudon's work and its continuing relevance in the study of modern societies.

John H. Goldthorpe, Emeritus Fellow,
Nuffield College, University of Oxford

This collection of papers, expertly curated by Gianluca Manzo, is as wide-ranging and thought-provoking as Raymond Boudon himself. It is sure to stimulate interest in a now-sometimes-forgotten giant of French sociology.

Neil Gross, Charles A. Dana Professor of Sociology,
Colby College (Maine)

This Memorial Festschrift honors Raymond Boudon (1934–2013) by considering his contributions to conceptualization, theory, and empirics, as well as their associated methods, across foundational topical domains in sociology and guided by expert commentators. It is not only a superb assessment, and its value will grow in three main ways. First, like most Festschrifts, it provides a portrait of the growth and trajectory of Boudon's ideas, embedded in his relations with other scholars, both teachers, peers, and students. This portrait will grow over time. Second, as the historian David Knowles wrote about the *quaestiones quodlibetales* of the medieval university (especially the University of Paris) and the debates held during Advent and Lent when anyone could ask any question of any master, Festschrift discussions are a valuable index to what is "in the air" – in this case both when Boudon was working and now. Third, Boudon believed in the promise of mathematics, and it will be possible to trace over time the progress of the $X -> Y$ relations in the book, as they travel from general functions to specific functions.

Guillermina Jasso, Professor of Sociology,
Silver Professor of Arts and Science, New York University

This book is not a hagiography. Unusually, its title truly reflects its content. Twenty-two sociologists from different countries and different generations take a fresh look at the work of Raymond Boudon. In keeping with his approach but without complacency, they highlight the theoretical and methodological contributions of his sociology, its limitations, its errors, its relevance for teaching sociology to the new generations, and the perspectives that remain open in several thematic areas.

Dominique Vidal, Professor of Sociology,
Université Paris Cité