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Trading routes, bypasses, and risky intersections: mapping the travels of 'networks' between economic sociology and economic geography

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Abstract: In economic geography the notion of the network has come to play a critical role in a range of debates. Yet networks are rarely construed in an explicit fashion. They are, rather, assumed as some sort of more enduring social relations. This paper seeks to foreground these implicit assumptions – and their limitations – by tracing the selective engagement of economic geography with network approaches in economic sociology. The perception of networks in economic geography is mainly informed by the network governance approach that is founded on Mark Granovetter's notion of embeddedness. By embracing the network governance approach, economic geography bypassed the older tradition of the social network approach. Economic geography thus discarded not only the concerns for network position and structure but also more calculative and strategic perceptions of networks prevailing in Ron Burt's work. Beyond these two dominant traditions, economic geography has, more recently, started to tinker with the poststructuralist metaphor of the rhizome of actor-network theory while it took no notice of Harrison White's notions of publics and polymorphous network domains.

Key words: interdisciplinarity, network governance approach, networks, publics, rhizome, social network analysis.

> I am part of the networks and the networks are part of me.
> I show up in the directories.
> I am visible in Google. I link, therefore I am.
> (William J. Mitchell, *Me++*)

I Introduction

1 The big N-thing

The more recent career of networks has been impressive, to say the least. During the early 1980s networks were, at best, rather grudgingly taken note of as mongrel hybrids, located somewhere in the obscure zone between the alleged ideal types of markets and hierarchies. From the early 1990s onwards, however, a variety of network forms increasingly expanded the 'swollen middle' of the governance spectrum (Hennart, 1993). Networks, in fact, turned from the rare exception to literal omnipresence–quite remarkable for a concept that already has been around since Georg Simmel.

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The roots of the network concept indeed refer back to Simmel's (1890) fundamental distinction between 'groups' (defined by some membership criterion) and 'webs of affiliation' (linked through specific types of connections). By highlighting the critical role of the position of actors in 'webs of affiliation' he laid the foundations for social network analysis. The principal perspective of social network analysis is informed by the 'anticategorical imperative' (Emirbayer and Goodwin, 1994: 1414) which rejects explanations of 'social behavior as the result of individuals' common possession of attributes and norms rather than as the result of their involvement in structural social relations' (Wellmann, 1983: 165; Wasserman and Faust, 1994; Scott, 2000). Behaviour and processes, in this perspective, are interpreted by reference to the particular structure and configuration of networks which have important behavioural, perceptual and attitudinal consequences for individual actors. Social network analysis, Burt (1986: 106) proclaims programmatically, 'captures causal factors in the social structural bedrock of society, bypassing the spuriously significant attributes of people temporarily occupying particular positions in social structure'.

In sociology, anthropology and psychology, the social network approach was employed in a broad range of empirical contexts ranging from explorations of reference groups and role sets through the analysis of social support to studies of the diffusion of information (Podolny and Page, 1998; Smith-Doerr and Powell, 2003). One empirical context most notably, though, remained somewhat out of focus: although industrial sociologists (Roy, 1954; Dalton, 1959) had long demonstrated the hidden powers of informal networks within formal organizational practices and structures, the social network approach hardly paid sustained attention to economic activity.

The enormous upsurge of theoretical interest in networks in the economy during the last two decades was mainly catalysed by Mark Granovetter's (1985) notion of embeddedness. By stressing 'the role of concrete personal relations and structures (or "networks") of such relations in generating trust and malfeasance', Granovetter (1985: 490) shifted the analytical perspective on networks in two respects. The notion of embeddedness provided a robust framework to study the institutional mechanisms by which networks are initiated, coordinated, monitored, recombined and terminated. This view on network governance thus shifted the focus from examinations of network structure and position to concerns with particular institutional contexts in which actors are embedded. Concurrently, this reorientation from the structure of networks to their specific contents implied a move from the austere quantitative methodology of sociometrics towards qualitative explorations of case-study research.

From the early 1990s on, economic geography keenly embraced the network governance approach that evolved around Granovetter's embeddedness notion (see Dicken and Thrift, 1992; Grabher, 1993a). The Granovetterian reading of embeddedness in fact not only turned into *the* master-paradigm of the new economic sociology but also epitomized a highly versatile key concept in the economic geography of the so-called 'cultural turn' (Peck, 2005). Boosted by the excessively celebrated 'resurgence of regional economies' (Piore and Sabel, 1984), the network governance approach afforded a multipurpose conceptual template on which the piles of Marshallian accounts of the allegedly re-emerging regional economies could be built. Regardless of how much the various variants of territorial innovation models differed conceptually or semantically, they all seemed to be tied together by networks, at least in the rather generic sense of more or less durable ties (see also Dicken *et al.*, 2001: 10–11). The conceptual elasticity of the notion of networks appeared not only as a precondition for the proliferation of networks throughout economic

geography (see Markusen, 1999, for a critique). Moreover, it also afforded a major platform for crossdisciplinary exchange between economic geography and economic sociology more generally.

2 The structure of the paper: mapping crossdisciplinary trade

In this paper I wish to assess this selective engagement of economic geography with network approaches in economic sociology. This evaluation attempts, on the one hand, to draw a balance of the productivity of the network governance approach in stimulating research in economic geography and in galvanizing crossdisciplinary exchange. On the other hand, however, the paper also attempts to foreground the (presumably unintended) consequences of the exchange that did *not* occur: by privileging the network construal of the governance approach, economic geography unavoidably opted against competing conceptions of the older social network tradition. This evaluation is not motivated by the scholastic ambition to bring charges of biased awareness against economic geography. By turning the view also beyond the two dominant network traditions, the paper rather seeks to identify promising crossdisciplinary debates that might extend, challenge or reaffirm our prevailing, quite often implicit assumptions on networks. At the very least, this assessment will clarify those areas of crossdisciplinary exchange that we might decide not to explore further. The evaluation is framed as a mapping exercise in which the actual routes and the potential pathways of the travels of the notion of networks between economic sociology and economic geography are sketched.

The paper sets off by depicting the main trading route of the network governance approach (section II) that was firmly founded on Granovetter's relational conception of embeddedness. This route branched off into the partially overlapping areas of project, strategic, informal and regional networks to which economic geography contributed varying degrees. Invariably, though, economic geography stuck with the 'strong-tie' end of Granovetter's paradigmatic dichotomy and turned networks into a shorthand for enduring, trust-based ties. Presumably reflecting the intention to dissociate the discipline unmistakably from economics as the 'science of suspicion' (Charles F. Sabel), economic geography until more recently seemed to confine its interest in networks to their benevolent attributes. In general a '... spirit of optimism has been linked to discussions of economic networks. They have been viewed as innovative, adaptive, resilient, open, and regenerative economic forms and [...] often seem to be connected with a sense of fairness or economic democracy' (Leitner *et al.*, 2002: 278–79). Apart from the occasional gesture towards some ostensibly 'dark sides' of networks, economic geography dispensed with the less munificent variants of networks that are forged to contravene hierarchical rules, mobilize conspiracy or organize crime. Instead, economic geography focused on the indeed very human side of family, friendship and kin in economic relations.

The paper subsequently ventures into the largely uncharted terrain of the social network approach that the main trading route between economic geography and economic sociology was passing by (section III). Economic geography, in other words, hardly took a systematic interest in the behavioural consequences of network configuration. Notions like the *tertius gaudens* (the third who benefits) and 'structural equivalence' (Burt, 1987) exemplify the critical role of network position and structure and fundamentally depart from the cohesion-fixated ideas of networks that travelled along the main trading route. By shifting the focus to non-redundant ties and 'structural holes' in particular, Burt's (1992; 2000) social network analysis invites an understanding of arbitrage and innovation that sharply contrasts with the 'strong-tie' view of trust-based relations prevailing in economic geography. More recently, research on 'small worlds'

(Watts, 1999a; 1999b; 2003) has underlined the often surprisingly strong connectivity of networks and elucidated the vulnerability of networks around key hubs (Albert *et al.*, 2000), another issue that economic geography has hardly been concerned with.

By moving way beyond the two dominant network traditions the paper finally approaches two risky intersections at which the familiar tie-and-node imagery of networks is stretched, crumpled up and blurred (section IV). The first alternative trope to this network depiction is the 'rhizome', a metaphor for a multiplex, heterogeneous and robust web of relations (Deleuze and Guattari, 1988) that influenced in particular the (later) actor-network theory (Callon, 1986; 1998; Latour, 1988). Although the rhizome metaphor has not even come close to the status of an alternative to the network conception prevailing in economic geography, it provides a conceptual pivot to shift beyond the established dualisms of structure/agency, subject/object, human/non-human and to move further towards topological understandings of space and networks. Utterly unexplored by economic geography so far remains Harrison White's (1992) route to dissolve crisp tie-and-node cartographies into more polymorphous and overlapping network domains. Between the more fluid and incoherent relational ties, 'publics' afford the social spaces in which the identity of actors only temporarily crystallizes at the intersection between different domains (Mische and White, 1998).

After this excursion into the wide and ramified conceptual terrain, the paper does not pretend to offer a comprehensive synthesis that, somewhat naïvely, seeks to redraft the map of the crossdisciplinary exchange (and mutual ignorance) into a more coherent and presumably more pleasing picture. The paper does *not* claim to provide the definitive guide for crossdisciplinary excursions through network territory. However, the paper concludes by suggesting some directions for further excursions, highlighting their risks and pointing to some pitfalls.

II The trading site: the network governance approach

1 The New Institutional Economics versus New Economic Sociology antagonism

Crossdisciplinary trade in networks evolved primarily on the extended terrain of the governance approach focusing on the institutional mechanisms by which networks are initiated, coordinated, monitored, recombined and terminated (Oliver and Ebers, 1998). In contrast to the social network tradition with its formalistic exploration of network structure and position, the governance approach concentrates on the particular institutional and social contexts in which actors are embedded. From concerns with the formal structure of networks the governance approach marks a shift to an engagement with the specific contents of networks (see also Smith-Doerr and Powell, 2003).

A major path leading to this trading zone was marked by the stylized and dramatized antagonism between Ronald Coase and Oliver Williamson on the one side, and Karl Polanyi and Mark Granovetter on the other. The confrontations of these two titanic pairs are rather well known and have become, at least in their abridged version, an integral element in the eclectic ensemble of theoretical building blocks that make up 'economic geographic theory'. The stage was set by Coase (1937) who asked the simple yet compelling question of why so much activity takes place inside formal organizations if markets are allegedly optimal mechanism for resource allocation. Coase answered this question by attending to the costs of exchange: when the transaction costs of market exchange are high, it may be less costly to coordinate transactions through a formal organization.

This seminal piece indeed lay fallow for almost four decades until it was picked up by Williamson (1975; 1985) and proponents of transaction cost economics in the 1970s. By theorizing both governance structures and organizational forms, the economics of organization approach subsequently moved much

closer to the fields of law, economic sociology, organization theory and business studies. From the early 1990s onwards, this corpus of research was also increasingly taken up in economic geographic reasoning (see, for example, Camagni, 1991; Grabher, 1993a; Yeung, 1994; Amin and Hausner, 1997). The 'in-a-nutshell' variant of Williamson's transaction-cost framework was the vehicle for this move closer to the social sciences and became the emblematic representation of the New Institutional Economics (NIE). Not surprisingly, of course, this vehicle was not unambiguously enthusiastically welcomed in all branches of the social sciences.

The most forceful and authoritative challenge was launched when Granovetter addressed the 'Problem of embeddedness' (1985) which emerged as *the* master paradigm of the New Economic Sociology (NES) (Swedberg, 1997). In the transaction-cost approach, under- and oversocialized concepts of economic action complement one another. Not far from Hobbes' 'state of nature' or Rawls' 'original position', the undersocialized perception of the market invokes an idealized state of affairs in which behaviour is unaffected by social structure and relations; and, as in Hobbes' *Leviathan*, the problem of disorder is 'solved' with an oversocialized concept of hierarchical power within the firm, which deflects opportunism by making potentially divisive decisions by 'fiat'.

In a rather unambiguous move, economic geography took to the NES side of the antagonism, endorsing a particular Granovetterian conception of embeddedness. While Polanyi primarily used the notion as a kind of shorthand for his *method* of studying institutions as concrete, multiply-determined objects that could follow different social logics simultaneously (Krippner, 2001: 777), Granovetter (1985: 490) 'scaled down' the concept to the analytical level of concrete personal relations and networks (Hess, 2004: 170). Ironically, economic geographic approaches in general seem to have a stronger affinity to Polanyi's (1973: xlvii) original interest in different forms of embeddedness as an analytical strategy to 'grasp [institutions] in their concrete aspect' as a complex mix of social logics. Nevertheless, the discipline embarked on Granovetter's relational interpretation of embeddedness that seemed to provide a highly versatile template around which the empirics of the re-emerging regional economies could be built.

The second major line of critique on Coase and Williamson focused on the dichotomous view of markets and hierarchies. Fairly early on, Richardson (1972: 883) drew attention to the increasing involvement of firms in non-market arrangements that refute the clear-cut dichotomy of firms as 'islands of planned coordination in a sea of market relations'. In practice, Richardson (1972) insisted, firms enter into all kinds of intermediate arrangements between market exchanges and hierarchies, ranging from subcontracting relations and strategic alliances to franchising and decentralized profit centres. Although this continuum view with two ideal types at each pole served as a useful analytical entry, it also imposed serious limitations. By conceiving of markets and hierarchies as the 'pure' forms, intermediate organizational designs were reduced to 'mongrel hybrids' instead of distinctive modes of governance (Powell, 1990). More and more, though, networks have come to be seen as a specific mode of governance in the ever-extending range between the alleged 'ideal types'. Most critically, this view also opened up a niche in the broad spectrum of network forms that appeared to be cut out for economic geography.

2 Network forms: placing economic geography in network studies

By unscrupulously cutting through the cornucopia of network forms and organizational variants that the elasticity of the notion has engendered, networks can be systematized along two dimensions–their duration and governance (Sydow, 2003). Different temporal dimensions have important consequences for

the types of regulation of network relations. Long-term networks, for example, are shaped by reciprocal ties of experience and expectations emerging from the 'shadow of the future' (Axelrod, 1984) alike. The governance of networks spans a broad spectrum from authoritative to distributed or, phrased differently, from more hierarchical to more heterarchical. In hierarchical networks, control is exerted by a more or less clearly identifiable centre or coordinator who regulates network practices and rules, such as the selection of network members, the allocation of resources, the evaluation of network practices, and the maintenance of network boundaries. In heterarchical networks, in contrast, the regulation of interaction and relations is distributed and associative (Hedlund, 1986; 1993). Moreover, heterarchical networks exhibit patterns of emergent self-organization, strong lateral ties and a diverse distribution of authority (Stark, 2001).

The two dimensions of stability and forms of governance open up a rather simple typology of informal networks, project networks, strategic networks and, the prime focus of economic geographic research in this context, regional networks. These forms, of course, do not represent distinct or essentialist categories, but rather overlap and interpenetrate each other to varying degrees. The particular network forms indeed evolve as complex combinations of overlapping, juxtaposed and nested governance mechanisms. This simple typology (an earlier version of which has been laid out in Grabher and Powell, 2004: xvii–xxii), nevertheless, is employed to locate the main routes of the interdisciplinary exchange between economic sociology and economic geography in the governance tradition of network analysis.

3 *Project networks: the discovery of the spatial context*

The task-specific assembly of participants in project networks typically displays a considerably higher level of hierarchical coordination than informal and regional networks. While informal networks are based on inter*personal* ties and strategic networks are configured as inter*organizational* alliances, project networks interweave interorganizational and interpersonal relationships. In contrast to other network forms that vary with regard to duration, projects are temporally limited by definition: deadlines are the emblematic feature of these 'temporary systems' with institutionalized termination (Goodman and Goodman, 1976; Lundin and Söderholm, 1995).

The temporal limitation and radical task orientation of project networks hold the promise of efficiency gains that, in turn, have propelled the diffusion of this organizational form throughout the economy. The transience of projects, however, also poses formidable challenges with regard to their coordination and control (Ekstedt *et al.*, 1999). Projects often entail high-risk outcomes, yet they lack normative safeguards that minimize the likelihood of failure. Moreover, there is rarely sufficient time to develop personal confidence that could compensate for the absence of shared experience, familiarity or social coherence. Project networks presuppose trust, yet their temporal limitation seems to hinder its development (Meyerson *et al.*, 1996).

This fundamental paradox of project organization has increasingly shifted the attention from a functionalist understanding of the singular venture and concerns with its 'optimal' organizational design to a problematization of the institutional context in which projects are embedded (see, for example, DeFillippi *et al.*, 2004; Söderlund, 2004). This contextual view rejects the conventional perception of the project as a phenomenon isolated from its history, stripped of the contemporary social and spatial context and independent of the future (Engwall, 2003). Projects in this perspective are seen rather as inextricably interwoven with an organizational and social context which affords key resources of expertise, reputation and legitimization (Gann and Salter, 2000; Sydow and Staber, 2002; Davies and Hobday, 2005).

The shift from managerial considerations of the optimal design and implementation of the single project to the institutional complexities of the project context has brought the regional level into the focus of project research in economic sociology and thus triggered some interest in economic geographic perspectives on temporary organizations. Beyond the obvious Marshallian dynamics of localized pools of specialists, the more recent concerns with regions as 'repositories of knowledge' (DeFillippi *et al.*, 2004) has drawn economic sociological attention to geographical notions of localized learning processes. More generally, the increasing sensitivity towards space in the social sciences (see, for example, the debate in Grabher and Hassink, 2004) seems also to have engendered the interest in the geography of projects with their multiple intertwined layers of highly localized and translocal networks (see, for example, Sydow and Staber, 2002). This crossdisciplinary exchange has yielded, among others, the notion of the 'temporary cluster' (Alderman, 2002) and the 'project ecology' (Grabher, 2002; 2004) to capture the spatial and social logics of temporary organizational arrangements.

4 Strategic networks: the realm of corporate ties, the realm of economics?

Formal interorganizational relations are, by their very nature, more strategic and tightly orchestrated than either informal or regional networks. While less tightly controlled than the chain of command in large hierarchical firms, strategic networks are much more centrally organized than informal or regional networks in terms of the selection of network members, the allocation of resources and distribution of revenues, and definition of network boundaries (Jarillo, 1988; Sydow, 2003). In general, communication channels and information flows are also less open and permeable than in regional and informal networks. Ties in strategic networks are forged, in a much more distinct and manifest fashion than in other forms, by power (Håkansson and Johanson, 1988).

Hierarchical relations and attendant asymmetries of power are the emblematic governance mechanisms within the large corporation. The efficacy of 'fiat', however, is particularly limited in multinational and global corporations because subsidiaries often control strategic resources and key competences, as well as critical linkages with key actors in their local environments (Ghoshal and Bartlett, 1990). Typically, in such large, dispersed, and interdependent organizations, hierarchical authority coexists with significant levels of local autonomy (Sölvell and Zander, 1995). Intra-organizational ties and external network relations with customers, distributors and suppliers thus interpenetrate one another (Johanson and Mattson, 1987).

While importing *en gros* from the sociological (and, of course, business management) literatures on the internal organization of large corporations, economic geography exported *en detail* vivid narratives and, in a few rare cases, conceptual guidelines to construe the interdependencies between internal and external ties of multinational corporations and their host economies. Above all, Peter Dicken's inventive matrices of local and non-local linkages elaborated in *Global shift* (2003) travelled beyond the confines of the respective economic geographic debate. While earlier work in this field seemed primarily concerned with issues of 'external control' of regions through large corporations, economic geography more recently seems to have adopted a less politicized perspective that circles around the questions of if and how large corporations function as 'pipelines' through which regions get access to global knowledge (see, for example, the debate on innovative milieus or, more recently, Bathelt *et al.*, 2004). The critical concerns with the cathedrals-in-the-desert syndrome and asymmetrical power relations (compellingly conceptualized in Doreen Massey's 1979 framing of 'the regional problem') thus apparently were superimposed by the fascination with interactive learning processes (see Hudson, 1999, for a critical review).

More recent managerial imperatives to concentrate on the so-called core competencies and to externalize non-core activities have extended the interest in strategic networks from the large corporation to supplier networks. The universally prescribed slimming down into 'lean' organizations has forked into a variety of paths, ranging from market-driven adversarial transactions to cooperative ties of mutual learning and interactive innovation processes (Helper, 1993). Crosscountry comparisons, in fact, have revealed that opportunism and trust are highly variable and dependent on specific national and regional institutional settings (Lane and Bachmann, 1997; Sako and Helper, 1998).

Within economic geography, the issue of the vertical disintegration figured large in earlier transaction-cost inspired attempts to come to grips with agglomeration economies in the early California School of Allen Scott and Michael Storper (1986; 1988). Vertical disintegration and supplier relations indeed took centre stage with the discovery of the Italian industrial districts. The canonical studies of Modena and Prato portrayed these textile districts as modernized versions of the putting-out system that offered an effective alternative governance to the 'false promises of vertical integration' (Lazerson, 1993: 203). The increasingly formulaic reference to the notion of embeddedness had alerted economic geographic inquiry to the entanglement of multiple social logics within supplier networks, yet the core thrust of this concept has also been flattened out in the course of the diffusion of the idea: emptied out from the essentially social gist, embeddedness of supplier relations has been occasionally trivialized to dense local forward and backward linkages.

Similarly, economic geography somehow subsumed the realm of the horizontal ties of strategic alliances in the diffuse outer zone of the 'global' operating beyond the familiar regional worlds. Perhaps economic geography took no significant interest in these horizontal ties (with notable exceptions, though, see Dicken *et al.*, 2001; Coe *et al.*, 2004) since they are, as the adjective 'strategic' suggests, less firmly embedded in social webs of regional and informal networks (Gomes-Casseres, 1996). The attribute 'strategic' was presumably read as a warning to stand clear from what obviously belonged to the realm of economic inquiry properly. Moreover, with the more recent shift from enduring joint ventures to short-term non-equity partnerships, such as R&D pacts and joint development agreements (Hagedoorn, 2002), strategic alliances have turned into much more ephemeral phenomena that, by their very nature, elude a quintessential geographical exercise: pinning down spatially 'crystallized' social phenomena onto a map.

5 Informal networks: from import to selective exchange?

Membership in an informal network is typically based on shared experience, pre-existing social ties or the thick bonds of kinship and ethnicity that draws participants together. Given that such relationships emerge out of repeated exchanges, informal networks symptomatically involve comparatively long-time horizons. Research on informal networks has portrayed this type of network governance rather ambivalently. Whereas one strand of research pays tribute to the essential compensatory role and 'lubricating' effects of informal ties in mitigating structural shortcomings of markets and hierarchies, a somewhat less prominent line of inquiry is primarily immersed in exposing the potentials of informal networks to disrupt markets and obstruct hierarchies.

The compensatory role of informal networks in market settings has been evinced, for example, in Geertz's (1978) classic account of the Moroccan bazaar that, at first glance, appears to approximate neoclassical price-driven markets. Yet, in order to improve the richness and reliability of information, buyers and sellers establish continuing relationships based on reciprocity. Using informal

relational contracts to cope with volatility is not confined to ostensibly 'premodern' contexts. Similar to the traders in the noisy informational environments of a bazaar, traders on the financial markets of the Wall Street or the City of London instrumentalize ties with other market participants to evaluate and triangulate information, rumours and gossip (Baker, 1984; Abolafia, 1997), a line of reasoning to which economic geography has contributed significantly (Amin and Thrift, 1992; McDowell, 1997).

Presumably the most vivid contrast to the sterile image of spot-contracting between atomized actors has been revealed in research on ethnic networks that afford the relational architecture of enclaves and ethnic economies. Ethnic ties 'suffuse an otherwise "bare" relationship with a sense of collective purpose' (Portes and Bach, 1985: 345) by providing 'bounded solidarity' and 'enforceable trust'. The amalgamation of these collective assets in the notion of 'social capital' subsequently tended to privilege the enabling attributes of informal networks (Putnam, 2000). This focus on the short-term benefits of social capital glanced over earlier accounts that illuminated how informal networks might turn into mobility traps over time (Sanders and Nee, 1996).

Despite the imminent spatiality of ethnic networks and enclaves the geographical community initially has been less involved in the relevant conceptual debates. In fact, it was up to the sociologists Waldinger (1996) and Light (1998) to make the case for geographical perspectives and scholarship in advancing theories on migration and ethnic economies. The more lively crossdisciplinary trade in recent times has moved beyond the emblematic genres of geography such as the idiosyncratic portrayals of the place-based nature of local enclaves and ethnic economies to explore the transnational character of migration and 'transmigrants' (Smith and Bailey, 2004), ethnic networks (Castells, 1996) or global élite networks (Sassen, 2002).

Informal networks are not only established to interpret information and to mobilize collective sources of reciprocity in turbulent market settings. Due to their informality, these networks are also particularly well suited collectively to distort, suppress or manipulate market information. Consequently, informal networks can provide a context for practices ranging from corruption and conspiracy (Baker and Faulkner, 1993) to organized crime in violent Mafia-type networks (Gambetta, 1988; Friman, 2004) or terrorist networks (Dillon, 2002; Raab and Milward, 2003). In fact, the risks associated with crime make trust 'far more necessary among criminals than among businessmen' (Arlachi, 1986). Significantly, economic geography has remained largely absent from this strand of network research. Economic geography's interest in Italian informal networks, for example, focused on the 'impanatore' rather than on the 'godfather', and was more concerned with the societal benefits of trust and social capital than with the power of honour and shame.

Informal networks also evolve in organizational contexts that are governed by formal, hierarchical control. As in market environments, informal ties in hierarchical organizations also fulfil multiple roles. They can compensate for the structural weaknesses of hierarchies when, for example, they constitute 'communities of practice' (Brown and Duguid, 1991; Wenger, 1998). Such lateral, self-organized networks, 'informally bound together by shared expertise and passion for a joint enterprise' (Wenger and Snyder, 2000: 139), provide decentralized means of learning and usually are not in conflict with organizational goals. The notion of communities of practice has rather rapidly migrated into a broad range of (sub)disciplinary contexts and, in the wake of the intertwined debates on the knowledge-economy and learning, has been increasingly employed in economic geography (see, for example, Gertler, 2003; Coe and Bunnell, 2003; Amin

While economic sociology seems to embrace the janus-faced character of informal relationships in hierarchical contexts, economic geography once more narrowed the focus to the more benevolent and functional dimensions of informality. The absence from this strand of research appears all the more remarkable since the success of informal coalitions in evading organizational rules and contradictions, as Dalton (1959: 49) asserted in his classic study of *Men who manage*, involves joined action 'of a kind rarely, if ever, shown in carrying on official activities'.

6 Regional networks: the ambivalence of an 'export success'

Presumably the busiest crossdisciplinary trade unfolded, not surprisingly, in the realm of regional networks, a natural domain of economic geography so to speak. The early accounts on the imbrication of family, community, polity and business within tightly knit localities in the Third Italy (Becattini, 1978; Brusco, 1982; Piore and Sabel, 1984), Baden-Württemberg (Herrigel, 1993; 1996) and Silicon Valley (Saxenian, 1994) provided most vivid embodiments of the notion of embeddedness. Although networks were rarely theorized in an explicit fashion, they denoted an integral ingredient in these Marshallian accounts that envisioned networks mainly in a rather generic sense as a shorthand for all sorts of ties that did not adhere to a straightforward market logic.

Presumably overwhelmed by regional worlds that radiated such a strong sense of (old European) cultivation *vis-à-vis* the brute force of uncivilized (US-style) big corporate capitalism, economic geography raved about regional networks. These small firm networks obviously held the promise to combine economic imperatives of efficiency, innovativeness and resilience with a sense of economic democracy and social fairness (critically, see Leitner *et al.*, 2002: 278–79). More cautionary interventions that pointed to the ambivalence of dense network ties and their inherent tendency to [illegible] bind into ties that blind were initially rather rare (see, for example, Grabher, 1993b; Scott, 1998).

The euphoria of the new regionalism and the rediscovered region also coproduced 'overterritorialized views on embeddedness' (Hess, 2004: 174–75) culminating in 'local fetishism'. Initially productive conceptions of territorial innovation models like innovative milieux, regional innovation systems and, above all, the cluster notion that had branched out from the district debate more and more seemed to constrict the view on regions to isolated 'islands of innovation' (Amin and Cohendet, 2004: 87). Despite convincing attempts to break out of what increasingly appeared as the straightjacket imposed by Marshallian analysis (Amin and Thrift, 1992; see also Gordon, 1991; Camagni, 1991; Gertler, 1995), the dominant insular perception of regions during the 1990s seems, in fact, to have been stabilized through crossdisciplinary trade. The biggest export successes of economic geography thus reproduced a local fetishism that, within economic geography, had come under increasingly fierce and substantial attack (see, for example, Oinas, 2000; Bunnell and Coe, 2001; Bresnahan *et al.*, 2001; Coe and Bunnell, 2003). As apparently symptomatic for crossdisciplinary trade, concepts seem to travel farther when 'frozen' in their infant rough-and-ready state.

Lately, however, imports from economic sociology have turned into authoritative conceptual pivots to break away from the obdurate deadlock of local fetishism. One of these instances relates to Powell's studies of biotechnology networks and his instructive distinction between 'local broadcasting' and 'global pipelines' (Owen-Smith and Powell, 2004) that travelled across the disciplinary boundary into economic geography (see, for example, Bathelt *et al.*, 2004). This conceptual step from the local into the non-local appears long overdue, yet it still seems rather distant from a topological understanding of spaces (Amin and

Cohendet, 2004: 154) that allows 'an understanding of individual sites as a node of multiple knowledge connections of varying intensity and spatial distance, as a place of trans-scalar and non-linear connections, and as a relay point of circulating knowledges that cannot be territorially attributed with any measure of certainty or fixity' (see also Allen, 2000: 28; Amin, 2002).

How far such more demanding notions of proximity will travel back into economic sociology remains an open question, to say the least. Up until now, the interest of economic sociology (and other disciplines that economic geography rather self-confidentially conceives as 'neighbours') was confined primarily to narratives about *physical* proximity which, after all, appeared as the core field of expertise of (economic) geography. Economic geography, to be sure, for rather long had cultivated this self-conception of the science of the meso-scale, holding the privileged expertise for the analytical level located somewhere between the macro/structural and the micro/idiosyncratic.

Some of the structural limitations of the regional network debate, above all its fixation with the blessings of embeddedness and the benevolence of trust-based ties, reflect the willing engagement of economic geography with the governance approach. In other words, economic geographic imaginations of networks hardly appreciated the second, in fact older, tradition of social network analysis in a more systematic fashion. Presumably economic geography was deterred from venturing more deeply into this terrain by the austere and formalistic style of the social network approach that appeared to clash with the predilection for qualitative approaches of the 'cultural turn'.

III Bypasses and uncharted terrain: social network analysis

1 From network contents to network structure?

Social network analysis starts from the assumption that social behaviour cannot simply be explicated by the individual attributes of actors. Explanations stem from analyses of patterns of relations. The hallmark of social network analysis, in Laumann's (1979: 349) words, is to account for 'the behavior of network elements (ie, the nodes) and of the system as a whole by appeal to specific features of the interconnections among the elements'. The austere style of theorizing in social network analysis is deliberate and reflects the chief strategy to avoid the 'traps' of categorical thinking. In this sense, social network theory attempts to institute a relational mode of analysis that breaks away from tired debates about the primacy of structure or agency in determining social action (Krippner, 2001: 769).

These debates reflect the efforts to ground social science on the unexamined construct of the person as an *entity* characterized by the 'typical laundry list of variables of interest in social science' – age, race, class, gender, etc – that are conceived as causal factors. Social network analysis, in contrast, places relations right in the core of social science. The intersection of such relations in concrete persons, social network theory maintains, is coincidental. Resolutely advocating methodological relationalism, White (1992: 197) rejects the person as the basic and unquestioned elementary building block, the 'atom' as it were of social analysis.

Referring back to Simmel's (1890; 1923) fundamental distinction between groups and 'webs of affiliation', networks represent sets of actors linked through specific types of connections. An industry, for example, consists of a group of companies who may all be members of a trade association, while a web of industry affiliations describes alliances between firms, interlocking directorates, or supply-chain relations among buyers and sellers. As a most basic representation of such affiliations, Moreno (1934) devised the formal language of the nodes and lines of the 'sociogram' which became the emblematic conceptual representation of the social network approach. Over the last decades,

the rather basic formal language of the sociogram or 'graph' has been translated into software tools (eg, UCINET, KrackPlot, Inflow, Pajek) to analyse and depict features of relationships parsimoniously (Scott, 2000). Although this strand of research has attracted criticism for its structural bent (Mizruchi, 1994), it produced a range of potent tools to conceptualize the interdependencies of behaviour and processes in the network (Wassermann and Faust, 1994; Smith-Doerr and Powell, 2003). In economic geography the conceptual toolkit of social network research, particularly the 'positional analysis' (Krippner, 2001: 792) *à la* Burt, has hardly been employed although it offers, as the next section aims to indicate, some imaginative conceptual devices.

2 Structural equivalence: the logic of 'keeping up with the Joneses'

Which type of network configuration is favourable to social contagion? By posing this question Burt (1978) addressed the issue of the diffusion of innovations. Although, of course, Burt was interested in the social mechanisms of contagion, this issue rather obviously has an essentially geographical dimension. According to a more familiar line of reasoning, frequent interactions and emphatic communication between network members smooth adoption. This logic of cohesion, in Burt's (1978; 1987) analysis is less powerful in driving diffusion than the social pressures created by structural equivalence. Structural equivalence, broadly conceived, occurs when two actors occupy similar positions in a social system by having identical ties with other network members (Lorrain and White, 1971; White *et al*., 1976).

Generally, structural equivalence predicts that actors identically positioned in the flow of influential communication will use each other as a frame of reference for subjective judgements even if they have *no* direct communication with each other (Burt, 1987: 1293). In other words, it is not through intense exchange between network members but rather through the perception of the proper action for an occupant of a specific position in the network that diffusion is primarily driven (see also Galaskiewicz and Burt, 1991; Burkhardt, 1994). Structural equivalence shifts the perception of the driving forces of innovation. Rather than being smoothly diffused through dense local relationships, innovation in this perspective is primarily stimulated by the social pressure of mutual comparison: the merciless mimetic pressures of 'keeping up with the Joneses'.

This conclusion affords a reorientation of our views on innovation and learning in general and invites a reappraisal of the different variants of territorial innovation models. By revolving around the crucial importance of a dense web of intraregional linkages, these models apparently tend to overemphasize the dynamics of cohesion at the expense of structural equivalence. More recently, a critical line of reasoning that resonates with the structural equivalence argument has been voiced pointing to the crucial role of mutual awareness and observation in stimulating regional innovation. Among the pioneers who explored this particular path in economic geography, Malmberg and Maskell (2002) pointed to the relevance of observation, imitation and mimetic processes more generally. This line of reasoning might benefit from drawing more explicitly on economic sociological imaginations, such as Podolny's (2001) instructive differentiation of 'networks as pipes' (through which resources are conveyed) and 'networks as prisms' (through which information about a person is inferred from ties to third parties) (see also the related concept of 'network transitivity' by Uzzi and Gillespie (2002).

3 Tertius gaudens and structural holes: arbitrage and robust action

A further key principle in social network analysis alerts to the vital importance of network position of individual actors for understanding social behaviour. In a triad, as Georg Simmel (1923) already had elaborated,

the *tertius gaudens* (the third who benefits), can leverage off a stable entrepreneurial position by creating competition: 'Make simultaneous, contradictory demands explicit to the people posing them, and ask them to resolve their – now explicit – conflict' (Burt, 1992: 76; see also Merton, 1957: 430). In this way, competition is 'produced' by elevating tensions. As Simmel (1902: 185–86) elucidated under the rubric 'divide and rule' this strategy holds equally well with large groups and networks. Generally speaking, entrepreneurship in this perspective, galvanizes around strategies to divulge and broker contradiction and tension between others.

Burt (1992; 2000) has further built on Simmel's *tertius* role in his discussion of how actors who connect two others previously unknown to each other bridge a 'structural hole'. These bridges represent unique, non-redundant ties between networks that otherwise would remain separated. Such non-redundant ties derive benefits from informational efficiencies since they provide opportunities for exploration and arbitrage. By bridging a structural hole, an actor is able to look at a wider information screen and for that very reason becomes an even more attractive network contact to other actors thus providing new opportunities to expand network contacts according to her particular interests. Moreover, actors close to structural holes 'are at higher risk of having good ideas' (Burt, 2004: 349) since they enjoy more opportunities to select and synthesize alternative ways of thinking.

The *tertius* position affords autonomy and manoeuvrability that can be instrumentalized for a strategic play that Padgett and Ansell (1993) label 'robust action'. At the core of robust action is the fact 'that single actions can be interpreted coherently from multiple perspectives simultaneously, the fact that single actions can be moves in many games at once' (Padgett and Ansell, 1993: 1263). The outcome is flexible opportunism, that is, maintaining discretionary options across unforeseeable futures in the face of attempts to narrow those options. Crucial for maintaining discretion is not to disclose any specific goals: 'For in nasty strategic games ... positional play is the maneuvering of opponents into the forced clarification of their (but not your) tactical lines of action' (Padgett and Ansell, 1993: 1265). Victory, hence, means locking in others, but not yourself, to goal-orientated sequences of strategic play that thereby become predictable. As Stark (1996) has demonstrated against the background of the postsocialist transformation, actors who can switch between the diverse positions they hold simultaneously in various networks can pursue such strategic games to evade accountability (see also Sedaitis, 1997).

This sort of entrepreneurship and arbitrage that flows from exploiting ambivalence is a far cry from the relentlessly innovative incarnation of the Schumpeterian entrepreneur in current district and cluster debates. While networks in economic geographic narratives are portrayed as webs of trustful ties to curb opportunism and to engender cooperation and innovation, networks emerge from Burt's conception rather as vehicles to pursue opportunistic behaviour and to produce competition. The iconographic economic geographic accounts are fixated on 'sharing', trust and mutual learning; Burt's viewpoint focuses on 'dividing', arbitrage and strategic games.

4 Strength of ties: on the importance of outsiders and strangers

Although explicitly less technical and algebraic in its approach than White and Burt, Granovetter's (1973; 1974; 1995) studies on job search offered substantive and analytical continuity with earlier sociometric work. Put briefly, information that was crucial for *Getting a job* (Granovetter, 1974) was provided, rather than by family and friends, by work-related contacts. By drawing on information diffusion models, Granovetter (1973: 1366) elaborated the elegant simplicity of the 'strength of weak ties': 'Whatever is to be

diffused can reach a larger number of people, and traverse greater social distance (i.e., path length), when passed through weak ties rather than strong.' Weak ties score rather low with regard to the amount of time, emotional intensity, intimacy (mutual confiding) and reciprocal services which characterize those relationships.

Conversely, the information received in the strong-tie networks is likely to be stale information, already received from the other members of the 'F-connection' of families and friends (Ben-Porath, 1980): information that reaches any one of the F-connections most likely reaches them all. It is rather through the weak ties and sporadic contacts that cross and link different coherent social groups that new and useful information becomes available (see also Constant *et al*., 1996; Podolny and Baron, 1997; Reagans and McEvely, 2003). In exploring the significance of weak ties, Granovetter also refers to 'marginal' actors and 'outsiders' who seem to play a crucial role in the first phases of the diffusion of information and innovation (see, for example, Rogers' (1962) seminal innovation study and Burt's (2004) findings about people near structural holes).

It seems to take only a small analytical step from Granovetter's and Rogers' sociological notion of the 'outsider' to Park's iconic 'marginal man' or Simmel's emblematic 'stranger'. Yet these personifications of urbanity hardly play a noticeable role in the accounts of the picturesque rural or, at any rate, non-metropolitan geographical settings of successful regional networks. The local, in other words, is rather portrayed in terms of the social cohesion of a village than of the diversity of a city. Rephrased in Ferdinand Tönnies' (1887) terms, locality is seen as *Gemeinschaft* (community) rather than as *Gesellschaft* (society)).

Due to its absorption with the F-connection-rich regional showcases, economic geography hardly appreciated until more recently the crucial importance of weak ties for innovation. Perhaps the strongest direct impact from economic sociology onto economic geography in this context arouse from Uzzi's (1996; 1997) instructive study of the New York garment industry. His research corroborated that firm survival depends on a combination of 'embedded' and 'arm's length' ties. Strong ties are, in other words, beneficial only in limited quantities after which point the insularity associated with maintaining close relationships turns into a liability (see also, for example, Rantisi, 2002).

More recently, the strength of network ties appeared in the focus of economic geographic inquiry into the reappraisal of translocal ties. However, the straightforward scalar nesting of tie strength into a local/strong versus global/weak-tie dichotomy reproduces the conceptual short-circuits of the regions-as-islands-of-innovation perspective. This simplistic mapping consequently provoked severe objections that deny a *causality* between spatial scale and density of ties (see, for example, Allen, 2000; Oinas, 2000; Amin, 2002; Ettlinger, 2003: 161).

5 Small worlds: the six-degrees-of-separation idea

As the current interest in 'small worlds' (see Watts and Strogatz, 1998; Watts, 1999a; 1999b; 2003; Barabási, 2002) seems to indicate, the focus of social network analysis currently seems to be moving from the strength of ties towards the density and reach of network relations. The notion of the 'small world' builds on the seminal 'six degrees of separation' issue pioneered by Milgram (1967). Based on his experimental study of arbitrarily selected individuals in North America, Milgram was intrigued by the seeming fact that everybody was potentially linked to everybody else by only six relational moves in a chain of connections (see also Travers and Milgram, 1969).

A first large-scale replication of Milgram's experiment – encompassing 60,000 email users who were asked to reach 1 of 18 targets in 13 countries by forwarding messages

to acquaintances – suggested that Milgram's surprising findings are remarkably robust (Dodds *et al.*, 2003). The idea that we live in a 'small world' indeed has been popularized in the theatre (John Greene's play, *Six degrees of separation*) and in entertainment (*The Kevin Bacon game*), as well as being applied to the studies of the worldwide web (Albert *et al.*, 1999), scientific collaborations (Newman, 2003), corporate board interlocks (Kogut and Walker, 2001; Davis *et al.*, 2003) and the evolution of biotechnology clusters (Casper and Murray, 2005).

The notion of the 'small world' also yields conclusions for the understanding of our regional worlds. First, 'small worlds' can be created by adding only a handful of remote links to a network where the level of local clustering is already high (that is, friends of friends are also friends). Thus, a small proportion of random ties added to several tightly cliqued local clusters can produce small-world effects. 'Short cuts' between local clusters and cliques minimize the average path length (Watts and Strogatz, 1998) and thus allow resources to 'hop' from cluster to cluster (Uzzi and Spiro, 2005). By emphasizing the huge impact of a few random ties, small worlds are, in an admittedly fairly wide interpretation, rather close to a generic understanding of urbanity that emphasizes accidental interaction and strangeness.

Second, while the idea of the *tertius* emphasizes the arbitrage opportunities of a privileged network position, research on 'small worlds' has revealed the vulnerability of networks around these key positions. Networks have a tendency to create hubs and 'aristocrats' (Watts, 1999a: 119) which may provide (temporary) stability and increase efficiency. However, networks that are overly dependent on these 'aristocrats' are very much prone to collapse if those central hubs are eliminated (Albert *et al.*, 2000; see also Granovetter, 2003). While this insight, particularly in this rather colloquial summary, might appear trivial, economic geography has hardly been concerned with the vulnerability of networks.

IV Promising turnings, risky intersections: rhizome, publics

Commenting on the social network approach Uzzi (1997: 63) has noted that Burt lays out an elaborate gridwork of social relations, but suppresses the social content underlying this structure: 'It is often proposed [in social network analysis] that network structure alone virtually determines action. Burt's foundational work takes this structural approach to its most natural conclusion: a network structure rich in structural holes is virtually all that is needed to induce information and resources to flow through the network like electric current through the circuit board.' The criticism of the apparent primacy of method over substance, network structure over contents was, perhaps, voiced most vigorously early on by Stinchcombe (1990: 381) in his discussion of interlocking directorates: 'One has to build a dynamic and causal theory of a structure into the analysis of links ... We need to know what flows across the links, who decides on those flows in the light of what interests, and what collective or corporate action flows from the organization of links, in order to make sense of intercorporate relations.' This more established line of critique alludes to the need to juxtapose, balance and, where appropriate, even combine social network with governance approaches.

Despite their profoundly different views on relations, both approaches adhere to a network construal that is rooted in the basic topographic imagination of ties that link nodes, of social relationships that connect social actors (regardless if individuals, groups, or organizations). This, in principle, generic sociometric conception of networks has been challenged fundamentally by two imaginations which prominently problematize agency and actors and appreciate the multidimensionality of network rationalities and the multiplicity and fluidity of network

1 From network to rhizome: actor-network theory

The first alternative trope to the ties-and-nodes depiction is the rhizome, 'the perfect word for network' (Latour, 1999). Proposed by Deleuze and Guattari (1976; 1988) the rhizome metaphor also influenced the (later strands of) actor-network theory (ANT; Callon, 1986; 1998; Latour, 1987; 1999; Law, 1992; Law and Hassard, 1999). Networks seen through this perspective are an essentially heterogeneous reality made up of multidimensional and constantly evolving entanglements: 'The rhizome is altogether different, a map and not a tracing', Deleuze and Guattari (1988: 12) explicate; 'The map is open and connectable in all dimensions; it is detachable, reversible, susceptible, to constant modification. It can be torn, reversed, adapted to any kind of mounting, reworked by any individual group, or social formation.'

In contrast to the rather clear-cut view on network formations in the governance and the social network approach, the rhizome offers 'a new IMAGE of thought, one which thinks of the world as a network of multiple and branching roots "with no central axis, no unified point of origin, and no given direction of growth"' (Thrift, 2000: 716). The botanical associations indeed seem intended (see also Hess, 2004: 179): the metaphor of the rhizome foregrounds the transformative and processual dimension of networks, it deliberately departs from the static views of 'transport without transformation' (Latour, 1999: 15) in the dominant network approaches.

The rhizomatic understanding of multiple entanglements in ANT overgrows the established binary juxtapositions of structure/agency, subject/object, human/non-human: the capacity to act and give meaning to action is neither solely embodied in human actors nor localized in norms, values and institutions that make up our familiar registers of 'social embeddedness'. Action rather takes place in 'hybrid collectives' (Callon and law, 1995) that entangle human actors as well as non-human actants in multiple ways. Tools, for example, are not just things that are used to achieve certain ends: 'They contribute to the making of the universe of possibilities that make action itself' (Callon and Caliskan, 2005: 18). Guns, to refer to a crass example of a tool, do not act themselves, ie, shoot people. However, guns shape agency by affording a particular behavioural repertoire. The rhizome also perforates the analytical distinction between practice and its scientific representation. The relational webs that constitute the economy, for example, not only comprise the familiar catalogue of nodes such as firms, consumers, and various institutions – but also the economists who contribute through calculative practices and conceptual tools to the performance of the reality they describe: the economy is embedded in economics (Callon, 1998).

Although the rhizome metaphor up to now has not diffused into economic geography on a similarly broad front as the tie-and-node imagery, it nevertheless exerts increasing influence on economic geographic imaginations of networks and space more generally in at least four respects. First, for (economic) geography the social network and governance approach offered a model for conceiving (or at least implicitly assuming) the fabrics of socio-economic life that could be assorted neatly onto different scalar levels (from local through regional to global); geographical notions of space themselves, though, remained largely untouched by this network imagery. ANT with its rhizome metaphor, in contrast, radically breaks away from the Euclidean scalar understanding to a genuine relational perception of space as topological stratifications (Murdoch, 1998). ANT, in other words, reformulates and, partially, radicalizes the pleas against essentialist understandings of space and time (Massey, 1997; 1999; Lee, 2002: 340–41). In a rhizomatic or topological geography, 'time-space consists of multiple pleats of relations stitched together' (Latham, 2002: 131). The science of nearness and

rifts' (Michel Serres, quoted in Murdoch, 1998: 358), interweaves time and space with a heterogeneous network of actants that has been differentiated, for example, into regions, networks and fluid spaces (Mol and Law, 1994).

Second, the perception of networks that perforated the established demarcations between human/non-human opened up novel avenues to delve into 'hybrid geographies' (Whatmore, 2002), in which nature, for example, is no longer perceived as the traditional passive object but rather ascribed an acting role. Third, by appreciating the multiplicity of interrelated processes in the constitution and reshaping of relational ties, ANT recently has inspired the dehomogenization of the supposedly lucid topographies of global commodity chains (Dicken *et al.*, 2001; Coe *et al.*, 2004) and of interpersonal networks that symptomatically interweave private and professional spheres (Ettlinger, 2003; see also Latham, 2002). Moreover, the rhizome has turned out to be a productive metaphor to differentiate Granovetter's notion of embeddedness into societal, network and territorial embeddedness (Hess, 2004).

2 Publics and polymorphous network domains: Harrison White

As the metaphor of the rhizome dissolves pristine network graphs into an impervious maze, so the notion of the publics seeks to blur and liquefy arithmomorphic notions of scale, boundary and structure of social relations. However, whereas the rhizomatic geography of ANT evolved (far) beyond the more established network traditions (but, rather unfortunately, seems to share the key word, if not the same notion), the idea of the publics has been proposed by a key figure of the early social network analysis, Harrison White. In contrast to the French poststructuralist roots (or rather rhizome?) of ANT, the trained physicist White continues to draw on mathematical models and concepts (White, 2002).

White starts his plea to break away from the clean boundaries between the private and the public, the micro and the macro, the local and the global with the fundamental observation that we 'are creatures living within social goos, shards, and rubbery gels made up by and of ourselves. We, like gels, may dissolve into a different order under some heat. Even the frozen shards exhibit only limited orderliness, and even then an orderliness lacking in homogeneity, and an orderliness made more problematic through its dual relation to physical space' (White, 1992: 337–38). The polymorphous character of social relations flows from the capacity of actors to manoeuvre across multiple social contexts by coupling and decoupling, that is tightening and loosening relational ties (see also White, 2000: 125–26).

In White's reasoning, switching between different domains goes on in the social space of publics that ease actors into and out of both social times and social spaces. Publics decouple network-domains from each other (White, 1995: 4), they provide 'interstitial social spaces' characterized by short-term copresence as well as by intersections between multiple network domains. They function by reducing the uncertain and problematic nature of such spaces 'by positing minimally recognizable identities, maximally decontextualized from the complex array of relations and story sets that each actor brings to the occasion' (Mische and White, 1998: 705).

Publics are thus special moments or spaces of social opening that allow actors to switch from one setting to another. Such slippage presupposes a certain amount of disorder and incoherence or, in White's terminology, ambage and ambiguity. Whereas ambiguity denotes the fuzziness of meanings and interpretations that facilitates the communication across different social contexts, ambage epitomizes a kind of instability, uncertainty, or polymorphology of ties and social roles which creates tendencies to switch from one relational setting to another. 'Thus ambage

is dual to ambiguity: fuzz in the concrete embodiment as opposed to fuzz in the rules of perception and interpretation' (White, 1992: 107). Ambage, or 'social roundaboutness' (Mische and White, 1998: 710), suggests a kind of uncertainty and polymorphology in social roles; it suggests that actors embody multiple identities and capacities which allow them to switch from one set of ties to another, playing different roles and parts at once.

This deliberate appreciation of fuzz indeed resolutely swerves from the austere formalism of the social network approach. Yet this line of reasoning on slippage between relational ties afforded by ambage resonates with notions of entrepreneurial flexibility and arbitrage available to the *tertius gaudens* who occupies a privileged network position (Simmel, 1902; Burt, 1992). It also reverberates with the idea of 'robust action' and the idea that a single action can represent coherent moves in many games at once (Padgett and Ansell, 1993). In other words, although concealed by the dissident and idiosyncratic phrasing, White's reasoning reveals traces of the social network approach.

As mentioned earlier, White (1992: 197) also rejects the person as the basic and unquestioned elementary building block, the 'atom' as it were of social analysis. He insists that the 'person should be a construct from the middle of the analysis, not a given boundary condition. Personhood has to be accounted for' (White, 1992: 197). Each 'I' in the common parlance, he continues (p. 198), 'is a more or less rickety ensemble; it is firm and whole only temporarily as a facet of one particular constituent discipline energized in some situation and style'. Persons, then, are not necessarily the governors of network relations, but are nodes of story condensation and identity that occur at the interface between multiple networks. Thus identities are, in White's very own terminology, emergent properties in publics (see also Ikegami, 2000).

Although White's notion of the fluid relational spaces of publics seems to offer yet another imagination to break away from the one-dimensionality of the dominant network view, geographic inquiry so far has stayed clear from this construal. At the disciplinary boundaries between economic sociology and economic geography, the potentials of this approach have been indicated, in a rare application, by the conception of the fluid connectivity enabled by mobile communication technologies (Sheller and Urry, 2003). Mobile telephony creates a sort of mobile 'public' that 'exponentially multiplies the possibilities for easing in and out of contingent socialities and picking up the multiple story lines through which identities are constituted. . . . Persons themselves are not simply stationary nodes in a network, but are flexible constellations of identities-on-the-move' (Sheller, 2004: 49).

V The very rough guide: travel suggestions, warnings, practical advice

1 On the trading route: approach strangers self-confidently

This paper set out on an expedition to map the conceptual terrain on which the notion of networks travelled between economic sociology and economic geography. The map that emerged in the course of this geographical exercise is dominated by a thick trading route, the governance highway, so to speak. Exchange along this route replicated symptomatic features of the trade of economic geography with other disciplines (see also Peck, 2005). First, although this trading route was by no means one-way, crossdisciplinary exchange was rather asymmetrical, albeit at varying degrees. Whereas the negative trade balance of economic geography appears relatively steep in debates on strategic and project networks, research on informal networks and even more so on regional networks crossed disciplinary boundaries more easily. Second, economic geography, on balance, imported conceptual building blocks in exchange for empirical accounts (see Sydow, 2003: 302–303).

Finally, and particularly in the case of regional networks (undoubtedly our major recent 'export success'), trade along the governance route augmented a reification of the prevailing construal of networks in economic geography as homogenous and universally beneficial 'strong ties'. On the other side of the boundary, this 'export success' stabilized sociological perceptions of regional networks in their iconic incarnation of industrial districts as coherent local entities. Trade, as political economy has taught us already, in fact is not an unequivocally beneficial affair.

In drawing this sobering account I do not intend to suggest that this trading route has turned into a dead end. Far from being exhausted, the governance approach can carry economic geographic reasoning on networks farther on. In sticking to this trading route we might, however, reconsider the 'terms of the trade'. With the increasing spatial awareness in the social sciences (Grabher and Hassink, 2004) – as manifest in debates on the resilience of national institutions (see, for example, Hall and Soskice, 2001) or the microgeography of the epistemic communities of laboratories (see, for example, Knorr Cetina, 1999) – the conditions in principle seem favourable. However, instead of attaching the proper spatial scale to these phenomena and to the familiar narratives on topographical networks, economic geography might insinuate a more challenging problematization of space onto the social sciences, one that seeks to grasp the interdependencies between topographical and topological space. There are, in fact, a few rare examples of a successful imposition of a more demanding perception of space onto our academic neighbours (Amin and Cohendet, 2004).

2 Leave the main trading route: consider the bypasses

Beyond the main trading route of the governance approach, the vast area of the social network approach remains largely unexplored by economic geography. Apart from fairly loose interpretations of the strength of network ties, economic geography hardly engaged in the systematic inquiry of network structures and positions. Why venture deeper into these areas that rather tenaciously have been bypassed? Whereas notions of 'small worlds' (Watts, 1999a; 2003) and 'structural equivalence' (Burt, 1987) challenge our cohesion-orientated assumptions of innovation and diffusion, concepts like *tertius gaudens*, 'structural holes' (Burt, 1978; 1992) or 'robust action' (Padgett and Ansell, 1993) imply that arbitrage, strategizing, even opportunistic behaviour might not be limited to some deviant 'dark networks' (Raab and Milward, 2003) but rather represent behavioural options leveraged off from ordinary network configurations and positions. On a more general level, social network analysis offers a repertoire of tools to conceptualize economic processes such as entrepreneurship and innovation in network terms. Networks in social network analysis, in other words, are not the counterworld to markets, they fundamentally *are* markets (see also Baker, 1984; White, 1992; 2002). Instead of incessantly reassuring ourselves that the economic is embedded in the social, we might move on to further substantiate the proposition that economic action, rather than being socially embedded, *is* fundamentally social.

In fact, the notion of embeddedness, against its very intentions, seems to have reaffirmed Talcott Parson's pact between sociology and economics that relinquished the determination of the economic to economists while sociology's chief concern lie in the realm of norms, values, institutions (see also Stark, 2000). Do you spot economic geography in this picture? Yes, indeed, economic geography up until more recently appeared mainly committed to the programme to place the economic in the familiar register of conventions, traditions and institutions that make up the (spatial) context (Peck, 2005). The point here, of course, is not to make the

case for a wholesale shift from the concerns with the social context to the analysis of network structure. The challenge lies rather in exploring imaginative ways to explore the interdependencies between accounts on structure and context. Promising directions for this route have already been indicated in economic sociology, particularly in small-world inspired research (for example, Uzzi and Spiro, 2004; Casper and Murray, 2005; Powell *et al.*, 2005).

3 At risky intersections: remember a way back

Eventually, our mapping exercise identified some risky intersections that, despite some blind corners, also open access to promising new areas. A most dramatic shift in direction is involved in moving away from the tie-and-node trope towards the metaphor of the rhizome (Deleuze and Guattari, 1976). Economic geography has already started to venture in this direction towards a topological understanding of space and a multidimensional view on networks (see, for example, Murdoch, 1998; Thrift, 2000; Dicken *et al.*, 2001; Latham, 2002). Where else to turn to explore the conceptual space of ANT?

Economic geography has yet more systematically to scout out the implications – and the limitations – of breaking away from the dichotomies of structure/agency, subject/object, human/non-human for the study of the economic. For economic geography the proposition that action takes place in 'hybrid collectives' (Callon and Law, 1995) would seem to more systematically appreciate the materiality of the economic. Studies of financial markets, for example, have exemplified the entanglements of actors with tools, instruments, technical devices, artifacts or algorithms in an instructive fashion. Computer monitors that are used to 'screen' the markets are the very locations of markets on which trading is performed (Knorr Cetina and Bruegger, 2002). Does not geography have a noteworthy tradition in studying the material world and beyond it not contribute to a 'science of associations' (Beunza and Stark, 2004: 370)?

The rhizome can perforate analytical demarcations that have become 'naturalized' in our prevailing lines of reasoning in a productive fashion. For this very reason, however, the rhizome can also turn into a trap when all too arbitrarily transplanted in any context (see Haraway, 1997). ANT-inspired studies tend to privilege the relational dimensions of the web at the expense of considerations of the actors themselves (see also Dicken *et al.*, 2001: 105); they are, put bluntly, strong on ties but weak on nodes. Whereas economic geography, quasi in the mirror image, privileges actors by rather implicitly assuming some form of generic relations between them, ANT seems to offer an invitation to glance past the differences between distinct types of actors in different domains and thereby also conceals uneven power relations. Although power (in its Foucauldian understanding) is by no means an alien concept to ANT in principle, in practice 'ANT misses that hierarchies are real' (Ettlinger, 2003: 157).

Harrison White's path towards a polymorphous notion of networks problematizes the roles and identities of actors in a more explicit fashion. The identity of the individual actors only temporarily crystallizes in publics in which different network domains overlap and intersect. The analytic strategy of conceiving identities as a 'rickety ensemble' (White, 1992: 198) appears particularly useful in transient and temporary contexts, like project-based environments. In such fluid contexts actors no longer simply have to relate to a single anchor of identity, that is the firm, but to a widening spectrum of competing sources of relational loyalties like the firm, a portfolio of projects and the individual self-conception as an entrepreneur (see, for example, Alvesson, 2000).

Following White's path, however, is not without its difficulties. In parts, the path appears difficult to access due to its idiosyncratic delection in White's own writing

and the interferences within a truly colourful spectrum of metaphors. More critically though, like the rhizome metaphor, White's notions of the publics and polymorphous network domains provide a potent catalyst to unfreeze our static and sterile network portrayals but they are less powerful in conceiving the analytical differences between different processes occurring between and within different network domains. Both metaphors are, in short, more inspiring as advice to leave the trodden paths than in specifying in detail the ways ahead. While the exploration of the rhizome metaphor involves further exploration of alien terrain and thus discontinues the trade with dominant traditions in economic sociology, White's path remains closer to proven terrain: in fact, it can be (re)connected with established trails that have not yet been fully explored by economic geography. Following White's path allows us to unlock the actors from the rigid grid of homogenous ties and to place them in the fluid context of an entire spectrum of network domains, ranging from the familiar strong ties over more strategic and calculative relationships – Burt ties if you like – to the thin and ephemeral ties at the neglected weak-tie end of Granovetter's spectrum (see, for example, Wittel, 2001; Grabher, 2004).

The paper, though, does not end with an emphatic 'this way!' First and foremost, it seeks to provide a map and not a guide. There is no single one best way definitely to determine the true essence of networks in a once-and-for-all manner but a multiplicity of paths to construe different types and accentuate different dimensions of networks. By drawing this map on crossdisciplinary exchange and mutual ignorance I wanted, however, to direct our attention towards an exciting terrain from which economic geography has so far stayed clear. The paper tries to encourage us to venture into that territory; at the very least, it illuminates for a moment what, so far, we have opted against.

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