

Networks and Institutions

Walter W. Powell and Achim Oberg

INTRODUCTION

We share a firm conviction that the traditions of research on networks and institutions ought to be brought into closer alignment. To pursue our agenda, we both selectively review past research that emphasizes their mutual influence and introduce an array of empirical studies and methodological tools that show how the two streams can be profitably joined. But before we build our argument about the commonalities in theory and the utility of methods, we take up why these lines of research are often treated, particularly among European organization scholars, as unrelated.

Networks are relational; they reflect webs of affiliation. They have a temporal element: a network exists only as long as a relationship endures. Networks are conduits that channel the flow of ideas and information. One might say that networks look more horizontal than

vertical. In contrast, institutions are obdurate structures. They reflect long-standing conventions and widely understood sources of power and influence. Institutions are ‘sticky’ (Clemens and Cook, 1999). They appear more vertical, either in the top-down form of research on the influences of the modern state or the professions, or bottom-up as in more recent studies that focus on building institutions. Nevertheless, in either respect, there is a strong constructivist imagery. Such differences in perception might well explain divergences in understanding.

But perhaps other sources account for the lack of common appreciation and awareness. In an important respect, institutions reflect widely accepted cultural understandings. They are imbued with legitimacy and taken for granted. In this regard, institutions are cognitive constructions. Networks, in contrast, are much more active forms of engagement. They can also invoke ideas of geometry, either in the form

of the distance or path link of networks or in their overall composition. Such imagery is not surprising given the early intellectual origins of network analysis in balance theory, or in its mathematical form, in graph theory (Diestel, 2010; Wasserman and Faust, 1994).

We want to disrupt the current division of intellectual labor. Indeed, we find it odd and wonder whether it reflects a kind of niche competition between organizational and economic sociology, or in management schools, between organizational behavior and strategy. Whatever its sources, we think a close reading of some of the early theoretical statements in institutional analysis and some of the most notable empirical papers suggest that the perceived disjuncture is flawed and unnecessary. To counter this view, we review three fruitful lines of work: (1) research on social relationships and the configuration of such larger entities as inter-organizational networks and fields; (2) studies that highlight relational aspects in meaning construction; and (3) a nascent direction that combines the two previous approaches via multi-level analyses that interweave the study of social relationships and meaning structures. For each of the three lines we provide empirical cases that demonstrate the co-constitutive relations between networks and institutions. Each case draws on empirical studies that we have been involved in. The benefit of drawing on our own past work is that we can provide visualizations of the processes that link relational and institutional factors. These concrete examples underscore the payoffs from thinking both relationally and institutionally. We turn now to locate our arguments in canonical writings on institutions, then begin our survey by drawing on Max Weber's fundamental early definitions of social relationships and their meanings.

NETWORKS AS SCAFFOLDS FOR INSTITUTIONS

In their classic paper, Meyer and Rowan (1977) observed that the formal structures of

organizations 'dramatically reflect the myths of their institutional environments'. They argued that organizations are driven to incorporate practices and procedures defined and buttressed by widely prevalent, rationalized concepts in the larger society. These practices were institutionalized through professional standards and status hierarchies, and reinforced by public opinion. Meyer and Rowan also stressed that the complexity of relational networks in modern societies generates explosive organizing potential, which greatly increased the spread of rationalized myths.

The generative potential of networks as transmission channels was expanded on by DiMaggio and Powell (1983). Their ideas about organizational fields, and the mechanisms through which ideas are transferred, drew directly on three insights from network research. The concept of an organizational field built on research on inter-organizational networks (Laumann et al., 1978). The field image also drew on ideas of structural equivalence (White et al., 1976), which emphasized that people in common structural positions often experience similar pressures and possibly even think alike owing to these constraints, regardless of whether they have direct contact with one another. The third source of inspiration was French sociologist Pierre Bourdieu's provocative discussions of the role of fields in creating, assigning, and maintaining cultural capital. Perhaps no scholar has emphasized the relational character of fields more than Bourdieu. His vivid line, 'To think in terms of fields *is to think relationally*' (Bourdieu and Wacquant, 1992: 96) captures the linkage between networks and fields. Bourdieu insists that mechanisms of institutional influence should operate most strongly within fields, rather than at a diffuse societal level. These disparate ideas were foundational to DiMaggio and Powell's argument about how fields are formed, leading them to posit a four-step developmental process that involved: (1) increased interaction among participants; (2) the development of well-defined status orders and

patterns of coalition; (3) heightened information sharing; and (4) mutual awareness and responsiveness.

Each of these four processes is inherently relational. Increased interaction among participants is facilitated by societal rules that smooth the establishing and deepening of social relationships; status orders emerge from vertical relationships, whereas coalitions are formed by horizontal relationships; information is shared within already established relationships; and awareness and responsiveness are bi-directional ties of mutual recognition and observation.

This strong connection between networks and fields does not mean that a field can easily be modeled as a 'flat' network consisting of only one type of social actor and one type of relationship. Instead, to model the four mechanisms we need different types of individuals and organizations, diverse types of social relationships (to wit, 'acquaintance relationships' that enable increased interaction among people without deep prior relationships, 'collaboration relationships' to form coalitions) and the variety of flows that follow these relationships (such as a flow of information, a flow of recognition, and a flow of endorsements). Before we turn to examples of complex network representations of fields, we begin with simple building blocks for these larger structures: the relationships between two individuals and the meaning construction that these relationships facilitate.

An Integrative View of Relationships and Meanings

When the German sociologist Max Weber summarized his conceptual and methodological ideas in *Wirtschaft und Gesellschaft* more than 100 years ago, he defined social relationships as:

The term 'social relationship' will be used to denote the behavior of a plurality of actors insofar

as, in its meaningful content, the action of each takes account of that of the others and is oriented in these terms. The social relationship thus exists entirely and exclusively in the existence of a probability that there will be a meaningful course of social action – irrespective, for the time being, of the basis for this probability. (Weber, 1978: 26–27)¹

Weber's definition of social relationships has proved robust. It captures the subjective elements of an interaction, the mutuality of expectations, and a temporal dimension as well. With relative ease, we can transpose Weber's definition into social network terms and also incorporate his writings about methodological issues (Ringer, 2009). Figure 17.1 illustrates a basic scenario consisting of two persons interacting with one another and two researchers observing their interaction.

Each of the focal persons has his/her own subjective understanding of how and why to interact with the other person and how the reaction of the other person could be understood. If a social relationship exists between the two, that attachment will guide them in interpreting the meaning of their interaction. Assuming that the two people are similarly aware, the likelihood of an overlap in their understanding is high. The result is a shared understanding based on an inter-subjective meaning construction.

A second aspect of Weber's definition is that the existence of a social relationship between two persons provides a chance for meaningful behavior. From a methodological point of view, a social relationship captures the likelihood of certain types of interactions. Moreover, a social relationship might exist even if neither individual was aware of it. For example, two members of the same large organization are joined by a 'colleague' relationship, even if they do not know each other. When they eventually meet, they recognize this relationship during a first introduction, and it can serve as a template for future behavior. This 'existence without knowing' aspect of social relations is a primary reason that reconstruction of such larger social entities as organizations, markets, or fields

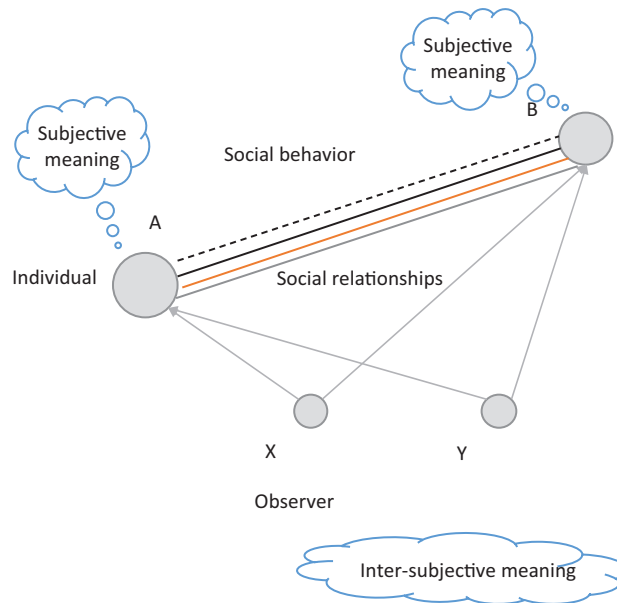


Figure 17.1 Subjective and inter-subjective meaning

as social networks enhances our understanding of the behavioral aspects of social and economic life. The idea of existence without knowing is captured in the concept of structural equivalence (Lorrain and White, 1971).

Weber also pointed out that a connection between people often entails more than one social relationship that provides meaning. When multiplex relations exist between two people, such as friend-to-friend, co-author-to-co-author, or senior-to-junior-scholar, each has to figure out which aspect of their relationship is relevant to understanding a particular interaction. Widely accepted social definitions of types of different relations are a useful guide to distinguishing meaning structures. For example, the father-son relationship is highly typified and captures a set of social expectations (which, of course, vary among cultures). Weber saw tradition and idealization as mechanisms to create types of relationships and their connected expectations of appropriate behaviors. As we will see later, such typification of social relationships becomes a critical building block

toward understanding the co-construction of networks and institutions.

In Weber's methodological thinking, types – especially ideal types – carry the potential for researchers to understand the interactions they observe. The difference between the use of types by interacting persons and their use by researchers is that researchers should explicate which types of relationships are best in explaining the observed behavior. The interacting persons themselves do not have to be aware of the relationship that best explains their behavior. Consequently, a purported 'objective' meaning could possibly deviate from the inter-subjective understanding shared by two persons.

The assumption that social relations provide meaning for interaction may strike some as static and deterministic. In his analysis of the spirit of capitalism, Weber (1904) described the connection between meaning and interaction as changing over time in different phases: In the first phase, the meaning of an interaction practice is clearly defined. In the second, a practice spreads among peers who share a

similar cultural background and therefore understand the same meaning. In the third, the practice is disentangled from its local meaning, making it possible for it to spread to groups with different cultural backgrounds. In the final phase, the interaction practice becomes rationalized, and thus its meaning stabilizes again. Translated into modern terms, it is clear that Weber recognized the social and cultural construction of both types of relationships and categories of actors.

SOCIAL RELATIONS AS BUILDING BLOCKS FOR INSTITUTIONS

We take Weber's discussion as a starting point for our argument that social relations are the building blocks of larger social structures. This elemental, 'bottom-up' account rests on two premises.

First, the type of relationship influences the accompanying interaction. For example, gift-giving might be seen as a typical interaction in a 'friendship' relationship, whereas negotiations and haggling are less likely; in contrast, in an 'anonymous market relationship', negotiations and money transactions are expected, whereas gift-giving is unusual. Assuming that strong connections among types of relationships and interactions exist, one can deduce an expected interaction by knowing the type of relationship. Following this assumption, the social network algorithms model expected interactions between two participants, tracing a path across chains of actors and deducing indicators for the effect of different relations. Assuming a typical behavior for a specific type of relationship, the modeled social network generates expected behavioral outcomes for participants even though actual behavioral data are not collected. The second premise is that larger social entities are assembled from the social relations among individuals. For example, a social relation connects two individuals ('dyad') through employment contacts, they might become members of a company

('organization'). Because of the individuals' reputations, their organization is endorsed by other organizations in the same domain as a respected member ('organizational field'). In turn, this good reputation enables the organization to initiate business contacts with other organizations ('market'). By studying individuals and organizations as nodes and their relationships as links, social network analysis helps us to understand the flow of information, the aggregation of legitimacy, the diffusion of practices, and the embeddedness of individuals and organizations in larger networks.

Example 1: Foundation of an Organization

Our first example highlights relational construction processes that change the positions of individuals and organizations during the foundation of a new organization. The organization in question is a software company here called KnowledgeFactory, which was formally founded in January 2000 in Germany at the peak of the New Economy boom to produce knowledge management software that overcomes the limitations of hierarchical knowledge diffusion. Most studies interpret the formal founding date as the 'birth' of an organization, but we are also interested in contacts that existed before founding. We studied these relations, and the processes that changed them from 1998 to 2001, through repeat interviews with founders, funders, early clients, early employees and friends (Oberg and Walgenbach, 2008). In addition, we had access to the internal electronic messaging system that stored all messages, with their sender and receiver.

From the interviews, we created a database of all individuals and organizations that were mentioned as relevant to the founding process. Using interview data, we coded types of social relations that connected individuals (acquaintanceship, friendship, co-ownership, mentor–mentee), individuals and organizations (organizational membership ties), and

organizations (market contract ties). We allowed for multiple ties between people. For example, the founders could be connected by both co-ownership and friendship. We also reconstructed the lifespan of each connection. We went through several iterations of interviews with participants to check the details for each person's relations.

The resulting database contains a two-mode network with nodes for individuals and organizations and edges for relations of different types and lifespan. To analyze the relational structure, we generated snapshots (see Figure 17.2) of the network of participants and their affiliations at particular times.

The first snapshot, two years before the formal founding, shows the participants embedded in two organizations. Some of the later founders and early employees were students at a university, and others had already founded a training company nearby. The organizational memberships within these organizations formed two dense clusters, as the respective contexts functioned as catalysts for contacts.

A striking feature of this example is the high number of multiplex ties in each cluster. The later founders have acquaintance relationships to other students and faculty. At the same time, they are members of the university where they acquired their first student consultancy jobs. One could interpret this high level of multiplexity as an indicator of the founders' social capital. The two clusters are weakly linked by acquaintance relationships and by the dual membership of one student of the university who was working part-time for the training company.

The lack of connections between the two organizations could be perceived as a structural hole that hinders information and knowledge from flowing between the two clusters (Burt, 1992). Nevertheless, the acquaintance relations provide a weak-tie structure for novel information to flow from one organization to the other (Granovetter, 1973).

One year later, the overall network structure had changed dramatically. The later founders at the university had successful

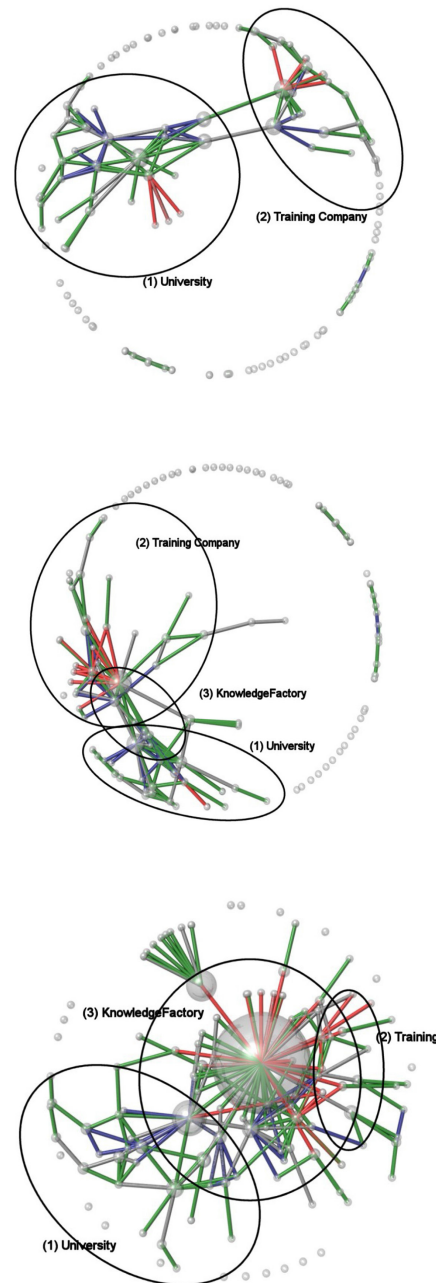


Figure 17.2 Founding of a company

consultancy projects; they learned through these projects that their clients were searching for easy-to-use knowledge management systems. Four of the later founders

developed a software prototype for such a system. As they were still master's and PhD students, they searched for other potential co-founders with prior business experience. In doing so, they talked to many friends and acquaintances. Eventually, the student with the double affiliation proposed to introduce the university team to the two founders of the training company. After some meetings, they decided to collaborate and find potential customers for the new venture. Luckily, they found early customers and started initial knowledge management projects. As they worked on these projects, people from the training company and members of the team at the university formed deeper social relationships. Consequently, we observe in the second visualization that the previous clusters of the university and the training company are still relevant, but the former gap between the two organizations is now bridged via multiple relationships.

During its first year, the founders of the Internet start-up convinced several 'business

angels' to invest in them. At the same time, they received contracts from large companies in the same region for their knowledge management system. To fulfill these, nearly 60 employees were hired during the first month, initially close friends, then acquaintances, and later people without any connection to the founders or the initial organizations. Within the organization, the depth of the relations among individuals varied. Some members were connected through multiple relations, including co-ownership, friendship and mentorship, whereas others were linked only by formal mentorship relations. In sum, one year after the founding of the organization, the network structure was quite different. The new organization became the major node in this scenario, whereas the relevance of the university and the training company receded.

To uncover the internal communication connections, we reconstructed the network of sent messages from the company's internal electronic messaging system 18 months after its formation (see Figure 17.3). We observed

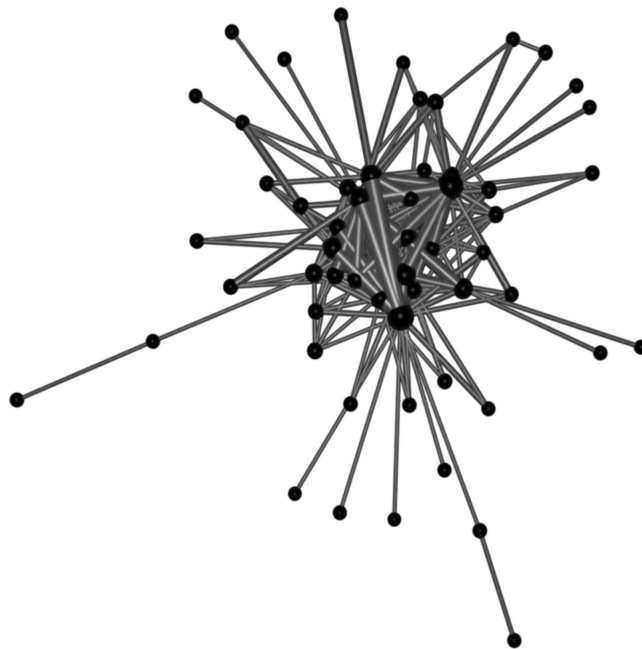


Figure 17.3 Communication network

a dense cluster of messages that connects all members of the organization, although the degree of involvement and the communication partners differ. Some employees form a strong core in which each member communicates with others. Other employees communicate infrequently with only a limited number of core members, and thus end up on the periphery.

When comparing the communication threads with the relations that existed before the company's creation, we observe that members with prior relationships are more likely to be in the core than those hired later. Furthermore, communication partners with multiplex relations – friendship combined with mentorship or ownership combined with mentorship – are less likely to use hierarchical signals in their communications than those with organizational membership and mentor–mentee ties as their only connection. Employees with multiplex relationships communicate in accordance with the company's avowed goal to implement knowledge management solutions that supplant more hierarchical modes of information diffusion. Members who lack social ties beyond their formal membership have a more limited set of communication partners, communicate most often with their mentors and evince signs of subordination. They do not embrace the company's goal to communicate non-hierarchically and use the mentor–mentee relations as a guide for orienting their interpersonal behaviors.

The example shows the strength and variation of the institutional expectations connected to social relations. Friendship and co-ownership both contain an expectation of non-hierarchical communication, whereas organizational membership and mentor–mentee relations come with stronger expectations of obedience and formal communication.

The study demonstrates both the flexibility and inflexibility of social relations. Relying on typical social ties, the network of affiliations was reconfigured extensively during the start-up phase. The non-idiosyncratic social relations operated as templates to configure and rewire social structures until the new company

was founded. But when it tried to change the behavioral expectations connected with social ties, the company failed to achieve its goal of establishing non-hierarchical modes of communication among all employees. In the short run, institutionalized relationships and their associated expectations provided a scaffolding to create a new entity, but highly institutionalized behavioral expectations about subsequent relations among new 'outside' hires hindered the effort to create an open workplace. The expectations inherent in social roles proved recalcitrant to attempts to build new work arrangements.

Inter-organizational Relations and Organizational Fields

After this example of relational processes within an organization, we turn now to relations among organizations. Analyses of relations across the same type of organization have been the stock-in-trade of network analysis. But to understand how fields form, and how field-wide norms and expectations develop, requires analyses of multiple types of organizations. It is at the intersection of different modes of activity that new fields emerge. Novelty often emerges at the intersection of two or more social worlds with divergent criteria of evaluation (Padgett and Powell, 2012; de Vaan et al., 2015). To illustrate the emergence of novelty, we draw on a two-decade project on the evolution of the field of life sciences (Powell et al., 2005, 2012). To exemplify how the intersection of social worlds leads to hybrid organizational forms, we present an example drawn from recent discussions of social impact (Korff, et al., 2015; Powell et al., 2017).

Example 2: Network Dynamics and Field Formation

We use a spatial analysis of Cambridge and Boston, Massachusetts, home to the largest

concentration of dedicated biotech companies and biomedical research in the world, to illustrate how different types of organizations interact, and in turn create a regional cluster. Boston has a rich array of world-class research organizations, including Harvard University, MIT, Tufts and Boston University. There are numerous world-class research hospitals, including Massachusetts General Hospital and Brigham and Women's Hospital. There are also many cutting-edge medical institutes, such as the Dana Farber Cancer Center. Several of the first biotech companies in the world were formed in Boston (Powell and Sandholtz, 2012). These organizations began collaborating on drug development in the 1970s and 1980s, and by the 1990s the Boston area also developed an active venture capital sector that helped finance numerous biotech companies.

At the start of the 21st century, Kendall Square in Cambridge had become home to a thriving cluster of biotech firms, as well as MIT and the Whitehead Institute for Biomedical Research, an international leader in the Human Genome Project. In the early part of this century, large pharmaceutical firms, including Novartis and Pfizer, moved their R&D facilities to Kendall Square, as did the Los Angeles-based biotech company Amgen. By one count, the larger Boston region had 57 independent dedicated biotech firms, 19 public research organizations and 37 venture capital firms, linked by an extensive network of relationships (Owen-Smith and Powell, 2004).

In the course of our project on the evolution of the life science industry, we collected detailed data on both formal and informal collaborative networks in Boston. The database included information on founding teams, strategic alliances, science advisory boards and co-patenting, all of which helped build a community of practice (Porter et al., 2006). The most striking finding from this work is that public research organizations were the cornerstone on which the Boston community was built (Owen-Smith and Powell, 2004).

To illustrate, more than half of the 131 people involved in creating biotech companies between 1980 and 1999 were academics, and the large majority (48 out of 67) were from Boston-area universities. These founders all retained some form of their university affiliations (Porter, 2004).

The public research organizations, notably MIT, BU, Harvard, Dana Farber, Massachusetts General, and the New England Medical Center, were densely interconnected, formally through research partnerships and informally through joint appointments of faculty and common grant funding. The biotech network depended on these organizations, and we have shown that if their presence is removed, the larger network dissolves (Owen-Smith and Powell, 2004, 2006). As the community matured, more and more participants joined and the reliance on public research organizations lessened. But the commitment to open science, in which information, knowledge and human capital were widely shared, persisted (Powell et al., 2007). The vitality of the Boston community sprang from the universities acting as wellsprings of knowledge, actively engaging in research partnerships rather than pursuing only revenue-maximizing activities. The Boston community was noted for collaborative competition, a cornerstone of the scientific ethos. Thus the inter-organizational networks that catalyzed the community left a lasting institutional imprint.

Figure 17.4 represents the Boston network, covering the years 1988–1999. The degree of connectivity – that is, the number of alliances that an organization engages in – is reflected in the size of the node. The shape of the node represents the type of organization; circles represent biotech companies, triangles universities, and squares research institutes and hospitals. In the upper left corner, we see alliances between dedicated biotech firms, with the most connected companies represented by the larger circles. The two largest circles are the first-generation companies Biogen and Genzyme, both founded by academics. In the upper right, we add universities, represented by triangles, and

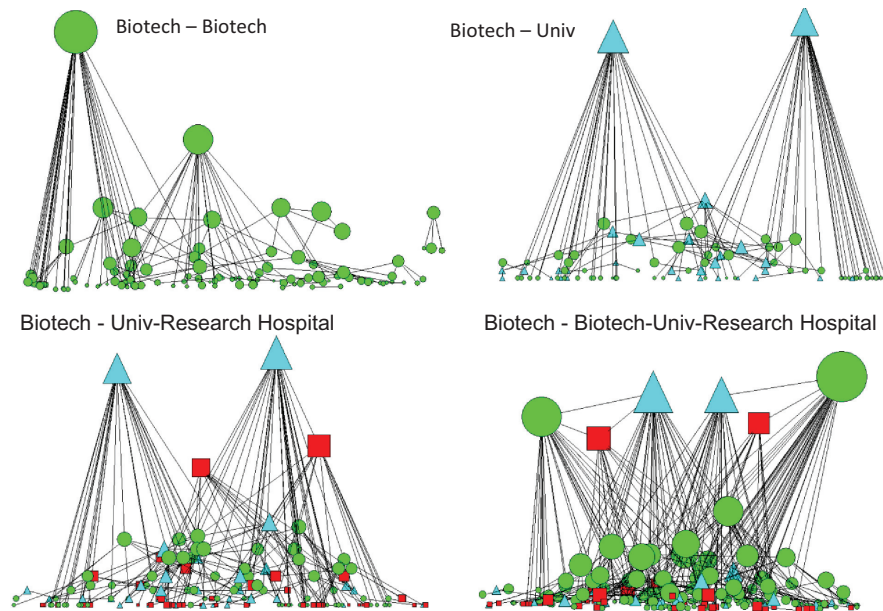


Figure 17.4 The Boston life sciences community, a field connected by different organizational forms (node size indicates number of alliances)

depict the network of ties between universities and biotech. The two largest nodes reflect the linkages of Harvard and MIT, on the left and right respectively. Research hospitals and medical institutes, the most active of which were Massachusetts General and Dana Farber, are added on the lower left as squares. The web of affiliations becomes much more complex and intermingled. On the lower left, we present a picture with all the organizations included. The full Boston community has something of the appearance of rival cliques, with two trios of firms, universities and hospitals at the head, vying with one another, and connected to an array of other organizations. This tightly connected, interdependent network is linked by multiple affiliations.

These network pictures illustrate how a set of individual relations among organizations of different types cohered into nested levels of affiliations that knitted the biomedical community in Cambridge and Boston; they created the dynamism that drove the evolution of the most productive biomedical

cluster in the world. Moreover, they illuminate how the joint engagement of universities, dedicated biotech firms, and research institutes and hospitals spawned a new era of life sciences research. These images collapse two decades of network data into four representations, so they do not capture the dynamics of the process. Nevertheless, they vividly illustrate how a web of affiliations spanned multiple types of organizations, private, public and non-profit, and suggest that the ethos of public research became the glue for the commercialization of the life sciences in the Boston cluster (Whittington et al., 2009).

How might such relationships evolve through time, and on a global level? Can we use network analysis to visualize how a field emerges and becomes a coherent entity? In Figure 17.5 we represent the evolution of the most connected set of participants in the worldwide field of biotechnology over a similar time span. To do so, we present four discrete-time visualizations to capture change and shift our focus from organizational forms

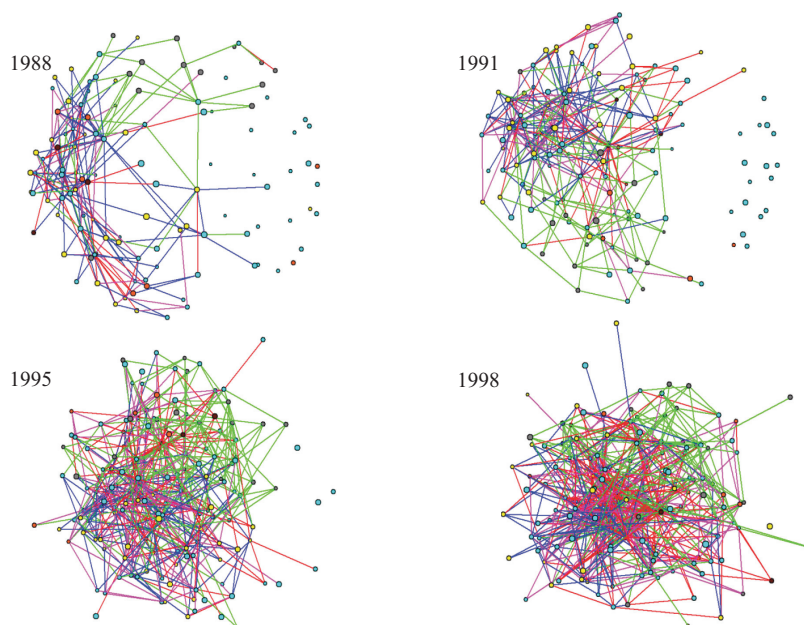


Figure 17.5 The dynamics of a field through time: the evolution of a biotech hub

to the type of relationships. We use Pajek, a free software package for the analysis and visualization of networks.

In this case, the networks are different types of formal inter-organizational relations, captured by data on contractual agreements between two parties. Pajek employs two powerful minimum-energy, network-drawing algorithms to represent data in two-dimensional Euclidian space. These algorithms simulate the network of collaborations as a system of interacting particles, in which organizational nodes repel one another unless network ties act as springs to draw the nodes closer together. These spring-embedded algorithms iteratively locate a network representation that minimizes the overall energy of the system by reducing the distance between connected nodes and maximizing distance between unconnected ones.

For this visualization, we include all members of the most connected component of the

overall network for the year 1998, represented in the lower right. We then go back in time to 1988 and depict a representation of the field a decade earlier. The links, or springs, are colored according to the functional activity reflected by a contractual inter-organizational tie. Red springs represent an R&D partnership, magenta a licensing agreement, green a financial relationship and dark blue an alliance involving one or more stages in the commercialization process, ranging from clinical trials to manufacturing to sales. All the nodes are scaled to the same size, so that we may focus on the evolution of relationships rather than the changing scale of nodes as in Figure 17.5. The nodes are colored according to their organizational form, with light blue a biotech firm, yellow a pharmaceutical corporation and brown a government institute or agency. Gray nodes represent venture capital firms; their growing importance is clearly seen in 1995 and 1998. One might think of the representation as an

image of participants with different identities who engage in diverse activities with a variety of partners.

Several key features stand out in the 1988 image. The predominant color is blue, and the most active participants are small biotech firms, pharmaceutical corporations and government research agencies. The strong presence of commercialization ties (blue) indicates the dominant strategy of mutual need during the early years of the biotechnology industry. Young firms lacked the ability to bring new medicines to market, whereas large firms trailed behind in understanding new developments in molecular biology (Gambardella, 1995). Finance ties (green) are less prevalent, and very few venture capital firms (gray) are present. Most young companies supported themselves by selling their lead products to large corporations, who subsequently marketed the medicines and pocketed the lion's share of the revenues. In the lower half of the figure, one can see red springs between biotech firms and a brown node, representing the US National Institutes of Health. These reflect research collaborations between start-up companies and the NIH as well as its National Cancer Institute branch. The disconnected nodes on the right of the figure represent organizations that were not yet affiliated, but became so by 1998.

Move ahead to 1991 and notice several important changes. Many more green springs reflect a new form of financing from venture capital rather than large corporations. A few orange nodes enter the picture, reflecting the growing importance of universities in R&D collaborations and licensing efforts. The top of this image now has a mixture of blue, red and magenta, indicating that research partnerships were becoming as important as commercialization ties.

Fast-forward to 1995, and the importance of venture capital, reflected in the green springs, grows even more. Blue springs have declined in number, whereas red and magenta have also increased. The field is much more interconnected. Finally, in 1998,

we see a densely linked field in which organizations have multiple affiliations with a large number of different partners. Near the center is a brown node, again the NIH, and red is the dominant color in the middle, highlighting the increasing salience of scientific collaborations.

What are we to make of these network images of a field's evolution, reflected in different kinds of partnerships and collaborations? These longitudinal snapshots tell the story of how a field moved from relations of dependence to alliances on more equal footing. This shift is reflected in the transition in the color of ties from blue to red. The underlying driver of the changes is the development of alternative sources of financing, reflected by the green ties, which represent venture capital funding. Blue springs represent late-stage commercial development, whereas green springs reflect early-stage new product development and companies that are at a pre-IPO stage. The centrality of red ties, associated with public research organizations, suggests that venture capital financing and government support of R&D supplanted small firms' dependence on multi-national corporations. The multi-national corporations that appear in the center (represented by yellow nodes) in 1998 also had to learn how to interact differently with small start-ups, engaging in research, licensing and co-financing with them, rather than simply cherry-picking their most promising products.

The field that emerged is tightly interwoven; it is like a high-speed autobahn, or a hub, in which connections among participants follow multiple independent pathways. In subsequent work, we continued these network maps into the 21st century. Powell and Owen-Smith (2012) show that the field evolved with an open elite structure, allowing fast access to new entrants with promising research ideas, but at the same time having intensive competition among the most densely interconnected organizations. Although each successful regional cluster – the wellsprings of the field – had a different type of organizational anchor,

the underlying relations and processes were similar: fluid labor markets, open sharing of successful practices and the interweaving of public and private science. These institutionalized expectations distinguished the successful regions, and even though they were absent in other cities, they left a relational footprint on the entire field. In this Boston example, we see the co-constitutive aspects of both networks and institutions: the norms of public science shaped early collaborations, and in turn an open-access network structure imparted its stamp on the larger community.

Example 3: Organizational Hybridity

Early research on organizational fields was based on the assumption that fields typically had a dominant type of organization or occupation, along with various supporting organizations. Consequently, studies of health care focused on doctors, hospitals, insurance companies and government regulation, and higher education studies focused on universities, students and professors (Scott, 2014: ch. 5). These early studies were typically focused on products and services, not on issues (Hoffman, 1999). Now, however, in many realms of life, fields are defined by emerging issues, and debates sprawl across a host of domains. Consider environmental sustainability, climate change, or many areas of health care that merge with lifestyle awareness. All these are fields with active participants from a wide spectrum of sectors.

Studying emerging issue-based fields is challenging, requiring new methodological tools that allow potential participants to be identified on the basis of connectivity rather than ontological properties. One fruitful source of data is the analysis of hyperlinks – the incoming and outgoing references that organizations make to one another on their web pages. Such data can be gathered with a webcrawler that starts from one or more identified central websites and then follows and

captures the network of links between web pages, in a form similar to snowball sampling. The resulting hyperlinks create a type of reference network, comparable to citations in academic papers or friendship networks expressed on Facebook. Lists of affiliated organizations with hyperlinks also resemble alliance portfolios, common in the study of inter-organizational networks, or tombstone listings, typical of work on investment banks. Incoming links may represent an organization's status or recognition, whereas outgoing links may reflect an organization's aspirations – that is, to whom it wishes to be attached or to whom it is indebted. Reciprocated links indicate mutual recognition. The overall portrait of a network of hyperlinks suggests the position of an organization within a particular domain or issue field.

The fact that references are hyperlinks, rather than resource flows or formal contracts, might raise concerns that such connections are somehow less tangible. But we think weblinks are particularly suitable for the analysis of dispersed fields, where interactions may be hard to observe in formats other than in digital communication. Even though it requires little financial investment, linking to an organization's website implies a willingness to alert one's audience to its existence and activities. Mutual bidirectional references reflect common awareness and a willingness to share traffic and a critical resource: attention.

To study the global debate on social impact that is bringing together organizations from international development, the non-profit sector and social entrepreneurship, we developed a weblink analysis of those involved in this discussion (Korff et al., 2015; Powell et al., 2017). Using a webcrawler we traced and recorded the hyperlinks to reveal a relational network of this emerging issue-based field. Our resulting sample, drawn in 2011, was remarkably interconnected. The 369 entities in our analysis had an average of 32 unidirectional connections to one another and shared 13 mutual references. With an average

distance of just 2.2 degrees of separation between any two members, the issue field of performance evaluation is highly cohesive. Nevertheless, the boundaries of the field were exceedingly porous: they spanned non-profit, for-profit, government and international organizations. Even non-organizational entities, such as blogs, conferences and social movements, were involved. And within the non-profit domain there was great variety as well: associations, foundations, non-profit consulting firms and various service intermediaries, operating charities, public research organizations and churches.

We use a circular connection graph to illustrate the features of connectivity and diversity (see Figure 17.6). Graphs of this type were originally developed for the representation of genomic data, but they have since been used to represent global migration flows by world regions (Abel and Sander, 2014), the spread

of epidemics (Guo et al., 2013), and even patterns of musical beats (Lamere, 2012). The beauty of this method is that a plot of hierarchically structured nodes, in our case different types of organizations, forms a circular pattern with their weblinks displaying the relations between the various members of the field. When drawing the paths of connections, our script bundles ties with regard to organizational form. The resulting visualization shows how nascent fields bring together different types of organizations, thus offering a tool to capture membership in a possible emerging field.

We take a single organization, Acumen, from the full sample and display its hyperlinks, representing all ties between it and other organizations. We are able to show incoming, outgoing and bidirectional ties. Compared to more typical network visualizations, the circular display has the advantage of

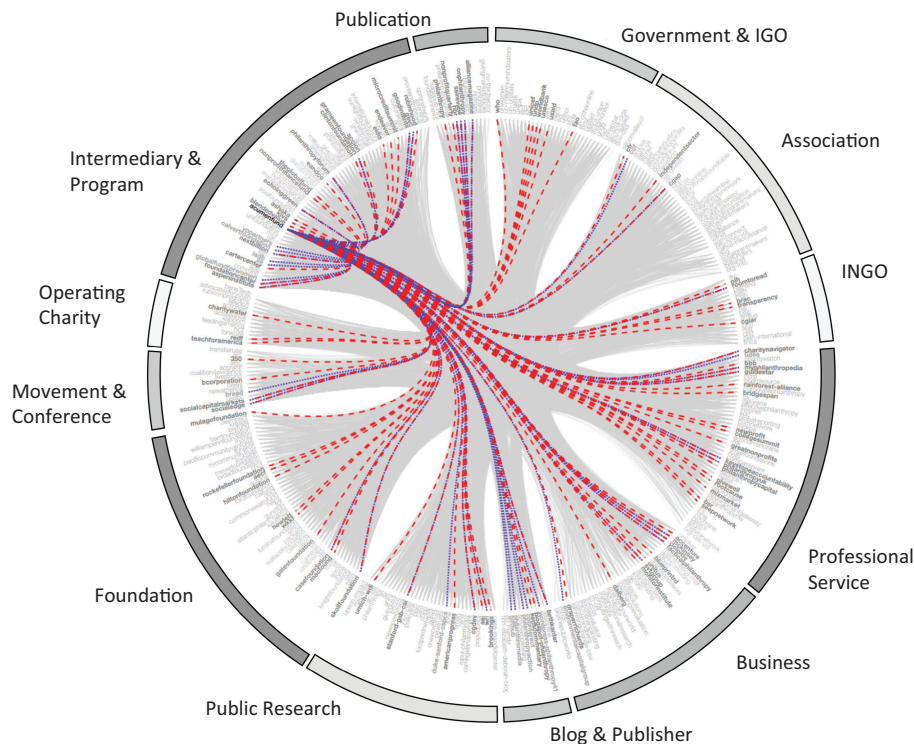


Figure 17.6 Relational definitions of organizational forms – Acumenfund as an example

conveying the distribution of types of organizations within the sample, thus highlighting diversity, and simultaneously representing ties among organizations, also depicting connectivity. We think these visualizations allow for a fast appraisal of the configuration of a field and the relationships among different types of organizations. This type of visualization is particularly appropriate for the analysis of nascent fields or fields in transition, where connections are made between organizations of diverse legal form. To be sure, a precondition for applying this method is the availability of information on organizations' legal status, but typically such information is easily obtainable.

The visualization depicts the hyperlinks that appeared in December 2011 on the web page of Acumen, a global non-profit venture fund created in 2001 to invest in social entrepreneurs working on solutions to poverty in the world's poorest countries. Acumen is an interesting case because it is a hybrid organization, or an amphibian, as suggested by its legal form as a non-profit venture fund. There is considerable interest these days in hybrid organizations (see Battilana et al., Chapter 5 this volume), but the focus of research has been limited to individual organizations rather than the wider environment in which they are embedded (Battilana and Dorado, 2010; Pache and Santos, 2013). Our network representation allows us to see the diverse set of organizations to whom Acumen has connections.

Acumen's mission is to build new organizational models for alleviating poverty. It employs a wide array of communication strategies, from regular email newsletters, to Twitter and Facebook accounts with more than half a million followers, to blogs. It also offers a fellowship program and has numerous free online courses. As an investment fund, it focuses on providing funds to help create financially sustainable organizations that deliver goods and services to the world's poorest communities. Its network of weblinks spans an array of organizational forms, with

particular depth in contacts with financial services companies and other funders. It has relationships with operating charities and international non-governmental organizations (NGOs), such as Bangladesh Rehabilitation Assistance Committee (BRAC), Teach for America and Room to Read, all organizations with an emphasis on entrepreneurial leadership. Acumen also shares bidirectional ties with leading consultancies, non-profit intermediaries such as Bridgespan, and for-profits such as Deloitte and McKinsey. In sum, we see a combination of links that involve financial support, consulting, training and mobilization. These affiliations suggest that Acumen seeks to establish itself as a central contributor to debates on social impact, and it is able to put considerable financial weight behind its vision.

Research Potential for Institutional Analysis

As we have seen in these examples, relational structures are vehicles for the flow of information, knowledge, resources and reputation. But networks are much more than mere conduits; they do not just pass things. Networks do 'transformational work' (Padgett and Powell, 2012: 9). We saw that individuals are deeply embedded in multiple networks through their connections to friends, collaborators and mentors. These webs of affiliations create various demands and expectations, and identities are forged out of these divergent expectations. To act in such complex positions and switch roles in order to fulfill the linguistic and social rules attached to various relationships is part of daily life. Humans are often very good at managing such complexity, precisely because many roles and rules are deeply institutionalized. Social network analysis provides a rich toolkit to analyze micro-level institutional processes at the level of real-life data – such as with analyses of electronic interactions in organizations.

Meanings – both in terms of typifying a relationship and with respect to the identities of the participants – emerge out of intermittent switching across activities and relations. Such stories (to use Harrison White's language, 1992) are the cultural and discursive face of networks. To focus solely on pipes and prisms (Podolny, 2001) or embeddedness (Granovetter, 1985) can elide the myriad ways in which networks and institutions are intertwined.

We can also study how organizations are embedded in a network of relationships with other organizations in a similar way. As we have seen in the examples, variation in relational position affects legitimacy, growth and rates of innovation, even when we control for other organizational characteristics such as size, age and form (Powell et al., 1996; Maurer and Ebers, 2006). Although early network studies reduced this thick relational embeddedness to a simple count of the number of partners, more recent work examines the expected variety of environments that comes with differing types of relationships and partners. Such fine-grained measures for the heterogeneity of environments are helpful to study the complexity with which organizations are confronted (Beckman et al., 2014).

In addition to individuals or organizations, we can also analyze the types of relationships that facilitate interaction and govern exchange. When looking at affiliations among partners, we observed in many of the examples two parties who were connected through multiple types of relationships. These multiplex ties help to both initiate and govern formal transactions. From a broader institutional point of view, the character and complexity of relationships makes participants more receptive to new ideas. Which kinds of relationships can emerge from prior ones, and how these relationships interact with each other, are fertile topics for studying how congruent and conflicting institutional expectations emerge (Zaheer and Soda, 2009).

Limitations

One premise of this research direction is that institutionalized behavioral expectations can be proxied by capturing relevant types of social relationships. By relying on types of social relationships, this line of research does face several limitations. First, the same type of relationship might have divergent meanings for different participants. For example, within the field of biotechnology, a contract for a joint research program between a university and a big pharmaceutical company might be a highly detailed formal document regulating who contributes what and who owns the intellectual property. In contrast, a contract for a research collaboration between a university and a start-up could involve only a short letter of intent discussing shared problems. Thus the same activity has divergent meanings, depending on whom it is conducted with. Second, when we study social relationships in larger fields or in different and overlapping fields, the cultural sphere of these fields might lead to different understandings of the same type of relationship. For instance, an 'organizational membership' relationship is strongly connected to a work contract in the business sphere, whereas 'organizational membership' in a non-profit setting is more similar to belonging to a club. Third, even within the same sphere, the meaning of a type of relationship may vary depending on the historical era. Marriage in the 1950s in the United States and Europe was strongly associated with a hierarchical difference between husband and wife, whereas marriage or cohabitation today is on more equal terms. And, obviously, the very meaning of marriage has changed profoundly in recent years.

In principle, social network methods have the ability to capture information about differences in meanings. But it is no easy task. The above-mentioned problems could be handled by increasing the amount of stored information on the cultural and temporal specificities of each relationship. Such efforts

have been rare because of data storage challenges, but we expect to see future research that makes use of fine-grained differences in the representation of types of relationships.

Another potential concern arises with the idea that social relationships ‘transport’ resources between actors, as if these resources are always commodities. The question is twofold. First, to what extent do tacit resources such as information or knowledge stay unchanged when traveling from actor to actor (Czarniawska and Joerges, 1996)? Resources may be altered as they travel across fields, social domains, or countries (Sahlin-Andersson, 1996). Transpositions might be the result of editing and translation practices that lead to local adaptations distinct from the originally transmitted idea (see Wedlin and Sahlin, Chapter 4 this volume). Indeed, a good deal of innovation occurs when ideas are transported from familiar ground to unfamiliar domains (Westney, 1980).

Second, social relationships are not the only vehicle for transporting tacit knowledge. The mass media and various high-status organizations are also crucial to the diffusion of ideas and legitimation (Meyer and Bromley, 2013; Meyer and Rowan, 1977). The World Wide Web, and if we think back to the past century, books, newspapers and radios, are crucial to the transmission of ideas and practices. Networks of relationships are important but surely not the only means through which ideas are shared and legitimated.

RELATIONAL MEANING STRUCTURES

A different, albeit smaller, line of research focuses on the meaning of relationships. Research in cultural sociology on narrative networks and historical reconstructions of relationships should be of keen interest to institutional scholars (Franzosi, 1998; McLean, 2007; Mische and White, 1998). Of special interest is the construction of meaning of typified relationships, types of roles

and organizational forms, and transmitted content. To capture these different entities, we use the term ‘concept’ as a placeholder.

An underlying premise of this research is that the meaning of one concept cannot be understood without acknowledging its relationship to others. For example, the concept of a specific organizational role such as ‘manager’ is understood by taking into account its relation to other organizational roles such as ‘employee’ or ‘owner’. Similarly, the meaning of types of social relationships is influenced by other concepts. For example, the meaning of the ‘manager–employee’ relationship is sharpened when compared with ‘colleague’ relationship or ‘friendship’.

The similarity of concepts to each other can be captured via semantic relationships of the type ‘A is similar to B’. Other types of relationships represent hierarchical categorical memberships (‘A belongs to B’) or contrasting ones (‘A is opposite of B’). Together, concepts of a specific domain and their semantic relationships form a semantic network. In general, these networks share core structural features with social networks that allow the application of network analysis methods. Just as individuals are embedded in a network, concepts are embedded in a network of semantic relationships (Carley and Kaufer, 1993). Nevertheless, some differences have to be understood before applying social network methods to semantic networks. Although the metaphor of flow is helpful to study the transport of resources that is attached to social relationships, semantic relationships capture the similarity, rivalry, membership and connectivity between ideas. This difference in the content of relationships leads to a shift in the unit of analysis: instead of the flows that accompany social relationships, semantic distances are most relevant. Analyzing semantic distances is fruitful when we study divergent understandings of debated topics or when we try to understand cultural differences between individuals, organizations, or even fields.

Semantic network analysis can be applied to diverse phenomena, building on a range of ontological and epistemological assumptions. For example, in computer science, semantic networks are applied to summarize the content of documents with the assumption that the resulting network reflects a stable inter-subjective knowledge structure (Maedche, 2012). In sociology, semantic networks have been used to reconstruct subjective mental models and perceptions of individuals (Carley and Palmquist, 1992; Doerfel, 1998). In organizational sociology, semantic networks were discussed as ontologies that are 'systems of categories, meanings, and identities within which actors and actions are situated' (Ruef, 1999: 1403). For institutional research, the potential of semantic networks to capture processes of meaning construction is appealing. Researchers have analyzed how new organizational forms are understood (Ruef, 1999), market categories created (Kennedy, 2008) and organizational practices accepted (Meyer and Hoellerer, 2010).

To conceptualize meaning-construction processes with semantic networks, we draw on phenomenological traditions in the sociology of knowledge (Berger and Luckmann, 1966; Schutz, 1967). In this view, social interaction is possible only because individuals work with reciprocal typifications of actors, actions and relations (Schutz and Luckmann, 1973). Whether, for instance, we are writing an email or interacting directly with others in the workplace, we use typifications of actors (e.g., CEO, manager), actions (e.g., bookkeeping, meeting) and relations (e.g., colleague, business partner). In so doing, we assume that our counterparts have similar understandings. Through tradition, taken-for-grantedness and legitimation, these typifications become cultural categories for both thought and action.

Typifications – or, as we suggested above, concepts – are thereby the result of processes of collective construction through which people achieve agreement on the meaning of a

concept. These processes are inherently relational because, in order to become part of the social stock of knowledge, concepts must be encapsulated in existing ideas. Thus, the relations to other concepts contribute to creating meaning for a focal concept in several ways. These linkages can be used to signal that the focal concept is a recognized part of the stock of knowledge. They can also be used to describe what the concept is and what it is not. Thus by differentiating a concept from others, its boundaries can be specified.

Although early proponents of the sociology of knowledge did not discuss connections among concepts in detail, Mohr and Duquenne (1997) have translated these ideas into relational terms. They examined how cultural categories of the poor were influenced by the treatment practices of Progressive Era poverty-relief organizations during the early 20th century in New York City. In an analysis of person-role interactions, Mohr (1994) demonstrated the historical contingencies of social roles and how the dominant moral discourse of poverty evolves. Later, writing with Harrison White, he argued that an institution is a link that interpenetrates the social and cultural realms (Mohr and White, 2008). Renate Meyer and colleagues applied a similar approach to the analysis of the semantic networks of the offices of the city of Vienna and the role identities they assign to citizens, customers and clients (Jancsary et al., 2016).

Example 4: Meaning Construction as a Relational Process

To explore relational aspects of meaning construction, we draw on Wikipedia for illustration. Wikipedia has become an integral part of our common knowledge sources today. Students, employees and managers look up terms when they hear them for the first time or when they need a short description of known concepts. Wikipedia articles are written by thousands of – mostly anonymous – authors. In the absence of extensive

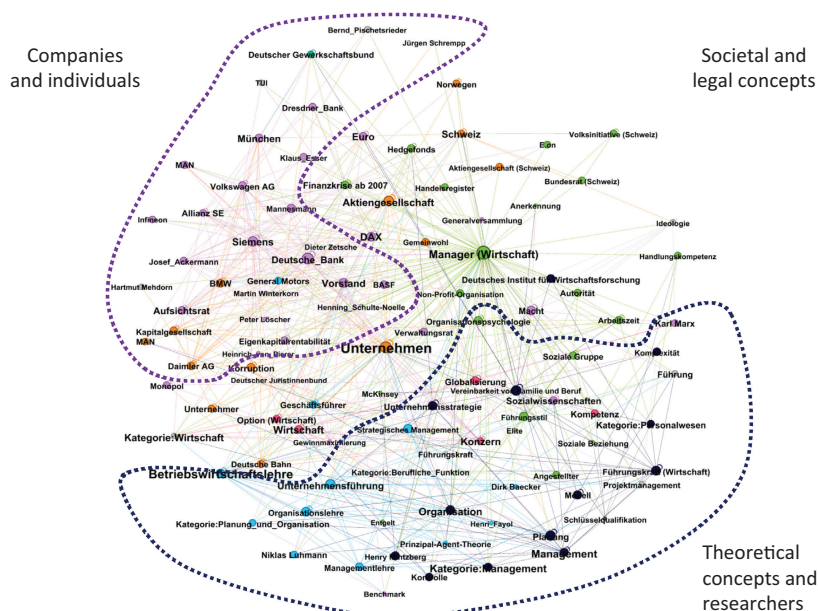


Figure 17.7 Ego-network of the 'Manager (Wirtschaft)' page on the German Wikipedia in 2008

quality-checking mechanisms for authors and articles before publication, readers are invited to add and correct articles. The aggregation and constant refinement of everyday knowledge by many for many is an interesting source to study how concepts develop over time.

From a methodological point of view, Wikipedia is an interesting and well-structured source for studying relational meaning construction (Jemielniak, 2014; Benkler et al., 2015; Etter and Nielsen, 2015). In general, each article tries to define one concept. For instance, we find articles defining organizational concepts such as ‘management’, ‘hierarchy’ and ‘employee’. Many of these are available in multiple languages. In the description section of an article, other articles are linked. The description of ‘hierarchy’ links to ‘superior’, ‘subordinate’, ‘span’ and ‘member’. By transforming the articles into concept nodes and their links into semantic relationships, we can draw a semantic network that captures the concepts and references among them. To illustrate, we select

the ego-network of the article on ‘Manager (Wirtschaft [Business])’ in the German Wikipedia (see Figure 17.7).

The ‘manager’ concept is surrounded by three clusters. In the purple area on the left side we find pages of (mostly German) companies and individuals that provide factual examples of the role of a manager: influential managers like Dieter Zetsche (Daimler) and Josef Ackermann (Deutsche Bank) who have influenced the common understanding of what a top manager in Germany is. In the blue area on the bottom we see an interconnected group of theoretical/scientific concepts that frame the definition of a manager: business administration (*Betriebswirtschaftslehre*), management (*Unternehmensführung*) and organizational leadership (*Führung*) are the fields of research and teaching that are engaged in theorizing the concept of ‘manager’ and training managers. Prominent thinkers ranging from Karl Marx to Niklas Luhmann to Henry Mintzberg are embedded in this group. In between these two groups are societal and legal concepts that position the managerial role between other social

entities, including companies (*Unternehmen*), board (*Verwaltungsrat*), stakeholders' meeting (*Generalversammlung*) and entrepreneur (*Unternehmer*). Additionally, normative aspects such as legitimacy (*Anerkennung*), corruption (*Korruption*), authority (*Autorität*) and responsibility (*Handlungskompetenz*) are connected to the managerial role.

Although the semantics of links is limited to 'concept A mentions concept B', without any classification of the character of the relationship (no 'concept A is a sub-concept of concept B' or any other precision), the references to and from a concept are simple but relevant indicators: (1) the number of references from a concept's description to other concepts can be interpreted as an indicator for the degree of attachment of the focal concept to a network of concepts; and (2) the number of incoming references indicates the relevance of the focal concept for the definition of other concepts.

Wikipedia stores all edits of articles, including changes of the description and changes in references to other articles. The stored versions can be downloaded for

research purposes. We reconstruct a dynamic network based on the stored changes, including all changes to the concepts' descriptions and incoming/outgoing references for a sample of managerial topics (Schoellhorn et al., 2016). Staying with the same example of 'Manager (Business)', we select the development of central indicators for this article over time (see Figure 17.8). The values on the y-axis are scaled to make the processes visible.

We first examine the number of other articles referenced, reflected in 'Outdegree' and trend line 'Polynomic (Outdegree)'. We observe a relatively high number of outgoing references right after the creation of the article on 'Manager (Business)'. The first authors of this article located the new article by acknowledging other articles for the definition of the focal concept. 'Acknowledging' can mean that another concept is mentioned either as a similar concept or as a hierarchically higher one, or that the concept is clearly different. After nearly 2 years, we observe a steep drop in references to other concepts. Such pruning of references to other articles

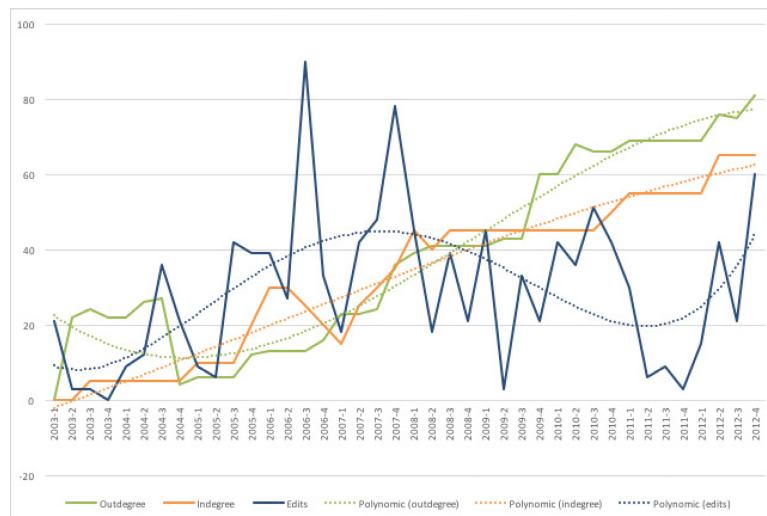


Figure 17.8 Processes affecting the 'Manager (Wirtschaft)' page on the German Wikipedia between 2003 and 2012 – processes are scaled on the y-axis to map them within the same diagram

limits the breadth of the focal article's context. The linkages are now selected more carefully, leading to a steady decrease in breadth. These processes can be interpreted as a form of boundary definition and maintenance.

From the start, the 'Manager (Business)' article aggregates the incoming references from other articles ('Indegree' and trend line 'Polynomic (Indegree)'). The steady increase shows that more articles written by authors who are largely independent from the original authors acknowledge the 'Manager (Business)' article as relevant. This development should indicate that the concept is increasingly recognized as part of the knowledge base.

During the 9-year time line the number of edits varies. In the initial introduction phase during the first six quarters, activity is relatively low. Then in a second growth phase lasting 3.5 years, the concept is redefined extensively, including pruning outgoing references. The heightened activity is connected with a significant growth in aggregating references from other articles. After that, we observe a stabilizing phase where editing takes place less often than in the growth phase, while outgoing and incoming references increase steadily. The initial increase in the number of changes in the article can be conceived of as editing and theorizing processes. The later reduction in the number suggests that, after a while, a certain agreement on the meaning of the concept has been realized.

The development of one concept in a semantic network with other concepts on Wikipedia reflects meaning construction. The achievement of agreement on the meaning of the concept is indicated by the reduced number of edits, boundaries are established through pruning and the recognition of the concept as part of the stock of knowledge or meaning system is observable by the steady increase in incoming references. Not all concepts on Wikipedia go through such a smooth development. Many are not recognized as relevant. Others show a high number of

edits even after many years, a sign that they are either hotly debated or still developing. Either way, such discussion indicates that the ideas are not 'settled'.

Research Potential for Institutional Analysis

Using semantic networks to study processes of theorizing, objectification, institutionalization and deinstitutionalization has several promising applications. First, individual semantic networks can be created from the discursive actions of individuals or organizations. Then they reflect the speakers' positions in a cultural topography (DiMaggio et al., 2013; Mohr and Bogdanov, 2013). Comparing such portraits helps us to understand the similarities and differences between positions within a broader discourse. Similarities reveal which aspects of a discourse are taken for granted, whereas differences show what is challenged or which new ideas are debated. Second, semantic networks analysis enriches study of the diffusion of ideas and practices (see Boxenbaum and Jonsson, Chapter 3 this volume). The spread of single ideas is often theorized in institutional research (Strang and Meyer, 1993) and analyzed for single practices such as ISO 9000 (see Guler et al., 2002; Neumayer and Perkins, 2005). How nascent ideas are embedded into an existing ecology of concepts and how the successful institutionalization of a practice might affect congruent or competing others is seldom studied. By incorporating semantic relationships, we learn how the formation of ideas influence their diffusion (Höllerer et al., 2014; Wruk et al., 2016).

Limitations

Although highly promising, the application of semantic networks in institutional research does face challenges. The first is methodological: in order to model semantic relationships,

we need a detailed qualitative coding of the connections between concepts (Phillips and Hardy, 2002). Alternatively, we might use automatic machine learning to identify semantic relationships, but this is currently possible only for simple semantic connections such as references or co-occurrences (Carley, 1993). Automatic identification can process large data corpora, albeit with a loss of subtlety. Qualitative coding is richer in capturing semantic depth but is applicable only to small samples. The methodological limitations of automated identification will decline as machine learning capabilities advance.

A second set of problems concerns the strong focus on semantic relationships and discourse in some research projects within this line of research: By capturing relations among concepts, such studies have focused on texts and have ignored the authors who created them. By ignoring the authors, the reconstructions of meaning structures become easily disconnected from understanding actors and social relationships. The last research direction that we present offers a solution to this problem.

A FRONTIER: MULTI-LEVEL ANALYSES OF CULTURE AND RELATIONSHIPS

Weber distinguished social interaction and meaning structures conceptually, but he proposed to study the dynamic between social relationships and meaning empirically. The two lines of research we have discussed focused either on the relational construction of social entities or on the relational construction of meaning. The third line of research we review attempts to overcome this divide by layering various units of analysis to study interactions among levels.

A relatively simple approach to adding a different level of meaning to a relational analysis is a multi-modal network, which combines two or more types of actors and their relationships. We gave an example earlier in

this chapter when we explained the founding process of an organization as an interplay of individuals and organizations. In a multi-modal setting, the social entities of higher order – in our example, organizations – provide a meaningful context for the relationships of lower order – in our example, individuals.

Multi-level networks go further than multi-modal networks by distinguishing network levels that are meaningful as independent levels and, at the same time, allow an interlocking of levels. This interlocking can happen via two mechanisms. First, the same set of actors can appear on each level. In this case, an actor's network characteristics on various levels are compared. A vivid example is Padgett and Ansell's analysis of the Medici family in Renaissance Florence (Padgett and Ansell, 1993). Second, when we use different sets of nodes on different levels, inter-level relationships can capture the connections. For instance, when the social relationship level contains organizations and their connections and the semantic network level captures labels for management practices and their semantic relationships, then a relation 'used by' connects management practices and organizations. By connecting nodes of two different network levels, this multi-level network analysis combines relational and semantic networks.

Example 5: Research on Social Impact

Shared symbols help create both membership and distinction within organizational fields. The idea of shared symbols connects the relational organizational field of DiMaggio and Powell (1983) with the organizational field understanding of Bourdieu (1985). Such a synthesis requires that we distinguish social relationships and the cultural expressions of organizations. Our next example undertakes a dual analysis of social relationships and cultural expressions.

As we described earlier, we captured the discourse on social impact in the United States by collecting the text on the websites of organizations that contributed to the discussion. We also collected the hyperlinks of references among the websites. After we identified the relevant websites, we analyzed them for keywords that signal a certain position in the debate on metrics. We identified three sets of keywords: a first set highlights ‘associational’ values such as ‘social justice’ and ‘charity’; a second focuses on ‘scientific’ concerns, including ‘survey’ and ‘data’; a third mentioned ‘managerial’ aspects such as ‘impact’ and ‘performance’. To be sure, all participants in the metrics debate used the keywords to some extent, but their usage differed significantly. Organizations that wanted to improve the measurement of social impact talked about it much more often than those focused on social justice.

To quantify the relevance of certain keywords for each organization, we stored all texts from each website and counted the number of appearances for each keyword. Then we aggregated the single-keyword counts to the number of occurrences within the ‘associational’, ‘scientific’ and ‘managerial’ domains. To control for the differing amounts of text on websites, we divided the columns by the number of all occurrences on a site. The results were three percentage values for the relative usage of associational, scientific and managerial keywords for each website. This ‘discursive fingerprint’ for each organization can be visualized in a triangle in which each position marks a particular mixture of the three perspectives (see Figure 17.9). In the center of the triangle, the three perspectives are used equally.

The distribution of organizations across the triangle shows a broad variety of positions in

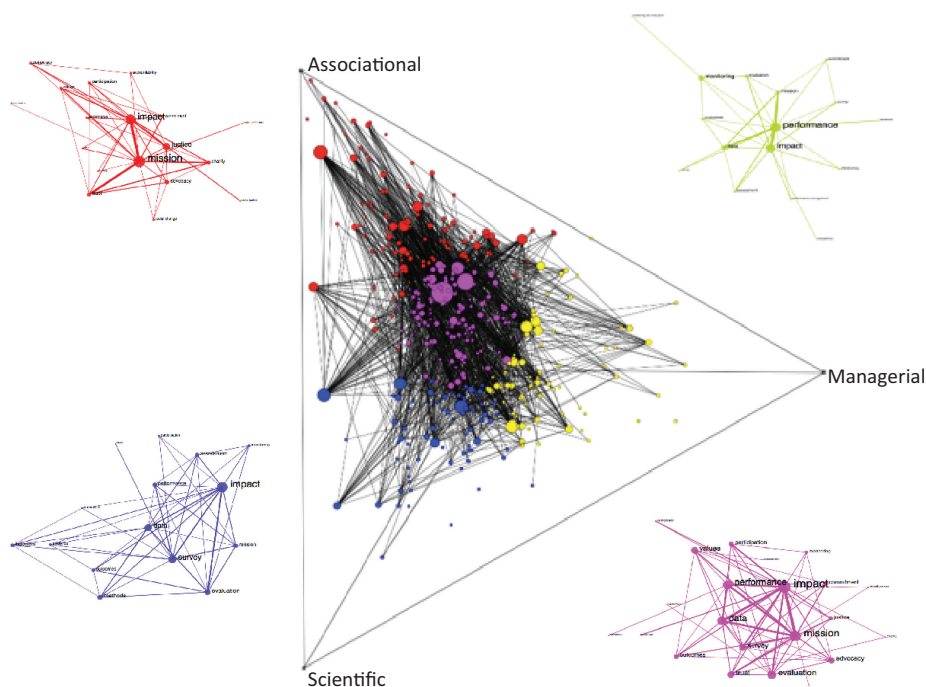


Figure 17.9 Overlay of semantic and social networks

the discourse on metrics. We can group the positions into three domains, each with a dominant voice: an associational community (colored red in Figure 17.9), a scientific community (colored blue), and a managerial community (colored yellow). Organizations in these communities use the keywords of their respective perspectives much more than keywords of the other two. We also find a fourth community of organizations that combines the three languages more equally (colored magenta).

As a next step, we add a relational layer. From the weblinks we collected, we extract the pairs of organizations that reference each other publicly on their websites. Figure 17.9 contains these social relationships of mutual public endorsement. As one can observe, many relationships connect organizations in the central community with organizations in one of the three ‘home’ communities. Analyzing the links in detail shows that the community of organizations that mixes discourses more equally forms a bridge to each of the other three communities of organizations with less balanced discursive positions (Korff et al., 2015).

In a final step, we identify how linguistic connections among the three perspectives function on a semantic level. We computed the co-occurrences of keywords for each community and drew co-occurrence graphs for each of the four communities (see Figure 17.9). In these graphs the keywords that coincide most often are connected via heavier lines. The organizations in the associational community strongly link *impact* with *mission* and add *trust* and *justice* as often-mentioned values. In the scientific community, *impact* is mentioned in combination with tools like *survey* and *data*, and with such purposes as *performance* and *evaluation*. In the managerial community, *performance* is most relevant and strongly combined with *impact*.

Overall, the semantic networks of the three home communities resemble prototypical ideas associated with their origins: Values such as *justice*, *participation* and *mission*

are discussed in the associational domain; *data*, *methods* and *randomized control trials* predominate in the scientific domain; and *efficiency* and *outcomes* typify the managerial domain. Organizations in the interstitial community combine *impact* and *mission*, as do members of the associational community; reference *data* and *survey*, as members of the scientific community do; and focus on *performance*, which is crucial for the managerial community. By picking up key terms of each of the other communities, organizations in the interstitial community create a synthesis of positions understandable to those in the other three communities.

In analyzing the backgrounds of members of the sample, we observed that the well-connected organizations in the interstitial community are neither ones with the highest status nor those with the longest history. Nor are they peripheral. Instead, the central interstitial community has a more equal composition of organizational forms and age cohorts than the other three communities. Therefore, what looks like a typical observation of a center–periphery structure is really an unexpected bridge. The interstitial organizations combine discursive positions in a way that connects positions in the same debate and facilitates mutual recognition among like-minded organizations as well as those from the other three domains.

Research Potential for Institutional Analysis

The combined analysis of social relationships and semantic networks expands the analysis of processes within fields. First, the semantic layer can, as we saw above, capture the cultural positions of organizations. By comparing an organization’s positions in a relational network and at the same time on a cultural level, we can conceptualize and measure the cultural embeddedness of an organization. Comparison of relational and cultural distances for pairs of organizations provides insight into the degree of structuration of a

field. Accordingly, in a highly structured field, we would expect a strong correlation between highly valued cultural expressions (Bourdieu, 1985) and an organization's centrality in a relational field (DiMaggio and Powell, 1983). On the other hand, if we observe that relational distances are low, whereas cultural distances are high, we can assume that interactions occur in a culturally fragmented field. Second, instead of capturing the cultural positions of organizations, a semantic level could entail the discursive positions of organizations in a specific debate. In such a multi-level analysis, the issue field (Hoffman, 2001) 'hovers' above a relational field. It would be interesting to explore how the structural positions of organizations affect their positions in an issue-driven debate or how the distribution of issue positions shapes the patterns of relationships among field members.

In addition to these two intra-field possibilities, a multi-level network approach allows us to study interactions among diverse fields. As in the previous example, the overlap of fields can be described in detail on relational and cultural aspects at the same point in time. This example is a snapshot of one point, but it would be enlightening to see dynamic analyses of overlapping fields that compare relational and semantic developments. Such analyses would deepen understanding of the causal mechanisms in the interaction between cultural and relational embeddedness of organizations and fields. As one example, it is possible to identify social connections where the cultural distance between fields would make it unlikely to have social connections. Instead of assuming homophily as a basic social rule that transforms quasi-deterministic culture into relationships (McPherson et al., 2001), we could observe where and why relations are created despite a low level of similarity.

Furthermore, if we assume that some fields are nested in other fields (Fligstein and McAdam, 2012), different levels for specific fields and their semantic specificities

could be captured in multi-level networks. Hierarchical relationships among organizations in different levels would need to be introduced to link the nested fields with overarching fields. Relational and semantic relations can then be analyzed as either 'horizontal' within one field or 'vertical', connecting higher and lower fields.

Studying cultural and relational dynamics within and among fields will deepen our understanding of how rewiring, emergence and stability occur. By analyzing the location of new ideas or new practices on a cultural layer, we can observe settings in which similar new concepts show up in areas that are relationally distant from each other. Such emergence without traces of diffusion following relational structures would fit the expectation that some ideas travel via communication media and are independent of social relationships. In the long run, we could capture, measure and explain mechanisms such as editing and adaptation via multi-level network analysis comparing the semantic differences of the adopted ideas and relational positions of the adopting organizations.

Limitations

As much as a multi-level perspective is valuable theoretically and methodologically, applications to empirical settings are not easy. Data on social relationships and meaning structures have to be collected at the same time and in matching quality. But with the advancement of computer science and linguistics, we have tools to collect, store and analyze large amounts of high-quality data. In some research settings, such tools can be applied to real-life data, which are generated independent of the research process.

The web pages of organizations contain data that can be split into social relationships among organizations and concepts mentioned by organizations. As we show above, hyperlinks can be interpreted as social relationships of endorsement or, if they are

bi-directional, mutual recognition between respective organizations. The published texts and even the images and icons on the web pages can be transformed into semantic data that capture an organization's cultural position (see Powell, et al., 2016).

Social networks such as Facebook and Twitter store data that can be transformed into multi-level networks as well (Golder and Macy, 2014). In addition to individual representations, relations among users are also stored. Such data would, in principle, allow a comparison of semantic, relational and behavioral interaction. In practice, access to such data is sometimes limited to a small set of cooperating or in-house researchers. Nevertheless, other publicly available sources can supply behavioral data. Wikipedia is an interesting source, as it stores edits on concepts next to the text and references as well. Yelp offers restaurant and other reviews, and Netflix has extensive film reviews (see Goldberg et al., 2016).

analysis, semantic networks and multi-level networks. Figure 17.10 sketches how these approaches are connected.

Research on social networks has emphasized the relational configurations of both people and organizations. The mantra of this work is perhaps best summarized as: 'in the short run, actors make relations, but in the long run, relations make actors' (Padgett and Powell, 2012: 2). In our analysis of the start-up company, we saw that individuals transformed acquaintance and friendship relationships into business relationships and then into organizational affiliations as they formed a new organization. This example underlines the observation that actors make relations in the short run, but in time those choices form their new identities. Looking at the community involved in discussions of non-profit evaluation, we saw that organizations can be defined by their connections to different types of organizations. In the biotechnology industry, the strategic trajectories of organizations were heavily shaped by their relational positions. Both examples underscore that the character of relationships molds both opportunities and worldviews, thus rendering some actions more legitimate and valuable.

TOWARDS INTEGRATION

We have discussed three lines of research on networks and institutions: social network

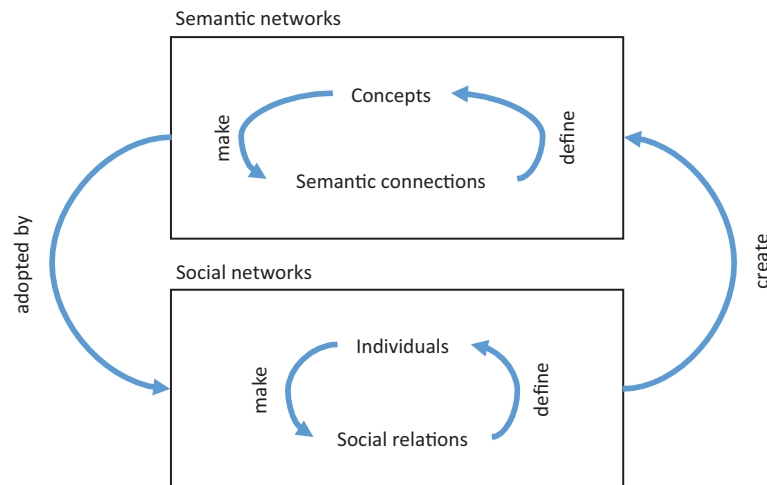


Figure 17.10 Multi-level relations between social and semantic networks

The second line of research we reviewed focuses on the discursive and cultural origins of meaning structures. The tagline of this work could be: 'In the short run, concepts reference other concepts via semantic connections, but in the long run, these semantic connections define concepts.' As the Wikipedia example shows, descriptions of concepts contain semantic connections that either help us compare concepts or create hierarchical relations among them. Semantic references from other concepts can further frame or reduce the meaning of a focal concept. The synchronous construction of concepts can be highly aligned in cases of well-theorized ideas or totally askew in cases of controversial topics. Attention to conceptual elaboration or the construction of narratives, especially for such emotion-laden topics as love or politics, is at the frontier of this line of research (Franzosi, 2010; Friedland et al., 2014).

The third research program focuses on the interplay of relational and semantic networks. To summarize it, one might say: 'In the short run, concepts are adopted by actors, but in the long run, actors create and change concepts.' In our nonprofit example, we observe the embrace of evaluation and other management concepts by social sector organizations. Furthermore, relational distance explains the mix of adopted concepts: the shorter the relational distance between organizations, the more similar the mix of adopted concepts. Reciprocally, organizations with longer relational distances combine concepts differently. They form communities in which central concepts are framed similarly within the community, but quite differently from other communities. In the long run, these alternative frames change the meaning of focal concepts.

A focus on the mechanisms outlined in Figure 17.10 would enable the study of complex institutional processes such as proto-institutionalization or changes in legitimate classifications. Proto-institutionalization may start when individuals form new types of relationships. For instance, 'Facebook

friends' became a new type of social relationship when more and more people made connections to distant acquaintances via the Facebook 'friend' function. This new practice – ironically a misuse of the software's function – led to an adaptation of the 'friendship' concept by introducing a distinction between 'friendship' and 'Facebook friendship'. After this new concept of friendship was extensively discussed in the media and integrated into a common stock of knowledge, people easily distinguished between 'real-life friendship' and 'Facebook friendship'. This new understanding even changes the way many people now make and maintain personal relationships. In this example, the proto-institutionalization was driven by changes in everyday practices, but this is not necessarily always the case. Influential institutional change of social relationships can start at the conceptual level, too. The reframing of concepts might expand or reduce the legitimate applicability of concepts even before practices have changed. For instance, disconnecting 'homosexuality' from 'sodomy' in the public discourse helped gays and lesbians to make existing committed relationships publicly visible. Public visibility changed the quality of relationships even before a formal recognition of homosexual partnership became possible.

A core assumption in our review of networks and institutions is that the situated meaning of relations matters a great deal. Individuals, groups, concepts, values, even fields take on meanings in and through their connections to others. In this regard, we argue that relations are the flows that both create and sustain identities. This duality of individuals and their relations to others and the meanings that adhere to such linkages is fundamental to the view, first offered by Simmel (1955) and later developed by Breiger (1974), that individuals are often defined by the social groups they belong to *and* those social groups are defined by their members. We think it is a short step, but a powerful one, to connect one level of social

structure (individuals and their relations, individuals and organizations, organizations and organizations) to larger social and cultural spheres. In this view, institutions are the products of differing network configurations. The relational structures are the scaffolding on which cultural, political and economic institutions rest. The persistence and resilience of these macro-structures depends, we believe, at least in part on the character of the networks that shape them.

We began our chapter with the conviction that the traditions of research on networks and institutions ought to be brought into closer alignment. After showing that canonical institutional work incorporated both relational and cultural concepts, we provided examples of three lines of research that connect network analysis and institutional analysis empirically. The three streams highlight the variability of relational structures to form new social entities quickly, emphasize the deeply institutionalized and hard-to-alter expectations connected with social relations, and illustrate the dynamic interplay between relational and meaning structures that forge divergent paths of institutional change. We showed, in the first line, that social relations are building blocks for institutions within organizations at the micro-level (see Schneiberg and Lounsbury, Chapter 11 this volume) as well as between organizations within organizational fields (see Wootten and Hoffman, Chapter 2 this volume). We then turned to a second burgeoning line of research on the relational aspect of meaning structures (see Phillips and Malhotra, Chapter 15 this volume). The third line of multi-level analyses is located at the frontier, bringing together both cultural and relational analyses. We are convinced that all three avenues have propitious futures; each will benefit from the expansion of big data sources becoming available for relational analyses, the advancement of social network methods, and theoretical progress in both network analysis and institutionalism.

Note

- 1 Original version in German: Soziale «Beziehung» soll ein seinem Sinngehalt nach aufeinander gegenseitig eingestelltes und dadurch orientiertes Sichverhalten mehrerer heißen. Die soziale Beziehung besteht also durchaus und ganz ausschließlich: in der Chance, daß in einer (sinnhaft) angebbaren Art sozial gehandelt wird, einerlei zunächst: worauf diese Chance beruht. (Weber, 2002: 13)

ACKNOWLEDGMENTS

We are grateful to Stefan Berwing, Royston Greenwood, Renate Meyer and Dominika Wruk for their very helpful comments on early drafts of the manuscript. Several of the visualizations were done by Jason Owen-Smith, co-author of the chapter that appeared in the first edition. We appreciate his help and generosity.

REFERENCES

- Abel, G. J. and Sander, N. (2014). Quantifying global international migration flows. *Science* 343(6178): 1520–1522.
- Battilana, J. and Dorado, S. (2010). Building sustainable hybrid organizations. *Academy of Management Journal* 53(6): 1419–1440.
- Beckman, C. M., Schoonhoven, C. B., Rottner, R. M. and Kim, S.-J. (2014). Relational pluralism in de novo organizations. *Academy of Management Journal* 57(2): 460–483.
- Benkler, Y., Shaw, A. and Hill, B.M. (2015). Peer production: A form of collective intelligence. In M. Bernstein and T. Malone (eds), *Handbook of Collective Intelligence*. Cambridge, MA: MIT Press.
- Berger, P. L. and Luckmann, T. (1966). *The Social Construction of Reality*. New York: Doubleday.
- Bourdieu, P. (1985). The social space and the genesis of groups. *Theory and Society* 14(6): 723–744.
- Bourdieu, P. and Wacquant, L. J. D. (1992). The logic of fields. In *An Invitation to Reflexive Sociology*. Chicago, IL: University of Chicago Press. pp. 95–115.
- Breiger, R. (1974). The duality of persons and groups. *Social Forces* 53: 181–190.

- Burt, R. S. (1992). *Structural Holes: The Social Structure of Competition*. Cambridge, MA: Harvard University Press.
- Carley, K. (1993). Coding choices for textual analysis: A comparison of content analysis and map analysis. *Sociological Methodology* 23: 75–126.
- Carley, K. and Kaufer, D. (1993). Semantic connectivity: An approach for analyzing symbols in semantic networks. *Communication Theory* 3(3): 183–213.
- Carley, K. and Palmquist, M. (1992). Extracting, representing, and analyzing mental models. *Social Forces* 70(3): 601–636.
- Clemens, E. S. and Cook, J. M. (1999). Politics and institutionalism: Explaining durability and change. *Annual Review of Sociology* 25: 441–466.
- Czarniawska, B. and Joerges, B. (1996). Travels of ideas. In B. Czarniawska and G. Sevón (eds), *Translating Organizational Change*. Berlin: Walter de Gruyter. pp. 13–48.
- de Vaan, M., Stark, D. and Vedres, B. (2015). Game changer: The topology of creativity. *American Journal of Sociology* 120(4): 1144–1194.
- DiMaggio, P. J. and Powell, W. W. (1983). The iron cage revisited: Institutional isomorphism and collective rationality in organizational fields. *American Sociological Review* 48(2): 147–160.
- DiMaggio, P., Nag, M. and Blei, D. (2013). Exploiting affinities between topic modeling and the sociological perspective on culture. *Poetics* 41(6): 570–606.
- Diestel, R. (2010). *Graph Theory*. Berlin and Heidelberg: Springer.
- Doerfel, M. L. (1998). What constitutes semantic network analysis? A comparison of research and methodologies. *Connections* 21(2): 16–26.
- Etter, M. and Nielsen, F. (2015). Collective remembering of organizations: co-construction of organizational pasts in Wikipedia. *Corporate Communications: An International Journal* 20(4): 431–447.
- Fligstein, N. and McAdam, D. (2012). *A Theory of Fields*. New York: Oxford University Press.
- Franzosi, R. (1998). Narrative analysis – or how (and why) sociologists should be interested in narrative. *Annual Review of Sociology* 24: 517–554.
- Franzosi, R. (2010). Sociology, narrative, and the quality versus quantity debate (Goethe versus Newton): Can computer-assisted story grammars help us understand the rise of Italian fascism (1919–1922)? *Theory and Society* 39(6): 593–629.
- Friedland, R., Mohr, J., Roose, H. and Gardinali, P. (2014). The institutional logics of love: Measuring intimate life. *Theory and Society* 43(3–4): 333–370.
- Gambardella, A. (1995). *Science and innovation: The US pharmaceutical industry during the 1980s*. Cambridge: Cambridge University Press.
- Goldberg, A., Hannan, M. and Kovacs, B. (2016). What does it mean to span cultural boundaries? Variety and atypicality in cultural consumption. *American Sociological Review* 81(2): 215–241.
- Golder, S. A. and Macy, M.W. (2014). Digital footprints: Opportunities and challenges for online social research. *Annual Review of Sociology* 40: 6.1–6.24.
- Granovetter, M. S. (1973). The strength of weak ties. *American Journal of Sociology* 78(6): 1360–1380.
- Granovetter, M.S. (1985). Economic action and social structure: The problem of embeddedness. *American Journal of Sociology* 91(3): 481–510.
- Guler, I., Guillén, M. F. and Macpherson, J. M. (2002). Global competition, institutions, and the diffusion of organizational practices: The international spread of ISO 9000 Quality Certificates. *Administrative Science Quarterly* 47(2): 207–232.
- Guo, Z., Tao, X., Yin, C., Han, N., Yu, J., Li, H., Liu, H., Fang, F., Adams, J., Wang, J., Liang, G., Tang, Q. and Rayner, S. (2013). National borders effectively halt the spread of rabies. *PLoS Neglected Tropical Diseases* 7(1): e2039.
- Hoellerer, M. A., Jancsary, D., Barberio, V., Meyer, R. E. (2014). Birds of a feather: Management knowledge as interlocking vocabularies. In *Academy of Management Best Paper Proceedings*. Philadelphia. pp. 873–878.
- Hoffman, A. J. (1999). Institutional evolution and change: Environmentalism and the U.S. chemical industry. *Academy of Management Journal* 42(4): 351–371.
- Hoffman, A. J. (2001). Linking organizational and field-level analyses: The diffusion of corporate environmental practice. *Organization & Environment* 14(2): 133–156.
- Jancsary, D., Meyer R.E., Hollerer, M. and Barberio, V. (2016). Recursive categorization and enactment of role identities in pluralistic institutional contexts. Working paper, WU-Vienna.
- Jemielniak, D. (2014). *Common Knowledge? An Ethnography of Wikipedia*. Stanford, CA: Stanford University Press.
- Kennedy, M. (2008). Getting counted: Markets, media, and reality. *American Sociological Review* 73(2): 270–295.
- Korff, V. P., Oberg, A. and Powell, W. W. (2015). Interstitial organizations as conversational bridges. *Bulletin of the Association for Information Science and Technology* 41(2): 34–38.
- Lamere, P. (2012). The infinite jukebox. Music Machinery. (Retrieved online on August 5, 2015: <http://musicmachinery.com/2012/11/12/the-infinite-jukebox/>).
- Laumann, E. O., Galaskiewicz, J. and Marsden, P. V. (1978). Community structure as interorganizational linkages. *Annual Review of Sociology* 4: 455–484.

- Lorain, F. and White, H. C. (1971). Structural equivalence of individuals in social networks. *Journal of Mathematical Sociology* 1(1): 49–80.
- Maedche, A. D. (2012). *Ontology learning for the semantic web*. New York: Springer Science+Business Media.
- Maurer, I. and Ebers, M. (2006). The dynamics of social capital and their performance implications: Lessons from biotechnology start-ups. *Administrative Science Quarterly* 51(2): 262–292.
- McLean, P. D. (2007). *The Art of Networking: Strategic Interaction and Patronage in Renaissance Florence*. Durham, N.C.: Duke University Press.
- McPherson, M., Smith-Lovin, L. and Cook, J. M. (2001). Birds of a feather: Homophily in social networks. *Annual Review of Sociology* 27: 415–444.
- Meyer, J. W. and Bromley, P. (2013). The worldwide expansion of 'organization'. *Sociological Theory* 31(4): 366–389.
- Meyer, R. E. and Hoellerer, M. A. (2010). Meaning structures in a contested issue field: A topographic map of shareholder value in Austria. *Academy of Management Journal* 53(6): 1241–1262.
- Meyer, J. W. and Rowan, B. (1977). Institutionalized organizations: formal structure as myth and ceremony. *American Journal of Sociology* 83(2): 340–363.
- Mische, A. and White, H. C. (1998). Between conversation and situation: Public switching dynamics across network domains. *Social Research* 65: 695–724.
- Mohr, J. W. (1994). Soldiers, mothers, tramps and ohers: Discourse roles in the 1907 New York City Charity Directory. *Poetics* 22: 327–357.
- Mohr, J. W. and Bogdanov, P. (2013). Topic models: What they are and why they matter. *Poetics* 41(6): 545–569.
- Mohr, J. W. and Duquenne, V. (1997). The duality of culture and practice: Poverty relief in New York City, 1888–1917. *Theory and Society* 26(2–3): 305–356.
- Mohr, J. W. and White, H. C. (2008). How to model an institution. *Theory and Society* 37: 485–512.
- Neumayer, E. and Perkins, R. (2005). Uneven geographies of organizational practice. *Economic Geography* 81(3): 237–259.
- Oberg, A. and Walgenbach, P. (2008). Hierarchical structures of communication in a network organization. *Scandinavian Journal of Management* 24(3): 183–198.
- Owen-Smith, J. and Powell, W. W. (2004). Knowledge networks as channels and conduits: The effects of spillovers in the Boston biotechnology community. *Organization Science* 15(1): 5–21.
- Owen-Smith, J. and Powell, W. W. (2006). Accounting for emergence and novelty in Boston and Bay Area biotechnology. In P. Braunerhjelm and M. Feldman (eds), *Cluster Genesis*. Oxford: Oxford University Press. pp. 61–83.
- Pache, A.-C. and Santos, F. (2013). Inside the hybrid organization: Selective coupling as a response to competing institutional logics. *Academy of Management Journal* 56(4): 972–1001.
- Padgett, J. F. and Ansell, C. K. (1993). Robust action and the rise of the Medici, 1400–1434. *American Journal of Sociology* 98(6): 1259–1319.
- Padgett, J. F. and Powell, W. W. (2012). *The Emergence of Organizations and Markets*. Princeton, NJ: Princeton University Press.
- Phillips, N. and Hardy, C. (2002). *Discourse Analysis: Investigating Processes of Social Construction*. Thousand Oaks, CA: Sage.
- Podolny, J. M. (2001). Networks as the pipes and prisms of the market. *American Journal of Sociology* 107(1): 33–60.
- Porter, K. A. (2004). You can't leave your past behind: the influence of founders' career histories on their firms. PhD dissertation, Stanford University.
- Porter, K. A., Bunker-Whittington, K. and Powell, W. W. (2006). The institutional embeddedness of high-tech regions. In Stefano Breschi and Franco Malerba (eds), *Clusters, Networks, and Innovation*. Oxford: Oxford University Press. pp. 261–296.
- Powell, W.W., Brandtner, C. and Horvath, A. (2016). Click and mortar: Organizations on the Web. *Research in Organizational Behavior*. 36:101–120.
- Powell, W. W., Koput, K. W. and Smith-Doerr, L. (1996). Interorganizational collaboration and the locus of innovation: Networks of learning in biotechnology. *Administrative Science Quarterly* 41(1): 116–145.
- Powell, W. W., Oberg, A., Korff, V. P, Oelberger, C. and Kloos, K. (2017). Institutional analysis in a digital era. In G. Krücken, C. Mazza, R. Meyer and P. Walgenbach (eds), *New Themes in Institutional Analysis: Topics and Issues from European Research*. Cheltenham: Edward Elgar.
- Powell, W. W. and Owen-Smith, J. (2012). An open elite. In J. F. Padgett and W. W. Powell (eds), *The Emergence of Organizations and Markets*. Princeton, NJ: Princeton University Press. pp. 466–495.
- Powell, W. W., Owen-Smith, J. and Colyvas, J. A. (2007). Innovation and emulation: Lessons from American universities in selling private rights to public knowledge. *Minerva* 45(2): 121–142.
- Powell, W. W., Packalen, K. A. and Whittington, K. (2012). Organizational and institutional genesis. In J. F. Padgett and W. W. Powell (eds), *The Emergence of Organizations and Markets*. Princeton, NJ: Princeton University Press. pp. 434–465.
- Powell, W. W. and Sandholtz, K. W. (2012). Amphibious entrepreneurs and the emergence of organizational forms. *Strategic Entrepreneurship Journal* 6(2): 94–115.

Copyright © 2017, SAGE Publications. All rights reserved.

- Powell, W. W., White, D. R., Koput, K. W. and Owen-Smith, J. (2005). Network dynamics and field evolution: The growth of interorganizational collaboration in the life sciences. *American Journal of Sociology* 110(4): 1132–1205.
- Ringer, F. K. (2009). *Max Weber's Methodology: The Unification of the Cultural and Social Sciences*. Cambridge, MA: Harvard University Press.
- Ruef, M. (1999). Social ontology and the dynamics of organizational forms: Creating market actors in the healthcare field, 1966–1994. *Social Forces* 77(4): 1403–1432.
- Sahlén-Andersson, K. (1996). Imitating by editing success: The construction of organizational fields and identities. In B. Czarniawska and G. Sevón (eds), *Translating Organizational Change*. Berlin: de Gruyter. pp. 466–495.
- Schoellhorn, T., Wruk, D. and Oberg, A. (2016). The social construction of management vocabularies: An analysis of data from Wikipedia. Working paper. University of Mannheim.
- Schutz, A. (1967). *The Phenomenology of the Social World*. Evanston, IL: Northwestern University Press.
- Schutz, A. and Luckmann, T. (1973). *The Structures of the Life-world* (Vol. 1). Evanston, IL: Northwestern University Press.
- Scott, W. R. (2014). *Institutions and Organizations*. Thousand Oaks, CA: Sage.
- Simmel, G. (1955). *Conflict and the Web of Group-Affiliations*. New York: Free Press.
- Strang, D. and Meyer, J. W. (1993). Institutional conditions for diffusion. *Theory and Society* 22(4): 487–511.
- Wasserman, S. and Faust, K. (1994). *Social network analysis: Methods and applications*. Cambridge: Cambridge University Press.
- Weber, M. (1904). Die protestantische Ethik und der Geist des Kapitalismus. In *Archiv für Sozialwissenschaft und Sozialpolitik* 20 (1):1–54; 21 (1): 1–110.
- Weber, M. (1978). *Economy and Society: An Outline of Interpretive Sociology*. Berkeley, CA: University of California Press.
- Weber, M. (2002). *Wirtschaft und Gesellschaft: Grundriss der Verstehenden Soziologie*. Tübingen: Mohr Siebeck.
- Westney, E. (1980). *Imitation and Innovation: The Transfer of Western Organizational Patterns to Meiji Japan*. Cambridge, MA: Harvard University Press.
- White, H. C. (1992). *Identity and Control*. Princeton, NJ: Princeton University Press.
- White, H. C., Boorman, S. A. and Breiger, R. L. (1976). Social structure from multiple networks. I. Blockmodels of roles and positions. *American Journal of Sociology* 81(4): 730–780.
- Whittington, K. B., Owen-Smith, J. and Powell, W. W. (2009). Networks, propinquity, and innovation in knowledge-intensive industries. *Administrative Science Quarterly* 54(1): 90–122.
- Wruk, D., Bort, S., Oberg, A. and Woywode, M. (2016). How relational theorizing influences the popularity of management concepts. Working Paper, University of Mannheim.
- Zaheer, A. and Soda, G. (2009). Network evolution: The origins of structural holes. *Administrative Science Quarterly* 54(1): 1–31.