Macrosociology-Microsociology

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Abstract

The history of sociology shows that the distinction between macro- and microsociology is at the same time fundamental and fundamentally ambiguous. This article presents a selective overview of the solutions to the micro/macro issue that have appeared in sociology from the classics to today's developments in philosophy of social sciences and sociology. The article aims to highlight the main sources of disagreement and division among sociologists interested in the micro/macro issue, and in the end stresses the importance of mechanism-based theorizing and formal methods to advance it.

Introduction

When the history of sociological theorizing has to be systematized, the distinction between micro- and macrosociology is fundamental (see, for instance, Collins, 1988; Cherkaoui, 2005: Chapter 5). But what are micro- and macrosociology? According to Randall Collins (1981: 984), "microsociology is the detailed analysis of what people do, say, and think in the actual flow of momentary experience. Macrosociology is the analysis of large-scale and long-term social processes, often treated as self-subsistent entities such as 'state,' 'organization,' 'class,' 'economy,' 'culture,' and 'society.'" While this broad characterization of micro- and macrosociology is largely undisputed (see for instance, Calhoun et al., 2012: 27), it seems problematic to provide a more precise definition. In fact, as noted by Münch and Smelser (1987: 356), "(…) the terms 'micro' and 'macro' have been assigned a number of diverse meanings in the sociological literature and these meanings are not always consistent with one another." Along similar lines, Wippler and Lindenberg (1987: 153) admitted that "there is no agreement on the micro/macro distinction, except that 'micro' always refers to smaller units than those implied by macro. (…) the various meanings attached to this distinction have generated micro/macro problems that stand in the way of an adequate solution of the master problem." Thus, the distinction between macro- and microsociology is at once fundamental and fundamentally ambiguous (as an additional proof, see Table 1 in Krause, 2013: 142).

In this short article, I first review solutions to the micro/macro issue that appeared in sociology from the classics to the 1980s. Without any claim to exhaustiveness, I select typical, in the sense of recurrent, solutions to suggest that (1) sociologists have often opted for a substantive understanding of the notions micro/macro, thus equating a given level of analysis with a given set of entities or phenomena; (2) sociologists have recurrently attempted to give one level explanatory priority over another; (3) in order to justify their 'priority' claims, sociologists have often mixed ontological and explanatory arguments (for an early statement along similar lines, see Wiley, 1988). In my opinion, these are the main sources from which the disagreements on the micro/macro issue arise. Then, by discussing in-progress epistemological, theoretical, and methodological developments, I suggest that such disagreements can be overcome provided sociology renounces the vertical, multilayer metaphor contained in the notions of micro and macro, and puts all its energy into the detailed description of the mechanisms that constantly transform small-scale heterogeneity into large-scale, time-resistant mixtures of homogenization and differentiation, whatever level the entities under study may be assigned on the low(micro) and high(macro) continuum.

Micro/Macro Balance

Although "the effort of classic sociology in no sense could be seen as having resolved the micro-macro polarization" (Alexander and Giesen, 1987: 19), the closest readers have recognized that classical sociologists were balanced micro/macro thinkers (Ritzer, 2008: 500). To see this quality, Boudon (1995) argued, one needs to inspect the complex interplay of programatic statements, methodological reflection, and empirical-oriented analysis in classical work.

Durkheim is a paradigmatic example. In the first chapter of *The Rules of Sociological Methods*, he defended the view that social structures have a reality in themselves, are external to individuals, and constrain their actions. By analogically building on biological and chemical phenomena like the 'hardness of bronze' or the 'liquidity of water,' Durkheim (1895 [1982]: 39) argued that the collective level arises from the individual one, yet the former is *sui generis*, meaning qualitatively different, from the later: "(…) the whole does not equal the sum of its parts; it is something different, whose properties differ from those displayed by the parts from which it is formed" (Durkheim, 1895[1982]: 128). That is why, according to some commentators (see Sawyer, 2005: Chapter 6), Durkheim should be regarded as the first 'emergentist' in sociology (on modern debates on the concept of emergence, see Bedau, 2003). However, as stressed, among others by Bearman (1991), Collins (2004: 32–40), and Cherkaoui (2005: Chapter 2, 2008: Chapters 1 and 3), this view did not restrain Durkheim from formulating detailed explanations in terms of networks, interactions, and actions of complex high-level outcomes like patterns of suicides or long-term dynamics of system differentiation.

Weber provides a specular case. In the foundational essay *Some Categories of Interpretive Sociology* (1913[1981]: 158), he

defined individuals as the 'atoms' of sociology and advised that sociology should start with individuals' actions and motivations and show how high-level structures and trends ultimately derive from them. However, similarly to Durkheim, Weber's analyses of specific social phenomena yield a more complex picture. For instance, Weber's study of the origin of capitalism as it is articulated in the *General Economic History* (1927[1981]) shows a complex explanatory model, which relates several levels of analysis and focuses on formulating specific hypotheses on mechanisms bridging these levels. Contrary to Coleman's (1987: 154–157, 1990: Chapter 1) criticism of Weber's analysis, which rests on commenting *The Protestant Ethics and The Spirit of Capitalism*, even the micro-to-macro step of Weber's explanation contained detailed analyses of relational and institutional factors that transformed individuals' beliefs into stable macrostructures – a point nicely illustrated by Cherkaoui (2005: Chapter 3).

Other classics pursued in practice this balance between micro- and macrosociology. Elster (1985, 2009), Cherkaoui (2005: Chapter 1), and Edling and Hedström (2009) have shown that, similar to Durkheim and Weber, Marx and Tocqueville were also attentive to the interplay between actions, interactions, organizations, and structures, and formulated specific hypotheses on detailed mechanisms relating several levels of analysis.

Micro/Macro Extremisms

The classical micro/macro balance was lost for a large part of twentieth-century sociology. As stressed by Ritzer (2008: 500), much modern sociological theory has been characterized by "micro and macro extremists – that is, the preeminence of theorists and theories that accord overwhelming power and significance to either the micro or the macro level." To capture this phenomenon, Turner (2001: 4) coined the polemic terms of 'micro-' and 'macrochauvinism.'

Talcott Parsons's structural functionalism played a crucial role in this radicalizing trend. Although in *The Structure of Social Action* (1937), Parsons's focus is on actors, the analytical importance of normative elements is already stressed without ambiguity. These elements will progressively become predominant with Parsons's *The Social System* (1951) and later work in which he studied how supraindividual structures are internalized by individuals and how these structures satisfy specific systemic needs. Parsons's (1954: Chapters 4, 15, and 19) writings on social stratification are exemplary of this approach. According to his interpretation, occupations crystallize different values, and the system provides larger symbolic and material gratifications to those occupations expressing the most important values at a given point in time. The specific (multilevel) mechanisms by which the consensus on these values emerges are left unspecified, however (for a detailed analysis of Parsons's work and more recent developments in 'system' theory, see, for instance, Joas and Knöbl, 2009: Chapters 2–4, 11, and 13).

As noted by Calhoun et al. (2012: 28), the most important 'microchauvinisms' grew in American sociology out of a reaction to Parsons's 'macroextremism.' On the utilitarian side, this is the case of Homans's (1961) defence of psychological reductionism

and his project to deduce every supraindividual structure from more elementary forms of exchanges among self-oriented actors within small groups. On the interpretive side, although different when carefully inspected, ethnomethodology (Garfinkel, 1967), symbolic interactionism (Blumer, 1969), and Goffman's (1982) frame analysis share the assumption that supraindividual structures are transient and contingent, depending on the way actors interpret and negotiate the meanings of actions and situations when they interact -Schutz's (1937[1967]) social phenomenology being a power source of inspiration for these approaches.

Let us finally consider the interesting case of shifting from micro- to macroextremism within the work of the same author. Peter Blau is perhaps the most refined example of this trajectory in that he moved from a refined variant of social exchange theory (see Blau, 1964) to an equally sophisticated version of macroextremism focused on how population heterogeneity suffices to predict the patterns of social interactions (see Blau, 1977, and, for a summary, Blau, 1987, 2001).

Micro-Macro Linkage

Compared to this overemphasis on the micro- or the macro-level between the 1930s and the 1970s, sociological theorizing began to develop a more balanced perspective – closer to the spirit of classical empirically oriented analyses (see first section) – in the 1980s. In the introductory essay to *The Micro-Macro Link*, Alexander and Giesen (1987: 31) suggested that "(…) in the present decade a quite different phase of theoretical debate has emerged, one marked by the serious ongoing effort within every theoretical tradition and from both sides of the great divide to link micro- and macroperspectives (…) we are convinced that the scope and intensity of this search for linkage are without precedent in the history of sociology." Münch and Smelser's (1987: 385) conclusion to the same book is equally explicit: "(…) those who have argued polemically that one level is more fundamental than the other (in some kind of zero-sum way), or who have argued for the complete independence of the two levels, must be regarded as in error."

The effort to reach a multilevel theorizing has been productive in different ways, however. In US sociology, some authors started with the idea that the distinction between micro- and macrolevels is too reductive to capture the complexity of social life. Thus, Alexander (1987) and Ritzer (2008: Figures 1–2 and A.1–3), for instance, suggested that we should instead think in terms of *continua* – in particular, the former proposes an individual/collective and an instrumental/normative *continuum* whereas the latter speaks of a micro/macroscopic and an objective/subjective *continuum*. By combining them, these authors argued, multidimensional analytical schemas can be built and used conceptually to map the variety of phenomena characterizing the social world at different levels of analysis. By contrast, other American sociologists still bet on the foundational value of a specific level of analysis to close the micro/macro gap. Randall Collins (1981, 2004), for instance, building on Durkheim and Goffman, suggested that a particular type of social interactions, i.e., ritual

interactions, that actors experience in a variety of social settings triggers emotions that in turn create a feeling of social belonging, which transforms microlevel disorder into macrolevel order. American students of social networks started with a similar assumption that the intermediate level of social relations is crucial to understand the micro-macro transition (see, for instance, Granovetter, 1973, 1983, 1985). Differently from Collins's qualitative perspective, however, network analysts did not limit themselves to a specific type of interactions. They started instead by empirically describing network-related features impacting on the kind of macrooutcome observed (for an example on the field of diffusion processes, see, for instance, Valente, 1995). Over the decades, social network analysts developed a well-specified set of mechanisms and theories on how microlevel entities and attributes translate into macropatterns (for an overview, see Borgatti and Lopez-Kidwell, 2011).

During 1980s, European sociology also developed original integrative approaches to the micro/macro issue. These approaches insisted on the circularity of 'structure' and 'action,' but they conceptualize this circularity in very different ways. On the one hand, Giddens's (1984) 'structuration theory' and Bourdieu's (1977, 1980[1990]) 'genetic structuralism,' although different in many respects, share the common assumption that there is a relation of codetermination between 'structure' and 'action.' In Giddens, this 'duality' is resolved by postulating that actors' practices dynamically create their own structural conditions, whereas, in Bourdieu, structures are assumed to become incorporated in actors through invisible socialization processes, so that structures silently reappear in the way actors behave and think. On the other hand, the 'structural-individualistic' approach developed by several Dutch sociologists (see Wippler, 1978; Wippler and Lindenberg, 1987) – or the very similar 'recursive' form of methodological individualism proposed by Boudon (1987) – starts with a specific image of actors, which assumes that actors have goals and attach subjective probabilities to different courses of action, and, instead of developing a general account of the relationship between structure and action, advises formulating specific 'bridge' hypotheses (i.e., hypotheses on the way structures impact on actors' goals and opportunities) and 'transformation rules' (i.e., hypotheses on specific institutions and processes that combine actors' action into collective outcomes).

Layered and 'Flat' Social Ontologies

As anticipated by the promoters of the micro/macro-linkage debate themselves (Alexander and Giesen, 1987: 31, 37), the set of solutions that took shape during the eighties did not lead to any widely accepted 'Newtonian synthesis.' In fact two opposite reactions can be detected. Both directly refer to ontology but develop opposite views.

Turner's (2005) reaction is a good example of the first perspective. His objection to both the 'multidimensional' and 'circular' approaches deserves to be quoted extensively: "the micro-macro distinction will not be theoretically resolved by talk about multidimensionality or recourse to tired old dichotomies like agency/structure, rational/nonrational, subjective-objective,

action-order and so on. Instead, we need to be much more specific on the properties of the social universe that are denoted by the labels of micro and macro" (Turner, 2005: 407). Thus, according to Turner, to develop a truly multilevel sociological theory requires us to reject the idea that the distinction between micro and macro is purely analytical. One should accept instead that "these levels *are* reality" (Turner, 2005: 409). On this basis, Turner posits the existence of three levels – i.e., 'macro,' 'meso,' and 'micro' – each of which is characterized by specific entities, driven by specific forces, and described by specific lawlike regularities. The task of a truly multilevel sociological theory, Turner (2005: 417) argues, would be "to develop theoretical models and principles explaining the nature of the linkages across levels."

Thus, Turner's reaction to the US micro/macro debate and to the European agency/structure literature is in line with the so-called 'critical realist' perspective, which, as Gorski (2013: 659) puts it, "instead of a purely conventional distinction between 'micro' and 'macro' [it] appeals to the real ontological distinctions between the various layers or 'strata' in the natural and social worlds." Within this framework, the solution to the problem of the micro/macro linkage would come from postulating the existence of a series of levels of reality with 'emergent,' meaning irreducible, properties and seeking to discover the origin of such 'originality' at each level as well as the effects of higher levels on lower levels (what is called 'downward causation' in this perspective). Archer's (1995) 'morphogenetic' approach as well as, more recently, Sawyer's (2005: Chapter 10, in particular) 'emergentist' sociology represent two sophisticated examples of this line of thought.

An equally 'radical' but opposite solution to the problem of linking micro and macro claims that the problem can be advanced by giving up the notion of level itself. This is the option chosen by Latour (1999), for instance. In an attempt to clarify the meaning of his 'actor-network theory,' he states that (1) "(…) the social possesses the bizarre property of not being made of agency and structure at all, but rather of being a circulating entity"; (2) "(…) in the social domain there is no change of scale. It is so to speak flat and folded (…)"; (3) "(…) there is no zoom going from macro structure to micro interactions (…)" (Latour, 1999: 17, 18, 19, respectively). For this reason, 'action-network theory' suggests not thinking in terms of levels but in terms of 'circulations,' 'trajectory,' or 'movements.' A similar, although more sophisticated, position is endorsed by Abbott (2007). Within the context of a discussion on mechanism-based theorizing in sociology (see last section below), he claimed "(…) the Coleman Boat presupposes a whole model of levels that it is the task of my own version of social theory to destroy. There are no levels. The levels concept is incoherent, an uncriticized inheritance from liberal political theory" (Abbott, 2007: 2). As an alternative, he suggests a relational and processual perspective that pays attention to the 'fractal' nature of the social world (see Abbott, 2001: Chapter 6) – interestingly, this 'fractal' nature is something denied by Latour (1999: 18). At the same time, Abbott (2007: 2) honestly admits that we do not really have at the moment a 'serious' theory that allows us to think of the social world with level-free eyes.

Toward a Scale-Based Thinking

It is a fact that the integrative stage of the history of the micro/macro debate was not capable of generating shared solutions. The authors who explicitly characterized the micro/macro distinction in analytical terms and at the same time attempted to integrate several levels of analysis were attacked on several grounds. First, it was observed that some of them tend conceptually to map social reality more than theoretically articulate its dimensions (see Turner's (2005: 407) objection to Alexander's or Ritzer's proposals). Second, concepts like 'duality of structure' or 'habitus' were criticized for restating the problem of structure/agency codetermination instead of providing the details of the interplay between the two (see Ritzer, 2008: 526; Turner, 2005: 406–407; Van den Berg, 1998). Third, it was remarked that, despite the programatic claim, integrative approaches ultimately end up giving one level priority over another, so that, for instance, Collins and Bourdieu finally remain a 'microreductionist' and a 'macrostructuralist,' respectively (see Ritzer, 2008: 507–510, 532). On the other hand, social theorists who overtly proposed a multilayer ontology, thus opting for the notion of 'levels of reality' rather than that of 'level of analysis,' raise the difficult question of the determination of the number, the content, and the frontiers among these levels. A quick comparison of Turner's (2005: 410–411) Table 23.1 with Sawyer's (2005: 211) Figure 10.3, for instance, would suffice to show that these choices are arbitrary, a priori, and ad hoc. Without empirical research, lists of 'levels of reality' are nothing but lists of verbal labels. Unfortunately, and somehow surprisingly, a similar objection also applies to theorists who opted for an analytical understanding of the notion of level in that micro- and macrolevels tend to be in practice equated to specific entities and activities. This is undesirable for two reasons. First, different micro- and macroperspectives usually opt for different micro- and macrocontents, thus generating conceptual ambiguity and confusion. Second, as soon as a specific content is given a specific level, one risks shifting from an analytical to a substantive, ontological characterization of this level, which in turn increases the probability that the discussion will turn to what exists or not in the social world (on this danger, see, among philosophers of social science, Little, 2006).

Recent debates in philosophy of social science seem to open a fruitful avenue to a resolution of these problems. In particular, Ylikoski (2012, 2014) proposes articulating three elements, namely the concept of 'scale,' the distinction between 'constitutive' and 'causal' statements, and the concept of 'mechanism.'

As to the first element, Ylikoski suggests that the distinction between micro and macro could be better described in terms of small- and large-scale phenomena (Ylikoski, 2014: Section 3). To think in terms of scales, he argues, would help avoid the implicit level-based vertical metaphor contained in the notions of micro and macro. The notion of level raises indeed the difficult question of knowing in what sense a social norm, for instance, is a higher level entity than the individuals believing in it. After all, the social norm, to be effective, should reside in the minds of some individuals (at least those who enforce the norm or those who are in charge of having the norm enforced). Thus, in this sense, the norm would be on the same level as the individuals. Within the scale-based framework, this ambiguity disappears; the norm is at a different scale than the actor in that, to be a social norm, it must hold for more than one actor (otherwise, it would be a private normative belief). The difference in terms of level is thus replaced by simpler differences in terms of size. The notion of 'scale' also makes it clear that the distinction between micro and macro, thus between 'levels,' can only be relative and content-free in that it depends on the target one is seeking to describe/explain – if one focuses on individuals interacting within a triad, then transitivity is a large-scale property, but transitivity becomes a small-scale phenomenon when one starts studying the dynamics of interactions within a given firm.

In Ylikoski's argument, scale-based thinking should be combined with an appreciation of the difference between 'constitutive' and 'causal' statements (see Ylikoski, 2012: 2.4; 2014: Section 4). A constitutive statement, he remarks, establishes a relation of dependence between small- and large-scale properties whereas a 'causal' statement describes a relation of dependence between the events that are responsible for the transition between phenomena at different scales. The distinction, Ylikoski argues, is important because it helps avoid the conflation between ontological and explanatory statements. The fact that a given large-scale phenomenon is *made of* smaller scale entities (constitutive viewpoint) does not imply that, to explain the former, one only needs small-scale events. From the point of view of 'causal' statements, the 'difference-makers' are not limited to a single, unique scale.

Within a scale-based framework aimed at answering 'causal' questions, Ylikoski (2012: Sections 2.2 and 2.4.1) finally suggests, the fundamental problem of scientific knowledge becomes the discovery of the 'mechanisms' that transform small-scale properties into larger-scale patterns as well as the mechanisms that clarify the way large-scale properties impact on the activities of smaller scale units. Thus, the problem is no longer what the micro or the macro is, nor what the most fundamental level of analysis is. The problem of micro- and macrosociology is reshaped in more general terms, i.e., as an enterprise of figuring out the details that make the connection between phenomena located at different scales, whatever their specific content.

Recent developments in sociological theory suggest that these ideas are progressively traveling from philosophy of sciences to sociology, and transforming the way sociologists conceive the distinction between micro- and macrosociology. I close this article by reviewing these developments.

Mechanism-Based Thinking

The explicit use of the concept of mechanism, entered sociology in the 1990s (see Hedström and Swedberg, 1998; for an analysis of precursors, see Manzo, 2010: 132–138). Over the last two decades, a distinctive sociological perspective called analytical sociology was elaborated around this concept (see Hedström, 2005). Its foundational axiom is that to explain a connection between events amounts to detailing the set of entities, properties, activities, and

relations among them that brings about the observed connection. Analytical sociology is now a complex intellectual movement that orientates empirical research in several areas (see Hedström and Bearman, 2009; Manzo, 2014a) and stimulates interesting controversies (see Abbott, 2007; Little, 2012; Opp, 2013). Analytical sociology is deeply concerned with the micro/macro issue. In this respect, three elements of this research program must be briefly discussed: (1) the form of methodological individualism that animates analytical sociology; (2) its views on the theory of action; and (3) some of its methodological proposals (for a more general and detailed discussion, see Manzo, 2014b).

As to the first point, analytical sociology's view is deeply in line with the distinction between 'constitutive' and 'causal' statements discussed in the previous section. From a 'constitutive' point of view, large-scale properties are assumed to be *made of* smaller scale entities and properties. A network-related property like transitivity, for instance, must be constitutively explained by referring to some properties of smaller scale entities such as their tendency to associate with similar others. In this sense, analytical sociology is reductionist. However, from a causal explanatory point of view, analytical sociology acknowledges the empirical existence of large-scale properties and structures, which are defined in the following way: (1) once they come into existence, large-scale properties span a temporal window wider than that characterizing the small-scale entities that have dynamically contributed to generating them; (2) once they have come into existence, large-scale properties cannot be meaningfully defined, or quantified, for a single small-scale entity (on this second feature, see Hedström and Ylikoski, 2014: 62); and (3) the specific value and form assumed by large-scale properties crucially depends on the system of interdependencies that exist among the set of small-scale entities that have dynamically contributed to generating them. Analytical sociology not only acknowledges the empirical existence of large-scale properties and structures but also that they are causally relevant; the only requirement is that it should be possible to indicate at least one small-scale element through which the large-scale effect operates – when the small-scale entity is an actor, no matter whether consciously or unconsciously.

Thus, this understanding of the micro/macro relationship is compatible with the form of structural individualism originally formulated by Dutch sociologists and Boudon (see previous section) as well as with its dynamic version proposed by Coleman (1993: 63). However, to recast this doctrine in terms of scales and pay attention to the distinction between 'constitutive' and 'causal' statements avoids the undesirable misunderstanding that the micro must necessarily be equated with actors and their activities.

With respect to the second point, i.e., the theory of action followed by analytical sociology, two novelties must be highlighted. First, contrary to what some have argued (see, for instance, Gross, 2009), there is nothing in the spirit of analytical sociology that commits this perspective to a specific action theory. On the one hand, when intentionality and rationality are mobilized, it is an open understanding of rationality in terms of reason-based behavior that is assumed (see Manzo, 2010: 150–157, 2012). On the other hand, both the 'wide' and a fortiori, the narrow version(s) of rational choice are explicitly criticized for their lack of realism (see Manzo, 2013a; Hedström and Ylikoski, 2014). The second novelty concerns a trend within analytical sociology toward the recognition that individuals and their (intentional) actions should not necessarily be regarded as the basis of final explanation (see Hedström and Ylikoski, 2014). As stressed by Ylikoski (2012: Section 2.5), 'intentional fundamentalism' is unmotivated from the point of view of the mechanism-based account of explanation, which is neutral with respect to the rock bottom of causal chains. Thus, although analytical sociology echoes previous solutions to the micro/macro issue, namely within the rational-choice tradition (see, for instance, Coleman, 1987), analytical sociology differs by not committing to a specific theory of action, or to a specific level of analysis. This choice is likely to increase the domain of application of the perspective.

One aspect of analytical sociology's methodology, which is my third point, tends in the same direction. With the partial exception of the rational-choice tradition, which built its micro/macro theorizing in part on mathematical models (for a recent statement, see Raub et al., 2011), the perspectives reviewed in the previous sections relied either on natural language or on statistical methods whose internal structure makes it impossible to represent specific mechanisms bridging different levels of analysis (for an old statement, see Coleman, 1987: 168–171). This is especially true when 'transformation' mechanisms involving dynamic interdependencies are at stake (see Coleman, 1986: 1316). By contrast, analytical sociology proposes a particular simulation tool, i.e., agent-based modeling, in order to formalize multilevel mechanism-based hypotheses and study their consequences. Note that, among theorists involved in the micro/macro debate, the potential of simulation models did not go unnoticed (see, for instance, Collins, 1988: Appendix; Turner, 2005: 420). However, compared to other simulation techniques, the flexibility and power of agent-based modeling opens new and unhoped-for opportunities for micro/macro sociological theorizing. Let me briefly explain why (for a more detailed discussion, see Manzo, 2014b: 29–35).

Because of the algorithmic nature of the technique and the specific programing language used to write such algorithms, any substantive mechanism for which one has a theoretical representation can be implemented and studied within the framework of agent-based modeling. For sociologists interested in theorizing about transitions among levels of analysis, this flexibility is especially appreciable for the following reasons: (1) Despite their name, agent-based models are not at all limited to representing 'individuals.' According to the bundle of properties and rules that one programs for a given class of objects, the latter can be used to design the behavior and interactions of a set of particles, molecules, cells, beliefs, actors, groups (of particles, molecules, etc.), organizations, or whatever else on which one may have a precise theoretical understanding and representation. Thus, the specific way in which an 'object' is programed and the specific type of relations that the programmer establishes among different classes of 'objects'

allow representation of any form of connections and exchanges among entities located at different levels of analysis. (2) Agent-based modeling is entirely agnostic about the logic of action by which agents are driven. Thus, if the small-scale entities to be represented are individuals, then self-interested maximizing agents can be designed as well as more or less sophisticated 'cognitive' agents, or even agents that are driven simply by heuristics. (3) Agent-based modeling makes it possible to handle several forms of heterogeneity. Agents can be heterogeneous in terms of attributes and attributes' values. More radically, agents can be heterogeneous in terms of activities, tasks, or the behavior rules by which they are driven. The temporal order in which these rules are performed can also vary across agents. Thus, agent-based modeling constitutes a robust formal tool to go beyond the metaphor of the 'representative agent,' an unrealistic metaphor widely used to avoid, rather than to solve, the problem of the transition from the small- to the large-scale phenomenon (see Gallegati and Kirman, 1999). (4) Agent-based modeling makes it possible to design both space- and network-based local interactions. Agents can be embedded within these interactions so that their beliefs, desires, and opportunities can be modeled as locally constrained and influenced by the choices of other agents and by the network's topology. Moreover, compared to social network analysis, agent-based modeling makes it possible to turn network-level patterns such as homophily, triadic closures, cycles, balanced structures, structural holes, or brokerages into dynamic mechanisms, and their large-scale consequences can be studied (among students of social networks the interest of agent-based simulations is increasing indeed, see Monge and Contractor, 2003).

In a nutshell, agent-based modeling represents a flexible virtual laboratory in which the consequences of specific mechanisms connecting entities at different scales can be studied in a rigorous way. To build such artificial societies requires that every detail is specified. For micro/macro theorizing, this obligation has two advantages. First, conceptual vagueness cannot exist; second, when one takes shortcuts because detailed knowledge is not available, this limitation is immediately visible, thus helping to see where our theoretical knowledge must improve.

With respect to the micro/macro issue, what kind of theorizing can analytical sociology produce on these bases? Analytical sociology does not seek a 'grand' theory explicating how the connection between small- and large-scale phenomena works in general. Analytical sociology's ambition is to provide detailed descriptions of how this connection unfolds for specific and limited portions of the social world. In multiplying these local inquiries, the goal is to detect common features across contexts and phenomena so that classes of semigeneral, in the sense of transversal, mechanisms can be found (see Hedström and Bearman, 2009: 7). Examples of this approach can be seen in the effort to establish if network-based exposure mechanisms are equally involved in the emergence of large-scale suicide patterns (Bearman and Moody, 2004; Hedström et al., 2008), inequality structures (DiMaggio

and Garip, 2011; Manzo, 2013b), fertility trends (Gonzalez-Bailon and Murphy, 2013), friendship dynamics (Bearman et al., 2004), or norm enforcement (Centola et al., 2005); if matching mechanisms work similarly on the job market (Stovel and Fountain, 2009) and for mate choices (Todd et al., 2005); or if imitation-based cumulative-advantage mechanisms apply to both the origin of status hierarchies (Gould, 2002) and consumption fads (Salganik and Watts, 2009).

This may seem not ambitious enough, but I believe it should help sociology to accumulate knowledge on how small-scale differentiation is turned into large-scale mixtures of differentiation and homogenization that is more precise than general transition modes – like 'aggregation,' 'combination,' 'externalization,' 'internalization,' or 'conformity' – which, according to some observers (see Münch and Smelser, 1987: 376–385), constitute the main outputs of several decades of micromacro theorizing.

Concluding Remarks

According to Archer's (1995) reconstruction, the solutions sociologist have proposed to the micro/macro, agency/structure issue historically fall within three types, i.e., 'downward conflation' (low-level entities are epiphenomenal compared to high-level entities), 'upward conflation' (high-level entities are epiphenomenal compared to low-level entities), and 'elision' or 'central conflation' (high- and low-level entities are inseparable and mutually constitutive). The sample of authors and perspectives overviewed in this article suggests that Archer's typology captures the fundamental trends of much of the debate. It is unsatisfactory, however, in three regards.

First, Archer's account does not consider heterodox readers who, contrasting usual interpretations, have shown that the classics are balanced micro/macro thinkers whose empirically oriented analyses escape Archer's three forms of reductionism. Second, Archer does not consider specific variants of the rational-choice tradition, modern social network analysis, and, for chronological reasons, the analytical sociology research program, all of which are approaches that reject both 'downward' and 'upward' conflation and seek to detail the mechanisms responsible for the interplay between structures and actors, thus avoiding 'central conflation' as well. Finally, again for chronological reasons, Archer's constructive proposal inspired by the critical-realism school of philosophy could not take into account recent epistemological developments that raise doubts about the utility of positing a priori an n-layer ontology, and suggest that, be it analytical or realist, the cake-layer model of society implicit in the level metaphor can be fruitfully replaced with a scale-based, flat perspective.

Thus, ultimately, this article suggests that the debates on the micro/macro issue are entering a new phase in which "there is no longer any demand for rigorous strategies of reduction" (Giesen, 1987: 337), and robust methods now exist for designing bridging mechanisms instead of only talking about them.

See also: AGIL, History of; Action, Theories of Social; Agent Based Modeling, Statistics of; Analytical Sociology; Behavioral Economics; Dramaturgical Analysis; Emergent Properties; Exchange: Social; Explanation: Conceptions in the Social Sciences; Functionalism, History of; Habitus: History of a Concept; Heuristics, History of; Individualism versus Collectivism: Philosophical Aspects; Intentionality and Rationality; Interactionism, Symbolic; Methodological Individualism in Sociology; Network Analysis, History of; Rational Choice Explanation: Philosophical Aspects; Rational Choice Theory in Sociology; Social Mechanism; Social Networks; Social Structure: History of the Concept; Sociology, History of; Utilitarian Social Thought, History of; Weberian Social Thought, History of.

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