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Networking in France. Is there a French School of Social Network Analysis?

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Abstract Social Network Analysis (SNA) is a sociology based on interaction that visualizes and models relations between actors. Whereas interaction is approached by classical scholars, we had to wait until the 1970s and the birth of computer science to see social networks analysis develop. This article investigates the influence of SNA in France from the 1980s and wonder if there is a French school of SNA? To do so, we first resume social networks history and highlight its contribution to sociology. Second, we analyze the trajectory and profile of five "disciplinary entrepreneurs," whose role in the field is important as they master three necessary languages for SNA: English, Mathematics and Computer Science. Third, in order to put back those individuals in their social structures, we cross SNA with the different French sociological tradition(s) (according to topics and methods). Last, we wonder if the institutionalization process succeeded in the creation of institutions from which a French SNA would be able to expand?

Keywords Social network analysis · Disciplinary entrepreneurs · Institutionalization · Sociology of science

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Introduction

Social Network Analysis (SNA), a sociology based on interactions and their modeling, is one of the latest current that occurred in sociological history, as it emerged during the 1970s. If sociology is related to the rise of modernity and its explanation, SNA is one of the last steps in this process. Indeed, Weber (1905) analyzed modernity as a process of rationalization. Nowadays, devices to rationalize one's personal network such as social media enable people to manage their relations easily. This allows us to interact with people we knew at kindergarten and with who we would probably have lost touch otherwise. But SNA is wider than the social networks websites. This enlargement comes maybe from the fact that this scientific current is founded on the definition of the social relations, with all the inherent complexity related to this definition: social media is just one visible aspect of this domain. Social relations are atoms of SNA, as it is a sociology that explains behaviors, attitudes and norms from them and vice versa. This dynamic American sociological current has been exported to France during the 1980s, but it finds its deeper roots in Weber and Simmel. These founding sociologists are the one who help us the most to seize relations and interactions. Yet, why such a gap between the founding fathers' works and the later development of SNA in the 1970s? How did this trend of SNA institutionalization affected its exportation to France in the 1980s? What was the French context on which SNA has landed?

First, let us highlight the roots. Simmel's sociology is a strong and unique root in American Sociology that have branched out throughout the twentieth century. By offering analysis about urbanism, small groups, inter-personal knowledge, conflict, or exchange, in Max Weber's filiation, this author became central in the development of symbolic interactionism, social psychology of social distance and social network analysis (Levine et al. 1976a, b). Simmel's influence on sociology is primary and can be explained by the usefulness of his definition of interactions. Defining elementary structures of social life as monad, dyad and triads, furthermore specifying the third part as the one that simultaneously unite and separate, Simmel offers tremendous concepts to think and model social ties in order to develop a structural approach in sociology. The notion of social circles is also a very helpful concept offered by Simmel to seize the classical sociological question of social bond in modern society. Simmel (1908 [1971], p.23) specifies that "*society exists where a number of individuals enter in interactions*". By saying so, he meets Durkheim, Marx or Weber in their scientific enterprise to explain the change from traditional communities to modern societies. Durkheim's answer refers to institutions and is related to solidarity mechanisms. Marx underlines the conflicts modern capitalist society creates and how they structure relationships between social categories. Weber's answer specifies the rationalization process that modern life supposes. Simmel's enterprise is the only one that relies on a structural basis that points out links as patterns of interactions and defines creation ties as well as autonomy through overlapping circles of interest.

During the last quarter of the twentieth century, simmelian concepts had been re-asked and re-used by scholars. Indeed, American sociology was, since World War II and the seminal work of Columbia team (Stouffer et al. 1949), focused on a research explaining people behavior, but neglecting the social part of it, when people interact in order to achieve a common goal or influencing each other. As this idea of patterning social ties was (re)committed, Simmel's triads and social

circles became the core of a new kind of analysis, soon after named Social Network Analysis (SNA) (Freeman 2004).

SNA can be defined as a structural approach based on interactions, the repeatedness of those interactions forms patterns in which actors are embedded[1] and that are also constrained by the position of the actor in the macro social structure. This definition underlines the relational - and not individual - specificity of SNA. Indeed, SNA need prerequisites. Freeman highlights that only recent approach can be qualified as SNA because todays works are integrated in a field constituted by four characteristics (Freeman 2004: 3):

1. *Social network analysis is motivated by a structural intuition based on ties linking social actors,*
2. *It is grounded in systematic empirical data,*
3. *It draws heavily on graphic imagery, and*
4. *It relies on the use of mathematical and/or computational models.*

This definition is the result of a social construction all through the second part of the twentieth century, based on the work of scholars interested in social interactions, and trying to institutionalize a relational sociology. To describe the importation of SNA in France (i.e., wondering whether some kind of relational sociology pre-existed in this country, verifying the institutionalization trend through research results but also among the French sociological institutions in which the scientific production is embedded) we propose to look at these four characteristics in French social network analysis. To do so, we first give a more in-depth definition of SNA, resuming its history and highlighting its contribution to sociology. Second, we describe the way five "disciplinary entrepreneurs" work. Referring to the term "disciplinary entrepreneur" is done in comparison to both "institutional entrepreneurs" (Maguire et al. 2004; Déjean et al. 2004) and "moral entrepreneurs" (Becker 1995): it means looking for people able to develop norms, values or practices for a scientific discipline as a social milieu. Those five scientists enjoy a specific position in the field as they master three necessary languages for SNA: English, Mathematics and Computer Science. Third, in order to put back those individuals in their social structures, we cross SNA with the different French sociological tradition(s), according to the topics and methods they deploy. Last, we wonder if the institutionalization process succeeded in the creation of institutions from which a French SNA would be able to expand?

Being a Relational Sociologist

Since 2004 and the rise of Facebook, the term "social network" has become predominant. Nonetheless, the expression "social network" does not belong to the Internet phenomena and has been developed with SNA. SNA offers definition and critics about

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[1] We use this longer definition of SNA: "*a structural approach that is based on the study of interaction of social actors [....] (and) is grounded in the intuitive notion that the patterning of social ties in which actors are embedded has important consequences for those actors. Network analysts, then, seek to uncover various kind of patterns. And they try to determine the conditions under which those patterns arise and discover their consequences*" (Freeman 2004: 2)

what is a relation and how they gathered in networks. A search in the Google Books Ngram Viewer displays a graph showing how the phrase "social networks" have occurred in a corpus of English books in the twentieth century (Fig. 1). We notice the rise of the phrase use from the 1960's and a steady increase throughout the second part of the last century. As Facebook and other online social media only appeared from 2004, it does not have any impact on this Graph.

Another search with the phrase "social networks analysis" offers a different view (Fig. 2). The use of the SNA phrase started in the 1970s and experimented a peak all during the 1980s. The highest year seems to be 1985, when Granovetter's theoretical article "Economic action and social structure: The problem of embeddedness" was published in the American journal of sociology (1985: 481–510). This paper definitively articulated economic sociology and SNA.

In fact, before the 1970s and in relation with the simmelian heritage, several attempts to institutionalize a sociology based on relations had occurred. The problem with those different attempts is that they missed some of the four prerequisites previously mentioned. This is why we had to wait until the 1970s for Harrison White and his students to develop and institutionalize SNA as a specific subfield. What are those previous attempts to grab social life through its relational patterns?

The first attempt to develop a relational explanation of social life was nearly a success and is known as sociometry. Moreno and Jennings (1934: 10-11) defined sociometry as "*an experimental technique [...] obtained by application of quantitative methods [...] which inquire into the evolution and organization of groups and the position of individuals within them*". This definition is really close to the one we have offered in introduction for SNA. So, why sociometry is today considered as the prehistory of SNA and not as its date of birth? Both for institutional and technical reasons. First, Marineau (1989), Moreno's biographer cited by Freeman (2004), introduced the brilliant but difficult personality of the man. Especially, a kind of paranoia seems to have restrained him from gathering scholars around him to create a school. Moreover, Moreno is famous for having drawn the first sociograms, i.e. the first networks visualization, describing relations among groups of students for instance. But a rapid glance at it (Fig. 3) shows that those graphs are drawn by hand. This constraint reduced the possibility of visualization. Indeed, over 30 individuals, drawn-by-hand (or not) networks are just a mess, looking like a wool ball, with no identifiable patterns of interactions. This is why we had to wait until the 1970s and the development
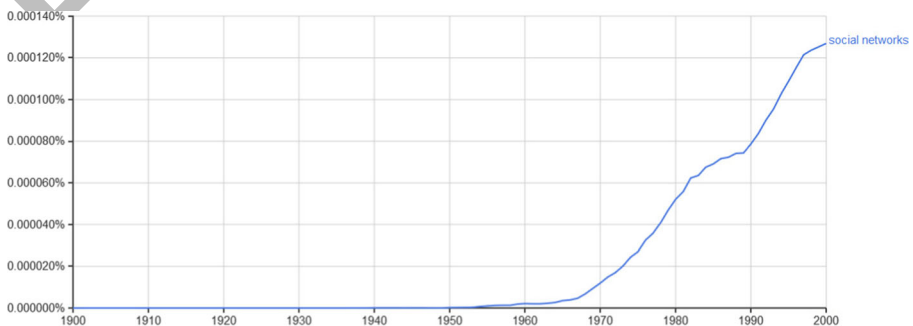

Fig. 1 The twentieth century appearance of networks. Source: Google Books Ngram Viewer, English Corpus (scanned books predominantly in the English language published in any country, July 2012)
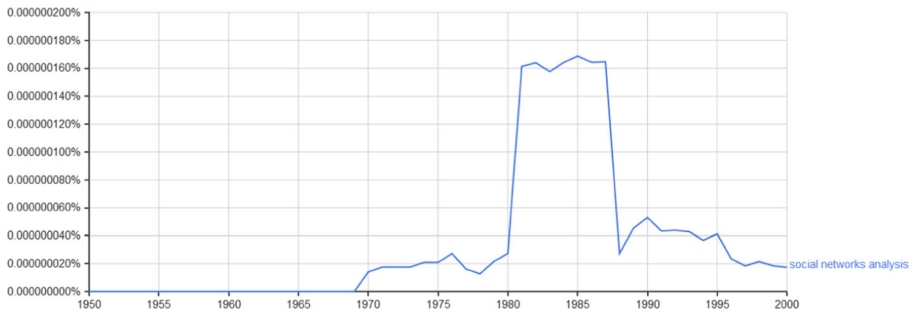
Fig. 2 The 1980's burst of SNA. Source: Google Books Ngram Viewer, English Corpus (scanned books predominantly in the English language published in any country, July 2012)

of computer science to visualize networks and calculate indicators that help understanding the social patterns anchored in them.

Another famous attempt was carried out by a group of scholars gathered around W. Lloyd Warner at Harvard before the World War II. They are famous for the two studies "Yankee city" and "Deep South." These both studies wondered how interactions play a part in individuals' life. They especially focus on stratification in genuine industrial and southern environments, crossing institutions and personal networks. Those studies are still relevant today for introducing the importance of seeking for cliques, i.e. subgroups of higher density, in networks or 2-mode networks, i.e. networks of individuals related to organizations or events. A famous example for 2-mode networks is offered by interlocking directorates (Mizruchi 1996).

Other attempts can be identified among other disciplines (i.e., not sociology). In particular, anthropology with Radcliffe-Brown and Barnes' works - Barnes seminal
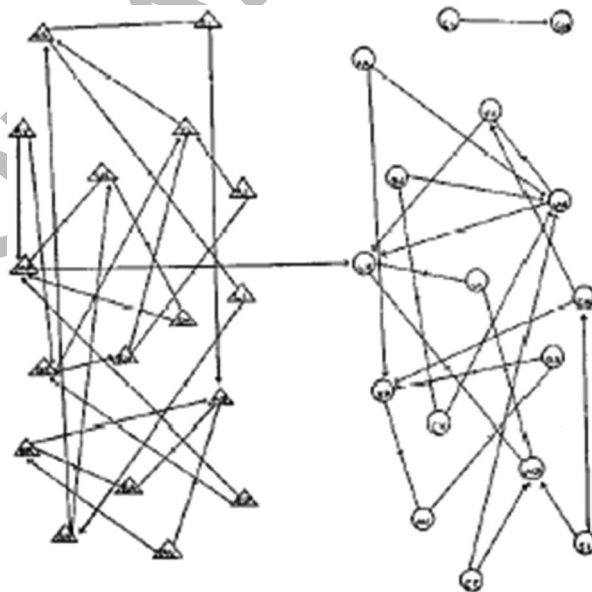

Fig. 3 An attraction network in a Fourth Grade Class (From Moreno [19], p. 38). Source: http://www.gnuband.org/2007/09/15/jacob_moreno_an_amazingly_mad_visionary/

1954 article "Class and committees in a Norwegian island parish", in Human Relations (7: 39–58) is known for being the first work in which the terms "social networks" appeared (Barnes 1954; Wolfe 1979). We also have examples in psychology with Lewin, Festinger, Heider, Cartwright and Harary, and in mathematics with Bavelas and other scholars who used graph theory to model small groups.

We thus have to wait until the 1970s and the arrival of Harrison C. White for SNA to bloom. Why such a late take-off when we know that Simmel's heritage is vivid all along the twentieth century? First, one reason is related to the necessity of operating computational calculation and to lean on visualization for networks analysts. The second reason is institutional and is related to the fact that science is a social constructed life as any other (Mullins 1973a, b). Educated in physics, White succeeded at institutionalizing SNA by proposing a bridge and a star (Fig. 4). In SNA, bridge and star are two different kinds of centralization measurement (Freeman 1978): the bridge is the ability to be a good broker and is measured by betweenness centrality; the star is the fact of attracting and centralizing attention or activity and is shown by degree centrality (Wasserman and Faust 1994).

White's bridge aspect is related to the fact that he acted as a link between the formal modelization of patterns derived from mathematics and physics and those implemented in sociology. This offered the opportunity to construct a theoretical model for social life. However, this model had to be tested empirically. Being a star, White attracted and centralized the attention of several students, who tested his model among various areas of social life and became famous for it. For instance, Edward Laumann developed the ego-network approach to investigate sexual practices (Laumann 1994); Mark Granovetter and the strength of weak ties in job market (Granovetter 1973); Ronald Burt and the measurement of the weight of structural holes on actors' autonomy (Burt 2009); Scott Boorman, Ronald Breiger, and François Lorrain who developed the blockmodeling approach to seize networks with structural equivalence of actors that define their roles in the milieu (White et al. 1976).

Up to now, we just underlined the importance of interdisciplinary influence in the development of SNA. But what about international influence? Sociology of science underlines the international dimension of science since the 1980s, which can be related to depiction of science as an universal mission. In particular, this international dimension operates in terms of co-authoring and co-citation (rather than in terms of financing; Gingras 2002). We can thus wonder whether during the period of SNA development there was other attempts abroad? The anthropological influence seems clear in the UK, especially at Manchester around Radcliffe-Brown and others. In France, Levi-Strauss
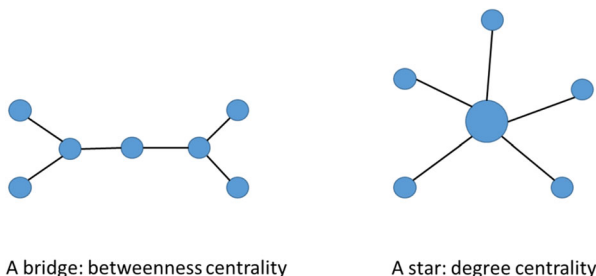

A bridge: betweenness centrality   A star: degree centrality

Fig. 4 Two main structures describing a bridge and a star position

approach can be categorized as structural as he explains group prevalence using kinship and marriage. The articulation with formal mathematical models is also present in his graphs. But Levi-Strauss never seemed to draw attention outside of his research area. So, as our computer criterion is missing, France did not experience a relational school of social behavior before it has burgeoned in the 1980s in the USA and has started to get known internationally. The authors from SNA are now among the most cited scholars – 35,000 times for "The strength of weak ties" according to Google Scholar. Because it became mainstream in the USA in the 1980s, foreign sociologists started to (re)discover and find interest in social networks as well.

Let us now focus on the French case and wonder about the potential impact of SNA on French sociology? Is there a French school of networks? How far is it dependent or independent from Anglo-Saxon SNA? Did the French social analysts complied with the four prerequisites defined by Freeman or did they emancipated from them? In France, the renaissance of sociology after World War II is centered around the sociology of work (Friedmann 1955). While SNA flourished in the USA, Bourdieu built a school in France and defined the structures of society without using patterns of micro-interactions (even though he was aware of the importance of social capital (Bourdieu 1980). To complicate this picture, it is Raymond Boudon, quite opposed to Bourdieu at that time, who translated Simmel works. How does a French SNA, in that context, would be articulated with this specific and territorially anchored theoretical background? Is the SNA influence only perceptible through the academic international productions or are there French sociological institutions dedicated to networks, which would be the sign of the creation of a specific scientific field?

"Disciplinary Entrepreneurs", Necessary but Insufficient Conditions

The arrival of SNA in France is not a natural contamination process from the USA to France, but a social one that is constrained in a specific international social and local context (Mullins 1972). We can list three kinds of difficulties that marked the introducing of SNA in: the language barrier (SNA is English-speaking), computer friendly, and mathematical awareness. These three languages are the ones French social analysts had to speak to be able to meet SNA and start building their own field.

In this section we will retrace the individual path of five "disciplinary entrepreneurs." We refer to the term disciplinary entrepreneur in comparison to both institutional entrepreneurs (McGuire et al., 2004; Déjean et al. 2004) and moral entrepreneurs (Becker 1995). We do so because we think that the initiative to do SNA in France, whether the institutionalization as a discipline is a success or a failure, is the result of both a scientific and social project. This project was at first ran by actors with specific trajectories and embedded in social circles. In other words, their trajectory and location allowed but also constrained them to act as people interested in SNA and trying to develop this kind of approach in France. We do not presume that SNA is finally today a school of thought and an independent specialty. Nonetheless, we examine the social process of science construction related to this part of sociology. To do so, we rely on interviews with five disciplinary entrepreneurs in sociology, chosen because they are key actors of SNA in France. In order to keep anonymity, we use this qualitative data to build our findings, but we do not quote the verbatim because those famous sociologists would easily become identifiable through their words. On the other hand, we lean on

public information as publications, affiliation etc. and our own knowledge of this subfield to which we belong.

The spoken language is a tremendous stake in science. From the 1970s English has become the language of science in the world. This linguistic homogenization movement is twofold. It enables scientists to share works and results, but also reveals a form of domination (Gingras 1991). Gingras also noticed that in France, this shift to English even entered the political debate. In September 1976, Eugene Garfield, the American president of the Institute for Scientific Information published an article in which he promoted French science written and published in English. This position received strong criticism in France and pushed the French scientists to be more suspicious about English and to establish French speaking dedicated scientific conferences and events.

SNA landing in France occurred in this difficult context. Our five entrepreneurs are rare sociologists who agreed at that time to read in English. First because they could do so, which was not that a common competence in France at that time due to the education system. But they also needed sometimes to look for a literature from elsewhere and with contributions they could not to find translated in French. They wanted to explore the relations as social dynamics, which was for them a "black hole" in France (literature on sociability was much more developed in North America at that time). This need to fill in the gap of sociability caused our entrepreneurs to cross the border of literature, but also of institutions. For example, the European annual networks conference, organized by the International Network for Social Network Analysis took place for the first time in Europe in 1989, in Groningen, Netherlands (see below). The closeness with France made it possible for some entrepreneurs to attend it and to listen to the keynote speaker Edward Laumann. They described it as a lower cost occasion to get familiar with this SNA literature that seemed to answer some of their theoretical questions on sociability. In that trend, the second European conference took place in Paris in 1991. Michel Forsé provided the keynote speech. Unfortunately, the cycle of European conference ended there, which also demonstrate the difficulty to get organized in an English-speaking environnement for French people. We had to wait until 2014 for a second first European conference in Barcelona and a second second one, in 2016 in Paris (see below). The third European conference (first third ever!) will take place in Germany in 2017.

The second important competence is mathematics. The same way that H. C. White received two Phds, one in physics and the other in sociology, our entrepreneurs have been trained in mathematics. They all recognized that it was easy for them to understand the modeling done by some much formalized American studies and to translate it into social comprehension. One crucial reference here is Claude Flament, who seems to be the first French scientist to deal with networks from mathematical graph theory (Flament 1963). Indeed, Claude Flament is mentioned by all our entrepreneurs. Interestingly, the on-line notice from one of his editor introduces him as Professor of mathematical psycho-sociology.[2] In the tradition of psycho-sociologist modeling behavior in small groups around Lewin, Bavelas, Cartwright or Harary with very formal tools, Claude Flament seems to be one of SNA's bridges in France (located in an interdisciplinary area between mathematics and psycho-sociology). Another indicator of this gateway position is his publications in the review "Mathématiques et Sciences Humaines"

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[2] Source: Armand Colin, http://www.armand-colin.com/claude-flament

(Mathematics and Human Science). This is an example of how our disciplinary entrepreneurs imported SNA through a mathematical media, offering indicators describing patterns of interactions.

Finally, a third necessary language seems important. All our entrepreneurs were interested in computer science at the time of its early beginning. They said during the interviews that they were equipped with devices long before the other sociologists. This computer user friendly ability is determinant as SNA cannot be done by hand with large networks and as it lays on computational calculation. Furthermore, SNA development is related to software developement: UCInet, developed by Steve Borgatti at the University of California Irvine, Ronald Burt's STRUCTURE started in 1975, Harrison White's CONCor developed to analyze structural equivalence and CONvergence of CORrelation in matrix, but also the Slovenian Pajek (Pajek can be translated by spider) dedicated to large networks and developed by Vladimir Bataglej. This appetence for computer from our entrepreneurs was very useful. The picture (Fig. 5) below shows a scene from the second European Conference on Networks held in Paris in 1991. It shows Michel Forsé giving a presentation with a Personal Computer and a network graph on the blackboard.

Yet, while necessary, these three language-speaking conditions are not sufficient. In fact, some of our entrepreneurs admitted doing networks without knowing what SNA was until a certain point of their careers. They first had an interest for interactions, and this interest then met social networks in the literature, in research projects or in international institutions such as the Sunbelt Conference. This meeting was made possible by the practice of the three languages, in particular English. Since Mullins (1972, 1973a, b), it is generally admitted that science is performed by social groups that maintain different kinds of relationships: first with colleagues, then with co-authors and finally between professor and students. Mullins also underlined the timing development that occurs for a specific topic becoming first a network, then a cluster and finally a specialty or a discipline. The three languages constraint expressed above had to be embedded in an historical and national context. Furthermore, Gingras (1991: 43) underlines "*three aspects in the discipline formation process: 1) a new practice emergence; 2) the practice institutionalization, that enables its reproduction and*

Fig. 5 Picture from the 2nd European Conference in Paris (1991). We would like to thank Alain Degenne for the Picture

systematic diffusion, and finally 3): the formation of a social identity, that can be shaped in different ways, as profession (as in medicine or engineering) or discipline (as in history, physics or sociology)". To find out whether SNA in France is a (part of a) discipline, we have to test those three conditions in the institutionalization process. What is new? Is it reproduced and diffused? Is there a social identity for social analysts? While Mullins first step seems to be found in our case, what about training networks and relations with students? The next section is aimed at analyzing these three characteristics by exploring the map of social networks analysis in France in terms of fieldworks, theories and methodology.

SNA across Multiple French Sociological Traditions

Although the French context was not favorable to the emergence of SNA, it still was implemented in the 1980s in the vein of the American institutionalization. To understand this, we argue that it is necessary to take into account, within the French sociological community, the multiple interactions between theories, methods and topics in competition at that time. The French sociological community constraint is additional to the four characteristics described above. Indeed, as it is described by Ansart (1990), several theoretical streams run across the discipline, but none of them is specifically centered on the systematic analysis of interactions. Thus, the path towards networks and their analysis began with the study of a specific topic and the use of a specific methodology: on the first hand the specific topic of sociability, and on the other hand questionnaire as a specific methodology.

The pioneering work on networks is due to Daniel Courgeau, a researcher in demographics (affiliated to the INED) interested in households migration: in 1972 and 1975, he published two articles in the scientific journal *Population* presenting the results of surveys on personal relationships of people living in urban and rural areas (Courgeau 1972, 1975). The aim of these studies was to find new explanations for social phenomenon. Indeed, Courgeau's hypothesis was that social and economic conditions were not sufficient to understand migrations, and that interpersonal links also constitute explanatory variables. The questionnaire contained a name generator (e.g. the kind of network question), and a rich database for network analysis. However, Courgeau mainly used classical attributes, such as gender, age, PCS and occupational groups,[3] and residence, to describe very precisely sociability. He did not refer to any matrix and graphs, centrality measures, or group structures.

It would take almost ten years to notice the first publication of a social network analysis in France (Ferrand and de Federico 2014) using graphs and other formalization tools. The paper is, again, published in *Population*. The author, Michel Forsé, re-used Courgeau's database. His aim was, with the graph he produced, to highlight systematically and "scientifically" the social groups of the rural areas, by suggesting a new way to regroup individuals (Forsé 1981). Indeed, instead of gathering people a priori on the basis of their affiliation to a social, occupational, age, or gender category, he proposed to reveal social groups on the basis of their contacts (family, kinship, friendship, professional ties), and then to analyze their social attributes to understand what these groups

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[3] In France, occupational groups are named PCS, professions and socio-professional categories.

sociologically mean (the young people from lower social classes, the community leaders, the retailers, the women elders single or widowed, etc.). This methodology of searching for patterns of interactions and articulating them with macro structures categories matches the SNA definition that we used in our introduction. The article also presented an algorithm to simplify graphs and detect subgroups in a network. This second aspect is quite close to what is done today with community detection (Orman et al. 2012). In parallel with this empirical work from Forsé, another French author, Alain Degenne, also had an interest in social networks. His first article on this topic was published at the end of the 1970s. In 1983, he wrote a note on the sociability networks in which all the main authors for social network analysis are quoted, as Moreno, Breiger, Granovetter or White for the Anglo-Saxon literature, but also Berge, Levi-Strauss and Forsé, for the French side (Degenne 1983). In 1984, in association with Claude Flament, he laid down the foundations of a framework for SNA. He raised the problem of the definition of "social relation", highlighting the fact that this phrase has several meanings (Degenne and Flament 1984). He thus promoted a formalized language that could be able to analyze social relations by respecting the diversity and heterogeneity found in data. This language contained different theoretical concepts (symmetry, transitivity, regularity, dependency), and different mathematical notations (matrix, graphs, blockmodel).

These multiple articles from Degenne and Forsé on sociability and networks, both empirical and theoretical (and more or less formalized), will be at the origin in 1994 of the first French Handbook on Social Networks (Degenne and Forsé 2004). The project had been sustained by Henri Mendras. This book, republished in 2004, twenty years after, has also been translated into multiple languages, even in English on the advice of Karl Van Meter. It sums up the main concepts that are considered today as useful for graph analyses: cohesion, equivalence, centrality and power, dynamics and multiplexity. Additionally, it presents several concepts such as social circles, social capital, interlocking directorates, that are heuristic for French sociologists.

During the 1980's, the works claiming to take the path of social network analysis are mainly quantitative, but all of them do not necessarily formalize their data and results on social relations in the graph and matrix language derived from mathematical graph theory. However, some notions are more and more developed and empirically tested. For instance: homophily, distinction between context and content of a link, dyad, triad, etc. Moreover, methodological tools, in particular name generators and "sociometric questionnaires" (originally developed by Moreno), are tested and improved. Alexis Ferrand, directed by Degenne, worked on a network approach of the "sexual relations and relationships of trusts" (1989). His survey used classical statistics tools (cross tabulation, means, percent, etc.), but he adapted them to analyze dyads and influence processes. In 1993, in his HDR[4] dedicated to "the analyses of personal networks," Ferrand also achieved a huge theoretical work: on the first hand, in a structuralist perspective, he highlighted the importance of the concept of "role" and its link to "social relationship" and the "systems" they form; on the other hand, in an interactionist perspective, he also devoted a chapter to the link between network approach and symbolic interactionism and social exchange. This theoretical proposal by Ferrand is significant to French researchers' SNA conception, for this constitutes a way to solve

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[4] HDR refers to the tenured dissertation in France. After defending HDRs, assistant professor (maître de conferences) can apply to associate professor position (professeur des universités).

the hard problem of the link between micro and macro levels of analysis, between individuals and structures.

While Ferrand and Degenne were working at the LASMAS research center[5] in Paris, the French institute for Statistics (INSEE) launched a big survey, named "Contact," of 5000 households. The results were published in 1988 by François Héran (Héran 1988). Once again, SNA formalized tools are not used in this article published in *Economie et Statistiques*, as it mainly focused on the differences that characterize the sociability practices of households in terms of age, gender, class and education. However, this article did contributed to the French construction of SNA, not because of its results but because of its discussion on the background literature. Héran quoted Granovetter and discussed the strength and weak ties of his works. Moreover, he reminded that some North American sociologists, as Wellman and Berkowitz (1988), considered that the primary reality was not the attributes of individuals but the links between them. Héran admitted that this approach was stimulating but he dismissed it for being too "radical": according to him, attributes explain networks and the formation of groups, not the other way around.

Thus, while there has been a stabilization of the SNA tools and languages, discussion kept on with the notion of "relationships." It appeared that French sociologists were not yet ready to cross the line, as their US colleagues had done. Typical of this denial attitude is Pierre Bourdieu, who proposed an analytic framework named genetic structuralism. According to this framework, the social world is relational, but Bourdieu mainly insisted on the objective relations structuring the social space (based on attributes) (Bourdieu 1997). However, he was well aware of the role of "connections," which is why he developed the concept of social capital (1980). Indeed, the latter mixes both "objective relationships" and "intersubjective ties" (as he calls them). But Bourdieu was very suspicious towards SNA. Even if he was aware of Granovetter and White's work and heard about "economic sociology" (1997), he considered this approach to be too interactionist. Indeed, by focusing on influence effects and strategic behaviors, network approach bore the risk, according to Bourdieu, of forgetting structural effects of social world (Eloire 2015).

But social network analysis found an outlet in another French theoretical current called "French strategic analysis." Represented by Michel Crozier and Erhard Friedberg (1977), this constitutes an important contribution to the sociology of organizations. Although these authors did not refer to SNA, they built an analytical framework that takes into account and enhances the importance of informal relationships between actors within organizations and beyond hierarchical and formal ties. They insisted on the political and strategic dimensions of actors within organization, defined as social constructions. They also developed the concept of "concrete action system," considering that actors' behaviors are constrained by structural rules (as regulation processes, power and exchange relationships), but also that actors are interdependent. In other words, they allowed the use of SNA to analyze organizations. This is for example what Emmanuel Lazega did when he studied, in the early 1990's, the collective action, informal social resources exchanges and the social processes of lawyers in a US corporate law firm (Lazega 1999).[6] After this first article published in the

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[5] Laboratory of secondary analysis and of methods applied to sociology, a research center dedicated to quantitative sociology

[6] Lazega was also inspired by the courses and works of the U.S. sociologists Ronald Burt and Harrison White.

Revue française de sociologie, Lazega developed what he called a "neo-structural sociology," that is an approach well suited to analyze organized collective action, triggered by networks at a meso-social level within organizations or between them (for example between firms within markets). Paralleling this theoretical development, Lazega promoted formalized network tools, and more particularly complete network methodology. In 1998, he published his own textbook in the French *Que sais-je?* editorial collection. This book explained how to proceed in order to analyze organizations using SNA in a formalized (sociometric questionnaire) and modeled (statistical models name p2 and p*) perspective, giving several empirical examples.

In the end of the 1990s, French social networks community is divided into two subgroups. The first one is composed of the researchers who are interested in sociability issues and promoting personal networks methodology; the second one is composed of those who are interested in collective action issues (with organizations and markets) and promoting complete networks (Eloire et al. 2011).

The French personal network (or ego-network) tradition probably found its outcome and best achievement in 2011, with the book entitled *La vie en réseau (Life Networked)* (Bidart et al. 2011). This book gave an overview of more than fifteen years of sociability surveys and of their dynamics. It has been authored by Alain Degenne, pioneer in terms of network analysis and sociability issues, but also by Claire Bidart, specialized in friendship issues through a sociological approach, and finally by Michel Grossetti, also specialized in personal networks since the end of the 1980s. The book mixed two different but complementary studies, the first one realized at the LASMAS research center, about what is known as "le panel de Caen:" a longitudinal cohort of young people living around the Normandy city of Caen. The second one at the LISST research center located in Toulouse. The methodologies employed were mixed: researchers combined qualitative and quantitative data, sociometric questionnaires and semi-conducted interviews; some results were formalized in graphs of interpersonal sociability, and several SNA indicators (as density, centralities, connectivity) were used to elaborate a typology of personal networks. But structural analyses were always associated with qualitative verbatims from interviews to give them a "sociological sense." For these researchers, the notions of "relationship contexts" (family, kinship, friendship) and strength ties are central. They conceive network ties as stories and they study them both in their dyadic dynamics and in their evolution as they are embedded in structures of personal networks.

On the other side, the French complete network studies tradition created step by step its own identity by focusing on economic sociology issues. During the 2000s, a theoretical and empirical program for the analysis of organizational phenomenon and economic institutions, activities and markets in the organizational society was established (Lazega and Mounier 2002). This research device has produced many PhD works for years. This approach has not sought to theorize the network on its own: indeed, network is just a tool from a heuristic methodology to renew sociological point of view on social processes. The main point here is the understanding of organized collective action, and the modeling of interdependences through social relationships. One of the main point is the ability to gather different traditions in sociology, both those insisting on structures and those insisting on interactions. Indeed, one of the main achievements in terms of development of network tools during the 2000s, has been the possibility of mixing data from interpersonal networks and

from social exchange resources between actors, with data from social structures and actors' personal attributes.

At the same time, our dichotomous presentation of SNA subfield must be tempered, for no tradition occupies a monopolistic position on a specific topic. Moreover, besides personal and complete networks, other methods exist, in particular "relational chains" and "interlock networks." The SNA environment is thus complex. Michel Grossetti, author of the Toulouse survey at the LISST, has been investigating the interpersonal relations that underlie inter-organizational ties, introducing network issues within biographic interviews in order to understand how people access to some resources (Grossetti 1990; Grossetti et al. 2011). He met the work of Harrison White through Degenne, and contributed to make this author known in France (like Lazega did in a different way). While Lazega is particularly more interested in the "new economic sociology" aspects of White's work, Grossetti is interested in his "general theory of structural action" (2007) and translated in French a new edition of the book named *Identity and control* (Grossetti and Godart 2007). He also directs his research on inter-organizational ties and on economic sociology topics (see for example Grossetti and Barthe 2008). He thus contributed to blur the dichotomous situation of SNA in France (between ego and complete network) by creating links between different topics. Moreover, he strove to broaden the methodological tools of network analysis. For example, in an article published in the *Bulletin de méthodologie sociologique* in 2011, he proposed a method for network study, not from a statistical point of view, but from what he calls "relational chains." This is a way of reconstructing how people have access to relational resources from narrative data based on crossed interviews. He presented the software Nvivo that he used to structure, code and analyze his data.[7]

Grossetti was not the first researcher in the field of SNA to be interested in this approach of networks dating back to the 1960s. Indeed, Alexis Ferrand was also interested in relational chains. According to him, the aim is to produce a method for the analysis of large networks without boundaries and clear limits, with the idea that it is possible to discover the properties of these kinds of networks at the level of a subset of relations forming "typical arrangements" (Ferrand 1997). According to him, the works using triads (Brailly et al. forthcoming), for instance, can be fruitful, because these structural forms involve interdependencies and constraints for the behavior of actors. Ferrand went a step further in his program in *Appartenances multiples. Opinion plurielle* (Ferrand 2011). This book described a survey device for testing the ability of people to express different opinions on the same topic according to the relational context (i.e. the people with whom the discussion occurs). The results showed that the stability of opinions is not necessarily the norm, and that the study of networks (as chains or triads) is of a great importance to understand opinions and typical forms of influence.

Confronted to this diversity of methods, topics and theories, the question of the institutionalization of the French SNA can be raised. Do researchers from diverse backgrounds can create a community in the social acceptation of the term? If so, what are the main institutions and processes sustaining this movement? In the next section, we raise this interrogation and try to show how, like the "new economic sociology" in the U.S. during the 1990s (Convert and Heilbron 2004), the French SNA, beyond its divergences, is becoming a community.

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[7] The idea of these relational chains is inspired by Stanley Milgram's survey on "small worlds" (Milgram 1967).

Towards Institutionalization

The development of SNA in France has followed three steps. The first step involved isolated individual initiatives of a few researchers; the second step involved the creation of links between researchers, thanks to international conferences and French institutions that helped SNA to develop; third, it involved the structuration of the community through numeric tools and punctual and recurrent events in order to diffuse and train network analysts (Mullins 1972).

Regarding the first step, during the 1960s, the preliminary researches on SNA in France are driven, not by French institutions, but by self-initiatives of individuals isolated and scattered. The first book on graph theory is published in 1963 by Claude Flament. Yet, it is written in English and directed to American researchers. Flament, a psycho-sociologist at Aix-en Provence, would publish a French translation of his book only two years later, in 1965. During the same period, Alain Degenne at the EHESS in Paris followed the statistics lessons from Marc Barbut, Claude Berge and others. He studied both combinatorial researches in mathematics and kinship structures in anthropology. He met Claude Flament in 1965 at a conference in Madrid. The latter proposed him to come to Aix-en-Provence to join the LEST (Laboratory of economics and sociology of work) in 1967. During the 1970s, research on networks were still scattered but the researchers who practiced it were integrated into the departments of dominant French institutions in social sciences: Daniel Courgeau (see above) was affiliated to the INED[8] when he led his surveys on urban and rural areas. Alain Degenne was affiliated to the observatory of the "continue social and cultural change," a program from the CNRS[9] directed by Henri Mendras. This program was not dedicated to SNA, but Mendras was open to what was at that time a new stream of research. The CNRS also financed the Alexis Ferrand's first works on friendship ties. As regard to Michel Forsé, author of the first article containing formalized SNA results, he was educated at Sciences Po Paris and at the INED, and held a PhD on sociability issues from the INSEE.[10] The INSEE also directed the survey named 'contacts' in 1985. But it is during the 1980s that the main actors of SNA began to create links between them. Undoubtedly, the most important event was, at this stage, the creation of the LASMAS research center in 1986 at the initiative of Degenne who left Aix-en-Provence for Paris. This laboratory was dedicated to quantitative surveys and data and aimed at spreading micro-computing technics. It would become the place where researchers would work together and develop SNA. The research engineers of the LASMAS, Lise Mounier and Marie-Odile Lebeaux, actively collaborated with Degenne, Ferrand, and later with Emmanuel Lazega. The latter was first hired by Michel Forsé at the OFCE[11] in 1991, and then at the LASMAS in 1992. At that time, there are wide variety of research in terms of themes and methodologies: for instance, a survey on sexual behaviors by Ferrand (Ferrand and Mounier 1990, 1993), or studies on the Paris Commercial Court or Cancer Scientists by Lazega.

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[8] National institute of demographic studies.
[9] National center of scientific research.
[10] National institute of statistics and economics studies.
[11] French office of economic conjuncture.

The second step is related to the multiplication of links between researchers. During the 1990s the international dimension appeared as fundamental. Several first meetings between French SNA researchers took place at *Sunbelt* (the annual international network conference). It was organized for the first time in 1981 by the *International Network for Social Network Analysis* (INSNA), an academic organization founded in 1977 by Barry Wellman. Most of the main French SNA researchers attended the Tampa's *Sunbelt* in 1989: Degenne, Ferrand, Forsé, Mounier, but also Karl Van Meter, a CNRS research engineer and director of the *Bulletin of Sociological Methodology*, a welcoming journal for SNA academic articles. Moreover, they created relationships with the methodologist and statistician Tom Snijders from Groningen (Netherlands). Groningen is an important place for SNA in Europe: this is where the first European conference on social networks (EUSN) took place, and this is also where Degenne and Ferrand decided to organize the second edition of the conference in Paris at the LASMAS. This 1991 conference in Paris was the second important one for French SNA. In 1987, Ferrand had organized a first conference named "An intermediate level: social networks," where the keynote speakers were two North American academics, Joseph Galaskiewicz (from Mineaplis University) and Barry Wellman (from Toronto University). 1991 was indeed an important year for SNA in France. First, the conference has been successful, with three hundred participants including a half French academics.[12] Second, it is the first time that a French scientific publication, *Société contemporaine* (n°5), published a special issue on social networks to which Ferrand, Degenne, Mounier, Forsé and Claire Bidart contributed. After this first special issue, several special issues would be published, for instance in the *Revue française de sociologie* in 1995. Third, two new main characters joined the pioneers of French SNA. The first one is Emmanuel Lazega. Coming from the US, he participated to the Paris EUSN conference in 1991 and ended up joining the LASMAS in 1992. He would later join Ferrand in Lille in 1999, and they would develop a SNA area with a yearly seminar ("networks and regulation") and a SNA research group composed of several PhD students. In 2016, twenty-five years after the second EUSN conference, Lazega has organized the second second EUSN conference in Sciences Po Paris. The second main character joining the pioneers at that time is Michel Grossetti from the University of Toulouse. He met Degenne, Van Meter and Ferrand during a methodological session at a conference of the International Sociological Association in 1987 and participated to the 1991 Paris conference. In 1992, he would start a course on SNA.

Hence, at the beginning of the 2000s, most of the main French SNA researchers had created interpersonal relationships, and despite the heterogeneity of their research interests, the idea had progressively spread between them that they were belonging to the same scientific community. Degenne and Forsé published their handbook in 1994, and they also institutionalized SNA within the LASMAS by creating a research axis named "social justice, communities and values" through the prism of social networks between 2001 and 2004. During this period, Degenne and Grossetti suggested to federate and create a discussion space: they created a 'thematic network' (RT) within the French Sociological Association (AFS; the RT26). The sessions of this RT took place at the AFS conference since 2004 until now. The RT26 has sometimes been associated with others, for example to the RT12 dedicated to economic sociology. Two years later, in 2006, a 'social networks' thematic mailing list was created and animated

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[12] French communications were mainly theoretical and concerned diffusion and innovation processes (Ferrand and de Ferrand and Federico 2013).

by Olivier Godechot: it now has one hundred and eighty members. This communication device allowed the members of the nascent community to diffuse information on events, as the RT sessions and other one-time or regular seminars organized in Paris, Lille or Toulouse. Toulouse became the main geographic center of SNA in 2012 when Michel Grossetti won a 'Labex'[13] with a theme centered around the "structuration of social worlds" (in which networks approach have a central position). Grossetti's federating action also consisted in the organization of three CNRS 'thematic summer schools' that took place in 2008 (at Cargèse), 2012 (at Ile d'Oléron) and 2015 (Ile de Ré). These meetings have been very important, not only for consolidating the community, but also for educating students and spreading SNA not only in the sociological field but also within the social sciences as a whole. An underlying assumption has been that SNA is not only a sociological and theoretical object in itself, but also a methodology provided to discover and analyze various kinds of phenomena, sociological as well as geographical or historical, etc. In fact, this is a multidisciplinarity characteristic of the development of SNA in France: after sociologists' RT26, historians gathered around Claire Lemercier have created the *Res-Hist* (networks and history) group, and geographers around Laurent Beauguitte and Serge Lhomme have created the *FMR* (flux, matrix, networks) group. These two geographers are even at the origin of the latest and probably main initiative directed towards the institutionalization of SNA in France: the creation, in 2016, of a CNRS 'GRD' (research group) named "social network analysis in social sciences." This GDR has several tasks, including the organization of the next thematic school, and the project of a new French academic and multidisciplinary journal dedicated to SNA (this would be published from 2017).

Conclusion

Social Networks had been the subject of many studies in the American sociology. To be part of what is today known as Social Network Analysis Research, there are four prerequisites (mentioned in our introduction): interaction as link bonding (or not) the actors; empirical data; graphic visualization; use of complex mathematical models. Nonetheless, this useful definition seems uncomplete to consider the effect of SNA in other countries, at least in France. To understand the influence between the American sociology and the French one at the intersection of networks, we have to take into account the national context of French sociology. Quantifying the impacts of SNA in an unconsidered manner would be at best pointless, at worse foolish. To chart SNA evolution abroad, sociologists must then consider sociology as a social milieu gathering actors in structures.

While necessary, the American definition of is not sufficient when applied to French structures. One important result of our paper is the need to take into account the importance of different languages, French of course, but also more formal ones such as mathematics. Another result is the need to consider what is at stake within the French scientific field, with dominant and challenging institutions. Today, SNA in France seems to have ensured an institutionalization process. After having started with a few

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[13] 'Excellence laboratory' is a French legislative framework allowing a large grant to a team of researchers in order to develop international scale works.

disciplinary entrepreneurs' deeds, some links have been knitted and have been transformed over time into organized groups. These groups are made to manage what looks like some kind of collective action. One can collect clues of this collective action: a subfield definition through the redaction of the Handbook, a working group among the main French sociological association (AFS), students training during summer schools, etc. Yet, this institutionalization process could be pushed further. For example, this could involve some well-known university degrees or a dedicated journal.

Should we go as far as affirming that French SNA has become an independent specialty from the American one and within French sociology? Some may cross that line, arguing that the recent development of interdisciplinary projects can be interpreted as a specialty development. Nevertheless, most French social networks analysts seem genuinely committed to be rooted into the French sociological heritage while enjoying the American network contributions. The intersection with other branches of sociology such as economic sociology or sociability studies is central in the development of French SNA, as well as the use of networks as a methodological artefact. We hope that the future of French SNA will be as composite and prolific as it has been through the last thirty years.

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