



The spontaneity of social network: a possibility for re-enchanting network study?

The spontaneity
of social network

995

Philippe Accard and Christophe Assens
*LAREQUOI, Laboratoire de Recherche en Management,
Université Versailles Saint-Quentin, Guyancourt, France*

Abstract

Purpose – For current works, agents create social network by drawing on the knowledge of their immediate environment, and they use network for cooperating with one another and for promoting their own economic and social interests. The purpose of this paper is to aid in re-enchanting network study, and present network as spontaneous social construction.

Design/methodology/approach – The paper draws on Hayek's spontaneous order. For Hayek, agents have access to a wide knowledge about social system, and use this knowledge to spontaneously coordinate with each other in the pursuit of their self-interests.

Findings – The authors develop the idea by presenting and performing an analogy of Hayek's spontaneous order to emergent structures. The result of this analogy is a conception of network dynamics wherein the spontaneous social construction of network structures is achieved by agents who have knowledge of the interaction rules that guide structures production, and who, by drawing on this knowledge, are able to influence the emergence of network structures. Agents thus spontaneously contribute to the emergence of a network, to its growth, and its decline.

Originality/value – This new conception of network focusses on the processes of the social construction of network structures. It provides a better account of network change and development than current works, and because it stresses the spontaneous, fragile and ephemeral character of network, it can prove useful for the re-enchantment of network studies.

Keywords Structure, Network, Emergence, Order

Paper type Conceptual paper

Introduction

In most works dealing with network, the key words are cooperation, social solidarity, exchange and the economic benefits which are obtained by the agents participating in network structures (Thorelli, 1986; Miles and Snow, 1992; Grandori and Soda, 1995; Ring, 1997; Gulati, 1998; Ahuja and Carley, 1999; Kogut, 2000; Biggiero, 2001). According to Gulati (1998), a network is composed of independent agents, each of whom cooperates with the others in order to achieve individual goals. Network is thus the product of agents' informal cooperation. In order for network structures to emerge, minimal conditions for agents' cooperation, or a "domain of consensus," are required (Thorelli, 1986).

The idea that networks can be spontaneous social constructs, i.e. constructs which do not necessarily derive from agents' need for cooperation, solidarity, and economic gains, does not appear in these works (Polodny and Page, 1998). These works therefore offer a disenchanted view of network, wherein the capacities of agents to imagine new types of interactions are not recognized.

We propose a different theoretical position. It is one in which the spontaneous characteristic of network is stressed. Networks are spontaneous constructions which may or may not serve the interests of the agents who created them. Network structures



can be created by agents' complex interactions, and may, despite the absence of intentional attempts at cooperating, provide agents with information, power and legitimacy. In this perspective, network is not the cold world created by agents when they interact only for the sake of social and economic interests. Rather, networks are seen as spontaneous social structures imagined by agents, which might or might not lose spontaneity and disenchant as they grow.

To examine these spontaneous phenomena, we propose to depart from the conceptual bases that guide network theories in which cooperation among agents, social solidarity and network social stability are stressed. Instead, we draw on Hayek's (1998) view of social order. We propose to show that networks stem from agents' spontaneous adjustments, and are structures that emerge from their ever-changing interactions. The perspective that we present is thus close to that of social constructivist works which deal with self-organization (Drazin and Sandelands, 1992; Tsoukas, 1998; Beeson and Davis, 2000; Bergmann-Lichtenstein, 2000; Black, 2000; Fuchs, 2002) and close to works which address the role that knowledgeable agents play in network structures production (Kilduff *et al.*, 2006; Sydow and Windeler, 1998).

To develop this theoretical perspective, we draw on the analogy of Hayek's spontaneous order to the concept of emergent structures. Emergent structures are patterns of interactions which are performed by agents who follow simple social interaction rules (Drazin and Sandelands, 1992; Tsoukas, 1998; Anderson, 1999; Beeson and Davis, 2000; Black, 2000; Fuchs, 2002). The rules render agents' interactions predictable and regular, which result in stabilized patterns of interactions. These patterns of interactions are emergent in that no single agent is able to control or design them. This view of social structures is informed by complexity theories (Morin, 1977, 1990; Prigogine and Stengers, 1984; Nicolis and Prigogine, 1992; Kauffman, 1995; Barnett and Houston, 2005).

For Hayek, spontaneous order is a process in which agents' efforts at coordinating in the pursuit of their self-interests result in the spontaneous creation of social order or, in a stabilized state of affairs (Hayek, 1998). Emergent structures and spontaneous order are similar in that they are social structures which are created by interacting agents. This similarity is clearly recognized by Hayek (1998). His spontaneous order, however, differs from other works on a fundamental issue, which is that of knowledge.

Theories of emergent social structures state that structures emerge from the interactions of independent agents who have only positional knowledge at their disposal, that is to say, knowledge about their immediate environment (Weick, 1969; Giddens, 1984; Drazin and Sandelands, 1992; Ashmos *et al.*, 2002; Fuchs, 2002). For Hayek, agents have access to dispersed knowledge, that is to say, knowledge about emergent characteristics of social system which are outside their immediate environment; this type of knowledge is the key to agents' spontaneous coordination in modern societies. Agents are able to have knowledge about emergent structures and to use this knowledge in further structures production. He thus gives a great importance to the role of agents' knowledge in the emergence of structures.

The simile and difference between emergent structures and spontaneous order offer the possibility for developing an analogy between the two concepts, and for creating a new image of network (Morgan, 1980; Weick, 1989; Tsoukas, 1991, 1993; Oswick *et al.*, 2002; Cornelissen, 2005). An analogy such as ours can help to re-enchant network theories, by stressing that network dynamics are actually the spontaneous creation of structures by agents. By emphasizing the role of agents' knowledge about structures production, the analogy sheds new light on the different phases of network dynamics and on the fragile and ephemeral character of network structures.

Emergent characteristics of network

Emergent characteristics of network clearly appear in non-hierarchical networks, although these characteristics are not specific to them. Non-hierarchical network structures are composed of a few agents whose positions are symmetrical and interchangeable. No single agent is in a hierarchical relationship with another agent, and no single agent is able to fill in a structural hole in the web of social relationships (Burt, 1992). In a network like this, each agent takes decisions on his/her own, and decision-making power is equally distributed among the agents. This network presents spontaneous characteristics, since none of the agents is the creator of the network, and network creation belongs to all the agents. Network structure emerges from the agents' interactions.

Social complexity of network

Because of these specificities, networks can be studied by using the theory of complex adaptive system (Tsoukas, 1998; Anderson, 1999; Barnett and Houston, 2005). According to this theory, a system is composed of independent agents whose interactions are governed by a simple set of rules. When they recursively engage rules in their interactions, these agents produce regular patterns of interactions, because these render interactions predictable. The patterns of interaction form network structures which spontaneously develop: no single agent is the designer of the network, and all the agents participate in its development. This structure is thus emergent. Each agent has access only to positional knowledge, that is to say knowledge of his/her immediate environment. Positional knowledge is obtained from the rules that each agent uses for interacting with others. Even though agents have access only to positional knowledge, a self-reference of action is shared by all agents, because the rules engaged in the production of structure render agents' interactions predictable and regular, and thus limit the possibilities for agents' interactions and interpretations of these interactions (Weick, 1969; Drazin and Sandelands, 1992; Tsoukas and Chia, 2002). A self-reference of interaction is established, because of agents' converging cognitive orientations, and this self-reference is used by agents to interpret environment and to create and select the rules for interactions that they judge useful for dealing with environment (Weick, 1969; Drazin and Sandelands, 1992; Anderson, 1999; Ashmos *et al.*, 2002; Tsoukas and Chia, 2002; Weick *et al.*, 2005).

Application of such a broad conceptual framework to social network raises fundamental issues, because social agents cannot be compared to programmable automata which obey well-defined simple rules. The interaction rules which agents obey, however, are created by them, or stem from the culture to which they have been socialized. Furthermore, rule creation, and the application of the rules in agents' interactions cannot be considered as separate from agents' social and economic interests or separate from agents' expectations about the possibilities of meeting these interests. Network is a form of organization wherein exchange conditions can be ambiguous. Opportunist behaviors may be adopted by some agents, and the consequences of these behaviors depend on the reactions of all the network agents and on the rules of exchange that they have created (Ouchi, 1980; Powell, 1990; Ring, 1997). Thus, specific forms of social complexity make it difficult to address the issue of spontaneous creation of networks.

For these reasons, a specific definition of network complexity beyond that of complex system theories is necessary, so that the issue of the spontaneous creation of networks can be dealt with. To do this, we propose a concept drawn from Hayek's

The spontaneity of social network

997

0953-4814
r 6 2014

work: that of spontaneous order (Hayek, 1998). Hayek's spontaneous order is based on the idea that agents have access to dispersed knowledge about emergent characteristics of social system, and utilize this knowledge for interacting. Spontaneous order thus offers a wide range of possibilities for conceptualizing how agents' creation and use of knowledge, modes of interactions, and expectations regarding diverse interests are engaged in the emergence of network structures.

Spontaneity of network

Hayek states that modern societies are vast social ensembles, and the knowledge that agents need in order to coordinate is widely dispersed throughout them. Social order is likely to develop spontaneously in these societies, and provide agents with access to dispersed knowledge. Hayek defines order as:

A state of affairs in which a multiplicity of elements of various kinds are so related to each other that we may learn from the acquaintance with some spatial or temporal part of the whole to form correct expectations concerning the rest or at least, expectations which have a good chance of proving correct (Hayek, 1998, p. 36).

The "multiplicity of elements of various kinds" which composes order is social rules. These rules have distinctive particularities. They can be applied by any agent in any kind of situation, in the pursuit of his/her self-interest. Thus, the application of the rules is independent of any kind of common interest or goal.

Order is spontaneous in that it is not purposely created by agents; it emerges from agents' activities when they create social rules in the pursuit of their self-interest. The rules are rules of social conduct that agents create by drawing on their successful and unsuccessful experiences of past social situations. The rules thus carry knowledge produced during agents' past socialization. They form an ordered set, that is to say that any agent, from the knowledge of a limited number of rules, can mentally reconstitute the overall characteristics of the set of rules and form expectations, which are generally correct, about the other agents' social conduct based on the set of rules. Agents' access to dispersed knowledge does not result in omniscience, but in an extended knowledge about social rules.

Agents can access dispersed knowledge from the set of social rules because of their "abstract conduct": for Hayek, in modern society, agents have no other choice but to search for and adopt responses that seem to be appropriate to situations that they do not cognitively master. These responses are based on their successful or unsuccessful experiences with the rules of conduct that they previously adopted. Abstraction is, for Hayek, this cognitive and social behavior that enables agents to cope with their ignorance of social situations.

Hayek's spontaneous order is thus a social emergence. Rules are produced by agents in reference to an already-existing set of rules; no single agent is able to control the production of rules, and the set, as a whole, has an ordered characteristic which imposes itself on agents' social conduct. In complexity theories terms, the set of ordered rules is produced in a self-referent manner, and the set, once created, is endowed with properties which cannot be reduced to agents' cognitive and social abilities. It therefore affects further production of structures, and is thus an emergence.

Hayek's spontaneous order thus provides a theoretical basis for understanding networks which differs from that used by many other works in the network field. While these works favor cooperation and social solidarity, Hayek's spontaneous order favors the coordination of independent agents (Birner and Edge, 1999).

The spontaneous construction of networks

Our analogy of spontaneous order to emergent structures is developed from the theoretical perspective outlined in the above section. The first requirement for developing this analogy is determination of the conditions of the analogical reasoning process. The conditions are those proposed by Tsoukas (1991, 1993) for developing abstract analogical reasoning. Analogical reasoning is based on the simile and difference of two symbolic elements. By using simile and difference, one symbolic element, i.e. the source, can be transformed into the other, i.e. the target, and thus a new image of the target, the outcome of the analogy, is obtained. The analogical reasoning is an "abstraction," when it is based on the generic properties of the elements involved in the analogy (Tsoukas, 1993). In the present case, the analogy is an abstraction which uses spontaneous order as its source and emergent structure as the target, and, as a result, a new view on emergent social structures is obtained. The generic property is the ordered characteristic of social rules. The specificity of this view of emergent structure is that it is based on the role that dispersed knowledge has in the spontaneous construction of social network. A specific definition of the process of the emergence of structures is defined below, and further details about this process are given by specifying the phases of network dynamics: creation, growth and decline.

The spontaneity of social network

999

The process of emergence of network structures

The specific perspective that we present is that the social rules that agents recursively engage in their interactions form a set of ordered rules. The rules which compose an ordered set are related to each other in such a way that agents can mentally reconstitute the overall characteristics of the set from the knowledge of a limited number of the rules composing the set. As a consequence, any agent, from the knowledge of a limited number of rules, is able to form expectations about the changes in the composition of the set of rules and about the changes in interactions which are guided by these rules, or in our case, about the changes in network structures. On this basis, each agent can either choose to go on performing interactions with other agents or modify them, and thus each agent contributes to the reproduction of network structures or to the production of new ones. Network structures thus emerge from the creation of ordered social interaction rules by agents.

As an example, let us take the case of an entrepreneur in an industrial district in Northern Italy. He runs a small business, and borrows funds from members of his family and from banks. This entrepreneur knows that a new law is about to be voted in, which states that bankers must apply tighter rules when granting loans to small firms. For our entrepreneur, this type of legal rule means that bank loans will not be so easy to get and that interest rates will be higher. The entrepreneur thus expects that the contractual rules that will be engaged in his relationships with bankers will be more restrictive, because of the tightening of another kind of rule, in this case, a legal rule.

As he continues his train of thought, the entrepreneur may think that, in the coming years, he will have to rely more extensively on family solidarity for finding funds and running his business. Solidarity among family members is a cultural rule that is fundamental in Northern Italy (Butera, 1991; Lazerson and Lorenzoni, 1999). The entrepreneur, because he knows about this cultural rule, and about the legal rules regarding small company loans, may anticipate that his relationships with bankers will not be as profitable, and he thus envisages having more interactions with family members and fewer with bankers. When considering his business from a wider perspective, he may also anticipate that, in the network, other entrepreneurs will also

rely more on family solidarity than on banks for financing their businesses. The network is likely to become more family-centered, and not as open to financial agents. In other words, the entrepreneur may anticipate changes in the network structure.

This example shows that new network structures emerge each time that the set of ordered rules guiding agents' interactions is modified. Agents will mentally reconstitute the overall characteristics of the new set of rules, and reconsider their expectations about the ongoing flow of interactions which compose the network structures. Thus, agents have two kinds of knowledge at their disposal. They have knowledge of their immediate environment while interacting, and they have knowledge about ongoing interactions which occur outside of their immediate environment. They access the latter by mentally reconstituting the overall characteristics of the set of rules guiding interactions in the network.

In our example above, the entrepreneur acquires positional knowledge as he interacts, because of the changes made in the interaction rules regarding loans. He accesses dispersed knowledge about network structures because he mentally explores the relationships of the rules concerning the loans and those defining the role of family in small business financing. This knowledge enables him to form expectations regarding changes in network structures, and he concludes that these are likely to become more family-centered.

The development of the analogy of spontaneous order to emergent structures thus results in a specific view of the social complexity of network structures: network structures emerge from the interactions of independent agents, who have access not only to positional knowledge, as complexity theories states, but also to dispersed knowledge. Network structures are, here, considered to be social constructs (Berger and Luckmann, 1961; Giddens, 1984; Drazin and Sandelands, 1992; Bouchikhi, 1998; Fuchs, 2002) which emerge from agents' recursive engagement of a set of ordered rules in their interactions.

Network social construction is carried out by agents in on-the-edge-of-chaos situations, because, in the process of network emergence, each agent's contributions to changes in the structures influences the other agents' contributions to changes in the structures.

During the process, each agent forms individual expectations about changes in network structures by drawing on her/his mental reconstitution of the overall characteristics of the set of rules that guides the changes. When a given agent's expectations are put into action, there are changes in rules and interactions which are then acknowledged by other agents, who, in turn, modify their expectations and interactions.

Each change in structures produced by any given agent thus offers possibilities of changes to any other agent who acknowledges the initial change. Network structures are therefore constantly changing in unpredictable ways; in complexity terms, they are evolving on the edge of chaos (Tsoukas, 1998; Anderson, 1999; Beeson and Davis, 2000; Black, 2000; Ashmos *et al.*, 2002). The successive changes that occur in network structures form network trajectory, which is composed of the successive structural states that network adopts on the edge of chaos.

The phases of network dynamics

The above-defined process of the emergence of structures is further developed, below, by addressing the phases of the dynamics of network: creation, growth and decline.

The creation of network structures. In the phase of network creation, frequent engagements of rules in agents' recursive interactions must take place in order for a set of rules to form, and so that agents, by mentally reconstituting the overall characteristics of the set, have access to a shared reference for interaction.

It must be emphasized that, during the phase of network creation, the rules, which apply to agents who are members of a social group, play a fundamental role. These rules fix the values and beliefs which condition the integration of an agent into a community (Zucker, 1986). In the early phase of network creation, agents have no other choice but to draw on these rules in order to start interacting, because they have not created many rules other than those ones.

The role of this cultural substrate is crucial in the early phase of network creation. This is, for instance, the case of the industrial districts in Northern Italy (Butera, 1991; Lazerson and Lorenzoni, 1999), where agents have a basic distrust of both the nation state and the marketplace.

Because of this set of rules, composed of cultural and specific social interaction rules, the network structures production becomes self-referent: agents produce structures by drawing on their knowledge of existing structures and on the expectations about the future states of structures which they have formed by mentally reconstituting the set of rules. The structures which emerge from this self-referent process exhibit both stability and instability. Network is now on the edge of chaos and it self-organizes (Morin, 1977, 1990; Prigogine and Stengers, 1984; Kauffman, 1995). However, identifiable structural traits are likely to appear in this situation. Structures are produced by agents who are performing frequent and dense interpersonal interactions (Coleman, 1990), and consequently, strong ties (Granowetter, 1985) are likely to be numerous in this phase of network. At this point, the growth phase of network begins.

The growth of network structures. Network structures spontaneously grow when new agents enter the network. The new agents socialize, that is, they learn and engage already-existing ordered rules in their interactions with agents already participating in the network. From the knowledge of these rules, the new agents are able to mentally reconstitute the overall characteristics of the set of ordered rules shaping the network. Thus, they share a reference for interaction with agents already in place, and are able to form expectations about changes in network structures.

In the growth phase, the rules which basically specify the conditions of agents' interactions are not institutional and cultural rules, as is the case for nascent networks. The rules crucial to this phase are those which define the conditions of agents' interactions and exchanges within the network. However, these rules do not exist independently of institutional and cultural rules. Both these types of rules form, together, the parts of an ordered set, because agents draw on their mental reconstitution of the institutional and cultural rules in order to create new rules for interactions and exchanges.

This situation is that of the above-mentioned Italian entrepreneur, who, because he knows about cultural rules, and about the legal rules regarding small company loans, anticipates the changes in relationships between bankers and family members by mentally reconstituting the set formed by these different kinds of rules.

In the growth phase, network differs from environment because its structures are reproduced in a self-referent manner by agents, i.e. by sharing the reference of interaction defined by the set of ordered rules, and also because, as new interaction rules are created by agents, the composition of the set of rules diverges more and more from the cultural and institutional rules which characterize social environment.

In this phase, network is on the edge of chaos, and thus, changes in structures occur apparently at random, which may be minor, or radical, changes. However, structures are likely to be less dense than in the creation phase, because agents have more knowledge at their disposal about the set of interaction rules, and they do not need to perform as frequent or as dense interactions to access this knowledge, as they did in the creation phase. Ties will be weaker (Granowetter, 1985) and structural holes (Burt, 1992) are likely to appear.

The decline of network structures. Decline, here, means that network may either lose its spontaneous character because of the creation of centralized or hierarchical structures, or it may collapse into chaos.

In the first case, new agents enter the network and bring along with them rules which cannot be part of the ordered set of rules that has guided structures production thus far. Agents already participating in the network thus have difficulties in creating rules that preserve the ordered character of their set of interaction rules. Newcomers may take this as an opportunity to create rules so that they can gather knowledge or deprive other agents of knowledge about the conditions of structures production. A single agent or a coalition of agents may therefore obtain a dominant position in the network structure. In this case, network structures are no longer spontaneously created by agents: they are designed by a dominant agent or a coalition of agents. Centralized and hierarchical structures are thus likely to be created (Miles and Snow, 1992; Assens, 2001).

This is what can happen when a non-hierarchical collaborative network, having experienced a period of growth, takes on hierarchical structures because one agent, having gathered more knowledge or information or resources than the others, uses these to create a dominant position within the network's structures.

In the second case, the network collapses into chaos. This happens if agents lose the ability to mentally reconstitute the set of rules that they have created. They can no longer access a shared reference of action, and they stop interacting or, they interact at random, and do not have clear expectations, either of their own interactions with other agents or of the ongoing flow of interactions performed by other agents. This collapse of network into chaos can occur when new agents come into the network and import new rules which differ too greatly from the rules of the agents already participating in the network. This is, then, a growth crisis.

This is what can happen, for example, when agents create interaction rules which are in contradiction with the cultural and institutional rules which have formed the social substrate for the creation of the network. The network dies from internal contradictions and social tensions. An example of this is a network composed of small family firms which are rooted in a geographical area or an industrial district, and which, as they grow, adopt rules of management which, by seeking short-term financial profit, contradict the social rules that guide social life in their area.

These three phases of network social structures construction are similar to the organization life cycle (Whetten, 1987; Quinn and Cameron, 1994), but they present socially complex characteristics.

Each phase shares with the other two the same process of social construction, in which structures are produced by agents who draw on a set of ordered social interaction rules. There is not, here, a specific process for each phase, as is the case in life cycle theories (Whetten, 1987; Quinn and Cameron, 1994; Powell *et al.*, 2005).

The three phases are integral parts of a trajectory of network, and this trajectory is modified by agents whenever they create interaction rules. There is thus no

predetermined succession, or length, of the phases. Network, once it has emerged from its social environment, may exhibit alternate periods of growth and decline. For each period, network structures exhibit varying but identifiable characteristics, which are the result of structure transformation on the edge of chaos.

The spontaneity of social network

953-4814
6 2014

The spontaneity of network construction

The conception of network structures as a social construct spontaneously achieved by agents, as proposed in the above section, focusses on the role that agents' knowledge of the conditions of structures production plays in network dynamics. By drawing on Hayek's spontaneous order and on complexity theories, it emphasizes the role that agents' access to dispersed knowledge plays in the spontaneous production of network structures. It thus reframes the conditions of network structures production and network dynamics in a more complex fashion than that proposed by existing works. The idea of spontaneous creation of network structures may thus help to re-enchant network studies.

1003

Reframing the conditions of the production of network structures

The conception of network structures proposed in this paper is based on the fundamental idea, drawn from Hayek's work, that while agents in social systems cannot have complete knowledge of what is going on, they are, however, able to mentally grasp order or patterns of significance from among the rules which guide agents' interactions. Hayek's conception of the spontaneous creation of social order is analogous to that of self-organization as defined by complexity theories. When Hayek's spontaneous order is applied by analogy to social network, the above conception of the spontaneous social construction of network structures is produced.

This conception of social structures, while rooted in Hayek's work, is actually close to that defined by Giddens' structuration theory, which has influenced the study of network structures (Kilduff *et al.*, 2006; Sydow and Windeler, 1998). In this conception, as in structuration theory, and in many social constructivist works on structures (Drazin and Sandelands, 1992; Ashmos *et al.*, 2002; Fuchs, 2002), social rules are considered to be the medium of transformation of social system. Here also, the basis of network structures construction is agents' creation of rules, norms and interpretive schemes, as in, for example, the idea of effectiveness put forth by Sydow and Windeler (1998).

The difference between the conception of network structures that is developed in this paper and the above-mentioned works, is that agents are able to access dispersed knowledge about structures production, whereas agents are usually seen as having only positional knowledge about structures at their disposal.

This perspective on social network also differs from approaches to network structures based on, for instance, trust, cooperation (Kogut, 2000), mutual commitment and agents' position in network structures (Burt, 1992; Powell, 1990; Granovetter, 1973; Granowetter, 1985). These approaches focus on the impact of structures on agents' cooperation, trust, and their social and economic interests. Our approach considers network to be agents' spontaneous creation, and trust, cooperation, agents' interests, and network structures all develop together. The fundamental issue, in the perspective proposed here, is the emergence of network.

Reconsidering the definition of emergent network structures

Self-organization is most often defined as the spontaneous creation, by independent agents, of patterns of interactions or structures. The structures which emerge from this

spontaneous process are seen as the unintended consequences, and sometimes as the unacknowledged consequences, of agent interactions guided by a set of interaction rules (Kilduff *et al.*, 2006; Kogut, 2000; Sydow and Windeler, 1998). The perspective on the spontaneous construction of network structures proposed in this paper brings nuances to this view of self-organization.

This perspective stresses that agents have knowledge about the rules that guide structures production, and that they are able to use this knowledge to influence the emergence of structures. However, the force of this influence is limited by the relative independence of the agents. Agents reciprocally adjust their knowledge of the set of rules that guides the production of structures, and each agent is able to decide whether or not to modify the set, when observing that other agents have made modifications.

These specific conditions of network spontaneous construction, which may seem very unstable, correspond to a situation which, expressed in complexity theories terms, is an on-the-edge-of-chaos state (Morin, 1977, 1990; Prigogine and Stengers, 1984; Kauffman, 1995). This situation is, indeed, consistent with complex system theories, which state that the self-organization of a network of independent agents can occur only in on-the-edge-of-chaos states.

These conditions, which maintain network structures on the edge of chaos, and which allow the network to spontaneously grow, are, in effect, relatively fragile. As shown in the second section, if too many new agents enter a network, a growth crisis may occur, which will result in movement toward either an ordered situation or chaos. In the same fashion, if the set of ordered rules that provides agents with extended knowledge about the conditions of structures transformation ceases to be ordered, agents are unable to use their knowledge to produce structures, and the network collapses into chaos.

The idea of spontaneous creation of network structures thus provides the basis for a socially complex perspective on network structures. It provides conceptual means for understanding how network structures are both stable and unstable and may exhibit singular dynamics which involve both intended and unintended, as well as both acknowledged and unacknowledged, consequences of agents' interactions on structures production.

Perspectives for re-enchanting network studies

The analogical reasoning performed for defining the concept of spontaneous production of network structures is an "abstraction," that is to say that it is based on the generic properties of the elements involved in the analogy (Tsoukas, 1993). These are spontaneous order as the source and emergent structures as the target of the analogy. This abstract reasoning can only result in a highly general conceptual framework of emergent social structures, which is appropriate for heuristic utilization (Tsoukas, 1991, 1993).

This framework can be utilized to deal with social networks in which individuals participate, because agents are, in this conceptual framework, knowledgeable individuals. It is not possible to study the networks of organizations or firms, except by focussing on the social networks in which the managers or other specific kinds of agents in these organizations or firms participate. Within these limits, this conceptual framework can be heuristically utilized for studying intra- and inter-organizational networks.

This perspective on network structures thus creates a shift of focus in network study. While most current works focus on network structural properties, here, the

focus is placed on the processes of the social construction of network, and on the fragile and ephemeral characteristics of network structures which stem from these processes. This theoretical shift may help in re-enchanting network studies.

Further development of the concept could address the issue of network self-regulation; this could more precisely conceptualize the spontaneous creation of structures by agents which engages network in on-the-edge-of-chaos states. The concept of "reflexive self-regulation" proposed by Giddens (1984) could serve as a basis for this development.

The heuristic utilization of the conceptual framework of spontaneous network creation, and these suggested ulterior developments, may help in re-enchanting network studies by giving back to agents the freedom of choosing, individually and collectively, the social structures in which they live and perform economic exchanges.

The spontaneity of social network

1005

Conclusion

Current works most often stress the role of agents' cooperation in the creation of network structures, and they focus on the advantages that the agents benefit from when they participate in network creation. Because most works consider network as a cold world created by agents for the sake of social and economic interests, and because they pay too little attention to the spontaneous creation of network social structures, their view of networks is a disenchanted one. We depart from this view, and suggest a specific theoretical perspective which emphasizes agents' coordination and the spontaneous creation of network structures that agents build while interacting. This approach is based on the development of the analogy of Hayek's social order to complexity theories, and introduces to network studies the idea that agents have access to dispersed knowledge of interaction rules that guides the spontaneous production of network structures. It thus emphasizes agents' ability to shape the social structures in which they live, and thus contributes to creating a re-enchanted view of network.

References

- Ahuja, M.K. and Carley, K.M. (1999), "Network structure in virtual organization", *Organization Science*, Vol. 10 No. 10, pp. 741-757.
- Anderson, P. (1999), "Complexity theory and organization science", *Organization Science*, Vol. 10 No. 3, pp. 216-232.
- Ashmos, D.P., Duchon, D., Mc Daniel, R.R. Jr and Huonker, J.W. (2002), "What a mess! participation as simple managerial rule to 'complexify' organizations", *Journal of Management Studies*, Vol. 39 No. 2, pp. 189-206.
- Assens, C. (2001), "Stability and plasticity in self-organized networks", *European Journal of Economic and Social Systems, EDP Sciences*, Vol. 14 No. 4, pp. 311-332.
- Barnett, G.A. and Houston, R. (2005), *Advances in Self-Organizing Systems*, Hampton Press Inc, Thousands Oak.
- Beeson, I and Davis, C. (2000), "Emergence and accomplishment in organizational change", *Journal of Organizational Change Management*, Vol. 13 No. 2, pp. 178-189.
- Berger, P. and Luckmann, T. (1966), *The Social Construction of Reality*, Anchor Press, New York, NY.
- Bergmann-Lichtenstein, B.M. (2000), "Emergence as a process of self - organizing", *Journal of Organizational Change Management*, Vol. 13 No. 6, pp. 526-544.
- Biggiero, L. (2001), "Self - organizing processes in building entrepreneurial network: a theoretical and empirical investigation", *Human Systems Management*, Vol. 20 No. 3, pp. 209-222.

- Birner, J. and Edge, R. (1999), "Two views on social stability: an unsettled question", *American Journal of Economics and Sociology*, Vol. 58 No. 4, pp. 749-780.
- Black, J.A. (2000), "Fermenting change: capitalizing on the inherent change found in dynamic non-linear systems", *Journal of Organization Change Management*, Vol. 13 No. 6, pp. 520-525.
- Bouchikhi, H. (1998), "Living with and building on complexity: a constructivist perspective on organizations", *Organization*, Vol. 5 No. 2, pp. 217-232.
- Burt, R.S. (1992), *Structural Holes: The Social Structure of Competition*, Harvard University Press, Cambridge.
- Butera, F. (1991), *La métamorphose des organisations*, Editions de l'Organisation, Paris.
- Coleman, J.S. (1990), *Foundations of Social Theory*, Harvard University Press, Cambridge, MA.
- Cornelissen, J.P. (2005), "Beyond compare: metaphor in organization theory", *Academy of Management Review*, Vol. 30 No. 4, pp. 751-764.
- Drazin, R. and Sandelands, L. (1992), "Autogenesis: a perspective on the process of organizing", *Organization Science*, Vol. 3 No. 2, pp. 230-249.
- Fuchs, C. (2002), "Some implications of Anthony Giddens' works for a theory of social self-organization", *Emergence*, Vol. 4 No. 3, pp. 7-36.
- Giddens, A. (1984), *The Constitution of Society*, University of California Press, Berkeley and Los Angeles.
- Grandori, A. and Soda, G. (1995), "Inter-firm networks: antecedents, mechanism and forms", *Organization Studies*, Vol. 16 No. 2, pp. 183-214.
- Granovetter, M. (1973), "The strength of weak ties", *American Journal of Sociology*, Vol. 78 No. 6, pp. 1360-1380.
- Granovetter, M. (1985), "Economic action and social structure: the problem of embeddedness", *American Journal of Sociology*, Vol. 91 No. 3, pp. 481-510.
- Gulati, R. (1998), "Alliances and networks", *Strategic Management Journal*, Vol. 19 No. 4, pp. 293-317.
- Hayek, F. (1998), *Law, Legislation and Liberty*, Routledge, London.
- Kauffman, S. (1995), *At home in the Universe: The Search for the Laws of Complexity and Order*, Oxford University Press, Oxford.
- Kilduff, M., Tsai, W. and Hanke, R. (2006), "A paradigm too far? A dynamic stability reconsideration of the social network program", *Academy of Management Review*, Vol. 31 No. 4, pp. 1301-1048.
- Kogut, B. (2000), "The network as knowledge: generative rules and the emergence of structures", *Strategic Management Journal*, Vol. 21 No. 3, pp. 405-425.
- Lazerson, M.H. and Lorenzoni, G. (1999), "The firms that feed industrial districts: a return to the Italian source", *Industrial and Corporate Change*, Vol. 8 No. 2, pp. 235-265.
- Miles, R.E. and Snow, C.C. (1992), "Causes of failure in network organizations", *California Management Review*, Summer, Vol. 34 No. 4, pp. 53-72.
- Morgan, G. (1980), "Paradigms, metaphors and puzzle solving in organization theory", *Administrative Science Quarterly*, Vol. 25 No. 4, pp. 605-622.
- Morin, E. (1977), *La méthode: la nature de la nature*, Le Seuil, Paris.
- Morin, E. (1990), *Science avec conscience*, Le Seuil, Paris.
- Nicolis, G. and Prigogine, I. (1992), *A la rencontre du complexe*, Presses Universitaires de France.
- Oswick, C., Tom Keenoy, T. and Grant, D. (2002), "Metaphor and analogical reasoning in organization theory: beyond orthodoxy", *Academy of Management Review*, Vol. 27 No. 2, pp. 294-303.