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A NETWORK APPROACH TO THE STUDY OF SOCIAL MOVEMENTS

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1. Introduction

A network analysis approach to social movements is outlined in this paper. More specifically, we want to point at some lines through which the concept of social movement network may be operationalized and empirically investigated.

We start with a discussion of some key components of the social movement concept, in order to show how important the notion of social movements as social networks is (section 2). Our approach to network structures relies upon the idea that social movements are composed by highly heterogeneous actors, and that differences in belief systems and cultural orientations play a very important role in affecting movements' structures. That happens in two ways at least. Differences in approaches to the same issues, as well as in emphasizing certain issues rather than others, may affect first of all the boundaries of a movement (our assumption being that such boundaries are defined by actors' mutual recognition as part of the movement). They may also affect its internal shape, thus facilitating communication and exchanges between certain actors rather than others. We also try to make clear that what we call social movement structures are actually the product of several structures of interaction, one for each type of link between SMOs. We focus particularly on the distinction between interorganizational links (involving exchanges of informations and/or resources between SMOs) and latent ties, i.e. ties activated by overlapping memberships or personal friendships between activists of different groups.

We maintain that social network analysis may prove useful in developing a more systematic approach to the study of social movement structures. Some general principles of that approach are introduced in sections 3 and 4. More specifically, section 3 discusses nominalist vs realist approaches to network structures. Section 4 introduces three different, yet not incompatible, research strategies

(detecting global structures, analyzing network and individual actors' properties, relating positions and actors' attributes), making reference to four ideal-typical network structures. The same strategies are then applied to an empirical example. Data describing the structure of the environmental movement in Milan are analyzed in section 5 (see also Diani, 1988; Diani, 1990a). Finally, problems related to data gathering techniques are discussed in the Appendix.

2. The concept of social movement and its implications for structural analysis.

2.1 The concept of social movement

Most scholars in the field would agree, although from different positions, that social movements are basically the result of interactions between different actors, mostly on an informal basis. The point has been raised in several contexts in the last twenty years. Luther Gerlach has been probably the first to emphasize the network structure of social movements and to point at its segmented and decentralized nature (Gerlach, 1971; Gerlach and Hine, 1970). Whereas Gerlach and associate's main interest were highly subcultural movements such as deep ecology or Black Power, the Resource Mobilization theorists have rather focussed upon the role of formal organizations in facilitating collective action. However, they have also retained a strong accent on interactions between actors, both in the sense of relations between SMOs (see eg Zald and McCarthy, 1980) and of links between them and their wider, loosely structured constituency (see eg McCarthy and Zald, 1973; McCarthy and Zald, 1977). From a still different perspective, Melucci (1989) has emphasized that even the existence of a social movement is the product of an

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interactive process between different and heterogeneous actors. What is at stake is the definition of the movement as an action system, the boundaries of which are the outcome of a bargaining process between different definitions of the goals, the means and the environment of the movement.

In a recent effort to discuss and contrast these and other notions in a systematic way, we have pointed out three basic components of the notion of social movement: collective identity, informal interaction between different (individual and organizational) actors, involvement in some kind of political and/or symbolic conflict (Diani, 1990c). To the purpose of a structural analysis, however, the last component may be largely ignored, inasmuch as it represents the background for interactions between social movement actors. Rather, it is worthwhile to focus on the other two dimensions.

2.2 Collective identity and shared beliefs

The presence of collective identity implies that social movement actors do not merely share concerns for specific issues; they also share, though to a different extent, a set of ideas and beliefs allowing them to frame such issues into a broader and more meaningful perspective (see among others Snow et al., 1986; Snow and Benford, 1988; Gamson, 1988; Melucci, 1989). These ideas provide them with some criteria to draw upon in order to structure their own behavior. It does not matter how loose such criteria may be, yet they will help social movement actors to give their initiatives a broader rationale; to choose among different strategies and action repertoires; to formulate predictions about their chances of success and the costs of action; to identify other members of the movement as well as potential allies and opponents. Without dismissing the importance of collective identity in fostering mobilization on collective

goals. (see eg Pizzorno, 1978). It's the definition of the mov's boundaries, the choice of strategies, repertoires, allies and opponents which matter most to our current purpose.

A mutual recognition as members of the movement is essential inasmuch it allows to draw its boundaries and to differentiate from other individuals, groups and organizations who are active on the same issues, yet maintain a specific identity. The movement identity usually relies upon shared beliefs about goals, strategies and repertoires, allies and opponents. In more formal terms, collective action may be viewed as the product of shared orientations concerning goals, means and environmental constraints (Melucci, 1989, chap.2). In spite of internal differentiations, social movement actors differ from other social actors at least in some core beliefs. They share, in other words, what has been defined a common "belief space" (Erickson, 1982). In the case of the antinuclear conflict in the USA it may refer to a global negative evaluation of nuclear power, contrasted to the "faith in progress" package adopted by former pro-nuclearists (Gamson, 1988). In the case of the environmental movement in Italy (and elsewhere), it may consist in a conception of social development as "balanced process" rather than as no-stop quantitative growth (Farro, 1990). The notion of belief space also holds when applied to other contexts, eg, political elites in the USA, who share the same fundamental attitudes to political and social life in spite of disagreeing on several points (Erickson, 1982). Emphasising the specificity of social movements' "belief spaces" is also useful as it allows us to differentiate social movement actors not only from their most obvious opponents, but from other actors as well. This is the case for instance with trade unions and traditional left parties in comparison to the environmental movements. They may start cooperations on several specific issues, yet the majority of workers' organizations still have a

different belief space, emphasizing quantitative rather than qualitative growth.

In order to set the boundaries of the movement is therefore essential, in our view, identify actors who share a collective identity. To this purpose, self-definitions as members of the movement by the concerned actors may not be sufficient, however. Indeed, social identity consists of two components, self-definition and external definition (Melucci, 1982). In our case, in order to be considered part of a given movement, actors need to be perceived as such by other members of it. This accounts for instance for the fact that in Italy right-wing groups active on environmental issues are not usually considered part of the environmental movement, in spite of defining themselves as part of it. In fact, they are not viewed as such by other environmental organisations (Varro, 1990).

As Melucci himself states very clearly (Melucci, 1988; Melucci, 1989), the existence of shared beliefs and identity does not mean that social movement actors are homogeneous to a total or even large extent: rather, the movement identity must be conceived of as the outcome of a constant tension between diverging orientations. Different, more specific, beliefs and frames may coexist, and usually do, within the same movements (see among others McAdam, 1982; Melucci, 1984; Tarrow, 1989). Globally, the degree of internal cultural differentiation in a social movement is far from stable; rather, it tends to change over time. We shall try later to formulate some explanatory hypothesis about factors affecting those changes. Now, we prefer to focus upon some implications which the plurality of beliefs has for structural analysis.

First, it may affect the internal structure and composition of the movement. In some phases more than in others, relationships within the movement may be strongly segmented, inasmuch groups and organisations tend to set up stronger bonds with groups which are closer to themselves in

terms of shared beliefs and orientations (for empirical analysis see Rucht, 1989; Diani, 1988; Diani, 1990a). Furthermore, when differences of beliefs within a single organization exceed a certain threshold, a split is likely to occur. Two or more new groups are thus created, each supporting specific beliefs which, however, are not necessarily inconsistent with the overall and looser movement frame. Eg, the story of Italian New Left in the 70s is marked by continuous splits, which have not prevented the new organizations from being part of the same broad social movement sector (Tarrow, 1989).

Tensions between different orientations may even affect the boundaries of a movement, yet. That happens when disagreements are so deep to put into question, or to impede, the existence of a shared belief space itself. Let us think of the former examples of collective action on environmental issues in late 60s and early 70s in Italy. In some cases, they were run by members of the traditional nature protection association; in others, by activists of urban social movements. Whereas the former adopted a "package" (Gamson, 1988) emphasizing nature protection and individuals' education, the latter framed often similar issues within an anticapitalist perspective, emphasizing the continuity between exploitation inside factories and nature pollution outside factories. Differences between the two were so deep, and political opportunities so unfavorable, to prevent any common belief space from developing. Over ten years later, both packages have been modified (see Diani, 1990b; Stefanizzi, 1987). New aspects are now emphasized, which may be compatible: priority to single-issue action; mistrust towards the political system as a whole; emphasis on relationships between preservation of natural environment and defence of quality of life in urban areas. That allows to speak of a common belief space and of new boundaries of the environmental movement, even though cultural differences

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between the different components are still present (Diani and Lodi, 1988).

The Italian environmental movement and its modifications over time provide a good example to a point which is worthwhile to stress again, i.e. that the presence of conflicting sets of beliefs does not necessarily imply the presence of particularly harsh conflicts between related actors; nor a shared belief space prevents automatically conflicts from arising. The Italian experience in the early 70s we have just recalled suggests for instance that New Left groups competing for support from the same constituency got involved in much more violent clashes, in spite of sharing the same belief space. Then, say, nature protection and urban political ecologists who adopted at that time totally different and in principle conflicting frames (Tarrow, 1989). The mere existence of a shared space of beliefs seems to say very little about the internal differentiation of the movement.

Let us summarize our argument on this point. The presence of shared, yet internally differentiated, identities and beliefs in social movements is a valuable clue for structural analysis. It defines first of all the boundaries of the movement, restricting it to actors sharing a given identity and belief space, while excluding on the other hand actors who are just concerned with the same issues. Moreover, differentiation within a given belief space accounts for the existence of cultural segmentation within a social movement. Finally, its changeable nature recalls analysts' attention upon the fact that both boundaries and internal segmentation may change over time, and that specific attention must be paid to the analysis of patterns and causes of such changes.

2.3 Interactions

Our notion of social movement emphasizes the presence of interaction between both individual and organized actors. In order to provide a more systematic overview of the different kinds of ties existing in a movement we may construct a double-entry table, showing the source of a given interaction in the rows and the targets in the columns (see table 1 below).

(Table 1 about here)

Cell I concerns relationships between SMOs. They may imply information flows as well as resources for action, either in the sense that several SMOs join their resources in a common effort to achieve some goals, or that some of them may lend their own specific resources (eg, technical expertise, privileged access to medias, militancy, places to meet - etc) to other, less wealthy, ones. Cell II refers to flows from SMOs to individuals who are either sympathetic or directly involved in the movement. In both cases (though, obviously, at a greater extent for activists), SMOs may provide individuals with several types of incentives for action (see Clark and Wilson, 1961). They may also offer, in broader terms, specific sets of beliefs which allow individuals to frame their experience in a way consistent with the movement's. On the other hand, individuals may give SMOs a substantial support in various forms: active membership, financial contribution, support to initiatives and campaigns, etc (cell IV). Finally, individuals may also exchange to other individuals who also identify with the movement (cell III). Several types of interactions develop at this level. They may relate first of all to the creation and diffusion of new, alternative subcultures and worldviews which have not necessarily strong connections - even though

they may have - to the political side of social movement activity (see among others Gusfield, 1981; Melucci, 1989). Interpersonal relations may also have more direct implications for SMOs, in many respects. They are definitely a key factor in accounting for individuals' decisions to join a SMO or a social movement campaign (Klandermans et al., 1988). They may also constitute an underlying structure of relationships between SMOs. Overlapping memberships and personal acquaintances between SMOs' leaders and core members may in fact provide a valuable channel for information flow and quick decision-making processes, though they do not always do. In this sense they may affect both SMO/individual dynamics (cells II and IV) and interorganizational relations (cell I).

As we have assumed, in our definition of social movement, that informal interactions between individuals and groups are a precondition for the existence of a movement (otherwise we face either pure cultural trends or pure organizational activities), we may describe the overall structure of a social movement as three concentric circles, all interrelated (figure 1; see Schmitt, 1989). The outer circle groups sympathizers, occasional participants and all people who in some way interact either with other individuals or with some SMO, on a loose basis. The middle circle groups regular movement activists and related SMOs. Most prominent leaders and core activists, who may play a role as influential individuals as well as members of some SMO, are in the inner circle. An adequate structural analysis therefore should not limit itself to the analysis of inter-organizational links, but should also take into account the massive presence of interpersonal links at all levels.

(Figure 1 about here)

Substantial advances have been made in the last years with respect to the role of personal networks in mobilization processes, ie, to how circle 1 and 2 are related (Klandermans et al., 1988; McAdam et al., 1988). Unfortunately, the same does not hold for subcultural networks within circle 1 (but see Melucci, 1984), nor it does for individuals' influence on SMOs' activity (ties within 2 and 3 and between them) (but see Rosenthal et al., 1985; Kriesi and van Praag, 1987; Schmitt, 1989; Diani, 1988; Diani, 1990a). In this paper we shall try to develop an adequate approach in order to relate interorganizational relations to personal links at level 2 and 3.

How have scholars dealt so far with the fact that interorganizational links may be both numerous and heterogeneous? In their study of public influence organizations, Knoke and Wood (1981, pp.226-227) pointed at 13 different types of interorganizational ties. More recently, Laumann and Knoke (1987, pp.12-13) identified three basic components in links between organizations active in the health and energy policy domains in the US: information transmission, resource transactions and boundary penetration, ie, "relationships serving both instrumental and solidarity-maintenance functions through the shared use of personnel." (ibidem, p.13; for other discussions of interorganizational links see Leblebici and Whetten, 1984). The same categorization may be usefully adopted as a starting point for social movement analysis. In our reconstruction of the structure of the environmental movement in Milan we assumed that four types of relationships might be detected (Diani, 1988). Two involved organizations directly: information exchanges and joint participation in public initiatives and campaigns. The others referred to interorganizational ties provided by single activists. In that respect we drew a distinction between overlapping memberships and personal acquaintances. The first case is similar to the Laumann and Knoke's notion

of boundary penetration (which draws itself upon the concept of "interlocking directorates": see, eg, Stokman et al., 1983). The second requires a little bit more of an explanation, as it makes a difference from other approaches. Informal, underground channels of communication between SMOs do not require necessarily joint memberships. Indeed, they may also be activated by personal friendship ties between leaders and/or core militants, which may either be preexistent to the foundation of SMOs, or develop outside the "official" occasions for interorganizational contacts (meetings, conventions, etc). It is advisable to keep the two notions separated, at least on a conceptual level, as they denote different aspects of interorganizational ties. Overlapping memberships are basically an indicator of activists' opinions about the similarity between two different SMOs (activists will be unlikely to work simultaneously for groups which they perceive to have very different goals and orientations). On the other hand, friendship and acquaintances ties may be viewed as an indicator of the degree of "subcultureness" in a given movement (where the existence of ties should be in principle less constrained by similarities between organizations than overlapping memberships).

3. Reconstructing social movement structures

So far our discussion has emphasized and selected some key problems for the analysis of a social movement structure, namely:

- a) the definition of boundaries;
- b) the existence of several different cultural orientations within a social movement, which may in principle affect its internal structure;
- c) the existence of different actors (individual and organizations) within the same movement, let alone the

existence of differences between SMOs in terms of bureaucratic structure and access to resources;

d) the existence of different types of relations between SMOs, and the necessity to clarify in advance what the implications for the analysis are from focussing on one type of link rather than another.

The main question is now how to approach these problems in the most systematic and consistent way. In order to do so we may draw upon the contribution of social network analysis. A very broad, yet fundamental way of approaching the problem consists of the alternative between "relations and attributes" (Knoke and Kuklinski, 1982; Blau, 1982). In other words, one may either start by detecting patterns of interaction between individual actors, and later to find out similarities between actors showing a similar pattern of ties to other actors; or he may start from existing crystallized positions (eg classes, status groups, parties) and try to draw the map of links between them. In the first case focus is on actually existing ties; in the second, it is up to the investigator to define criteria of membership in different categories, be they classes, status groups or whatsoever. A systematic discussion of relational vs attributes approaches with specific reference to interorganizational relations has been proposed by Paulson (1985). In his view, networks may be classified along two dimensions, type of boundaries and type of connections. As for boundaries, the composition of a given network may be found out on the basis of three different criteria (originally proposed by Aldrich and Whetten, 1981): relations with focal organization (organization set); joint activity (action set); common environment (global set). Connections between members of the same network may be identified on a relational or on a comparative basis: "relational involves the use of evidence of a direct social relationship whereas comparative involves the use of evidence of similarity of social characteristic..."

(Paulson, 1985, p.109). In our case, similarity in social characteristics might imply shared beliefs, similar goals, emphasis on certain action repertoires, proximity in organizational features, similarity in activists' profiles, and so on.

We shall follow Paulson in cross-classifying boundaries by connections, yet with different criteria for boundaries. Rather than its three-fold classification we shall refer to the dichotomy "nominalist vs realist":

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"In a realist approach to boundary specification, the network analyst adopts the presumed subjective perceptions of system actors themselves, defining the boundaries of a social entity as the limits that are consciously experienced by all or most of the actors that are members of the entity.... In a nominalist perspective, network closure is imposed by the researcher's conceptual framework that serves an analytic purpose..." (Knoke and Kuklinski, 1982, p.22; see also Laumann et al., 1982).

Paulson

In a nominalist perspective, members of the environmental movement network might be all SMOs and individuals active on issues which are by common agreement considered specific of such movement (pollution, nuclear energy, green areas, etc). Another possible criterion might consist in being associated to some focal organizations in the movement. On the other hand, the adoption of realist criteria would imply that only actors who define themselves and are defined by their allies as part of the movement would be included in the network. We are thus able to identify four different types of networks (table 2). Type 1 reconstructs actual ties between groups which satisfy given conditions, whereas type 2 describes links between actors who satisfy given conditions and are internally grouped according to given characteristics. Both of them may be criticised on the ground that the membership criteria is too loose, and that they do not allow researchers to distinguish between actors who are actually part of the movement and actors who are just allied to it

(eg, political parties or trade unions, who in most cases cooperate with social movement without either defining themselves as a true part of it or being legitimized as such by the mov's core actors). These problems are overcome if we adopt a realist definition. The choice between types 3 and 4 must be inspired to practical as well as to theoretical reasons. Type 3 may prove useful when we want to find out the extent of ties between actors with different characteristics (eg, between actors with high and low centrality degrees, or between actors supporting different sets of beliefs) (see for instance Diani, 1988, chap.4). However, preliminary classifications of social movement actors in subgroups may be risky, inasmuch differences between them are not as clear and reified as, say, in the case of parties, occupational groups or ethnic minorities. For these reasons it seems in principle advisable to start from the analysis of actual links between actors who broadly define themselves as part of a movement (type 4). Later on, it will be possible to check whether structural positions and patterns which resulted from previous investigation may be characterized on the basis of any relevant attribute.

(Table 2 about here)

The procedure we propose appears consistent with what are considered the three basic steps in network analysis (Knoke and Kuklinski, 1982). The first consists in the detection of overall network structures. The second consists in characterizing single actors, subgroups or even complete networks using attributes like centrality or density. Both of them have to do with actual relations. The third step implies on the other hand the search for correlations between relational data and actors' attributes. In the following sections we shall deal separately with each step.

chance to analyze ties between actors occupying the same position, in order to check their degree of internal cohesion.

In order to better illustrate the logic of the structural equivalence approach and its implications for social movement analysis, let us look at some classic network structures. Even though such structures have been mainly analyzed by analysts of interpersonal dynamics and communication flows within small groups (see, eg, Leavitt, 1951; Moreno, 1953; Mattioli, 1977; Scott, 1985: chap. 7), they may provide a useful starting point for interorganizational networks as well. We shall particularly refer to four basic models, the clique, the circle, the wheel and what we call bipolar (structure) (figure 2). Let us imagine that each point in such models corresponds to a SMO.

In terms of structural differentiation, the clique is definitely the least differentiated network: as all actors are adjacent, they all have the same pattern of ties and may therefore be assigned to the same structural position. At the other extreme, the circle represents the most differentiated structure: there are indeed as many positions as points, as no actors have the same pattern of ties. The bipolar is rather differentiated, with four structurally equivalent positions (1-5; 6; 3; 2-4), whereas the wheel is only slightly more differentiated than the clique, with a central position (occupied by 6) and a peripheral position occupied by all the others.

(Figure 2 about here)

4.2 Indexes for actors and networks

The same models also provide a useful basis in order to illustrate the second step of network analysis. We shall

4. Analyzing social movement networks: a formal introduction

4.1 Detecting overall network structures

Two basic strategies are available for people willing to investigate network structures, social cohesion and structural equivalence:

"[If a social cohesion criterion is adopted,] actors are aggregated together into a position to degree that they are connected directly to each other by cohesive bonds.... [If structural equivalence is adopted,] actors are aggregated into a jointly occupied position or role to the extent that they have a common set of linkages to the other actors in the system. No requirement is imposed that the actors in a position have direct ties to each other." (Knoke and Kuklinski, 1982, pp.19-20)

Several arguments have stood for preference being assigned to structural equivalence approaches rather than to social cohesion ones. As they have been discussed extensively elsewhere (Burt, 1978; see also Knoke and Kuklinski, 1982, pp.19ff), I will focus here upon a reason which appears to be peculiar to social movement analysis. Social movement networks may include a quite high amount of groups, organizations and individuals. Beyond a given threshold, it would be quite unrealistic to focus exclusively on densely connected subgroups of actors, as it would imply to miss informations about actors who behave in a similar way, yet are not directly linked to each other. On the contrary, a structural equivalence approach allows the researcher to find similarities of ties even between actors who are not directly connected. This may be for instance the case of local groups spread on a wide territorial area who are not adjacent to each other, yet share a common pattern of ties as they are connected to the same central organizations. Moreover, as we shall see later on, the adoption of a structural equivalence perspective does not preclude the

focus in particular on the notions of centrality (which is a property of single points in a network) and density (which is a property of a whole network).

Density has been described as "a proportion that is calculated as the number of all ties occurring in the matrix divided by the number of all possible ties ($N \times N - 1$, if self-directed ties are not permissible)." (Knoke and Kuklinski, 1982, p.45). Its values may therefore range between 0 and 1 and may be considered a rough indicator of social movement actors' will to cooperate to each other and keep alive a dense patchwork of exchanges. It seems plausible to assume that density in a social movement network will be highest in periods of "nascent state" (Alberoni, 1984), when the accent on solidarity is essential to the growth of the movement; lowest when motivations as well as resources for sustained mobilization are short, and instrumental attitudes towards collective action tend to prevail. Main characteristics of the four basic models we have just introduced are shown in Table 1 below. The clique has the highest density, as all the possible relations are activated, whereas it decreases to 0.400 in the circle and to 0.333 in the bipolar and wheel.

The concept of centrality has on the other hand to do with the position that single actors occupy within a given network. There is widespread consensus that the more an actor is involved in ties to other actors, the higher his chances to influence others' behavior and to obtain access to valuable restricted resources such as information and decision-making procedures. On the other hand, there is ample discussion about the best ways of operationalizing the concept (for reviews of alternative interpretations see Knoke and Kuklinski, 1982; Freeman, 1979; Burt and Minor, 1982). In this paper we shall refer basically to that version of centrality which is based on the inner degree index. Inner degree of actor i has been defined as the "number (or proportion) of relations received by actor i

from all others." (Knoke and Kuklinski, 1982, p.45). We shall also refer, when dealing with symmetric ties, to the concept of betweenness. It tries to better capture the intermediating function which is performed by actors who are placed somewhere on paths, connecting two other actors. In this view, an actor is central to the extent he is placed between other actors and may thus exert some control on information flows and exchanges between them. Several methods are used to compute actors' betweenness. Here, we shall refer to the one adopted by MacEvoy and Freeman (1987), based on the local dependency matrix. In our models, all the actors in the clique and the circle have the same inner degree, as well as the same betweenness. Points 1 and 4 in the bipolar structure have a higher centrality than other points according to both measures, whereas the same holds for point 1 in the wheel. Finally, an index of graph centralization may also be computed, based on inner degree and ranging between 0 and 1 (MacEvoy and Freeman, pp.49-51). In our examples, such index equals 0 in clique and circle structures, 1 in the wheel and 0.40 in the bipolar (see table 3).

(Table 3 about here)

4.3 Comparative remarks

How well do the structures we have just described reflect ideal-typical social movement structures? We are now going to compare them in order to provide an answer to this question, under the assumption that

- a) all the actors in each network have in principle enough resources to activate ties to other actors;
- b) if that does not happen, that's due to the existence of some constraint;

c) the major among possible constraints consists in the existence of several belief subsystems within the movement, whose differences are not so extensive to induce splits in the mov's identity, yet are big enough to affect patterns of interaction and alliance.

A clique structure will probably fit better to a movement with a high degree of collective identity and solidarity. Its high density is actually an evidence that actors in the movement have a similarly high inclination to engage in collective action. Its low differentiation reflects on the other hand the absence of relevant lines of segmentation within the movement: all actors are structurally equivalent, all actors conceive of each other as potential partners in some type of exchange.

The wheel structure is very close to the clique in terms of structural differentiation, but very distant in terms of solidarity. Its density is relatively low, as all the actors but one are involved in only one tie. That does not prevent them from a quick access to each other, however, as they all are adjacent to the same core actor, who performs a central role in terms of control of communication and exchange flows. This pattern seems to be typical of a movement where instrumental orientations are dominant and actors have a rather weak identification with the movement as a whole. Specific sets of beliefs are not sharp enough to provide strong incentives to collective action, nor, on the other hand, to create internal currents within the movement. Thus, individual actors prefer to focus on their own issues, limiting their connections to a core SMO (presumably with a privileged access to greater resources). That acts as a liaison between all actors who are active on the same issues and share at the same time a broad and generic collective identity.

Whereas both clique and wheel appear to be little or no differentiated, the opposite holds true for circle and bipolar. The circle is as decentralized as the clique,

inasmuch there is no actor whose centrality score exceeds the others'. However, the overall motivation to collective action is sensibly lower than in the clique (0.4 vs 1.0). Moreover, structural differentiation is very high, and as many several internal segments as the actors may be detected. The circle fits probably well to a social movement where collective solidarity has been undermined by a growing ideological strife, but no dominant internal cleavage has emerged yet. That implies there is not a clear barrier within the movement between supporters of different cultural options. Rather, there are many potential lines of segmentation which all play a role in affecting interaction patterns, yet no one from a ruling position.

Finally, the bipolar seems to reflect the structure of a movement where there is a quite clear internal segmentation, which is overcome only by a few core organizations of the different sectors. In this case, beliefs which differentiate between social movement actors are strong enough to affect their links to other actors, but for core actors who act as linking points (once again, we may assume that such actors are the most gifted in leadership resources of any kind). Although the structural differentiation is still high (4 positions), it is less impressive than in the circle. On the other hand, low network density suggests that incentives to collective action and solidarity are not that high. All that seems to imply that the bipolar structure is typical of social movements who have been crosscut in the past by deep internal ideological quarrels. They are no longer alive at the present, yet are still sharp enough to affect links of more peripheral actors.

Let us now try to provide some clarification to our point, as well as to formulate a broad, exploratory hypothesis about relationships between different structures. We have already suggested (section 4.1) that a clique structure is typical of phases of identity formation, when pre-existing social and cultural boundaries dissolve and new

ties are established. All actors in the growing movement (or social movement sector, as collective identity may not be necessarily restricted to a specific movement) share a sense of belongingness to the same collective actor, and cooperate to each other. However, such situations of "collective effervescence" are necessarily temporary. When they finish, many actors withdraw from the movement and many resources go. Those who go on playing a role in the movement experience a new sense of constraints and lack of resources for action. A very common way for overcoming it is by a massive use of ideology. However, that implies that segmentation within the movement tends to grow, even though different actors still identify themselves with the movement at large. A circle-like structure is thus likely to develop. As time goes on, however, the beliefs who marked the specificity of the movement in its starting phases tend to fade and ultimately disappear. Collective action tends therefore to assume more and more an instrumental-oriented structure, where some core actors take up most coordination tasks, while peripheral actors focus on their specific issues. Bipolar and, eventually, wheel structure are now prevailing.

In very broad terms, we may identify the first two steps of this process in the evolution of the protest cycle which developed in Italy between the late 60s and the early 70s. An early phase, when new alliances were established and new solidarities developed, was followed by a second one, when opportunities and resources available for action drastically decreased. SMOs and activists had thus to emphasize the role of ideology as a key incentive to participation and as a way of differentiating from other actors, competing for the same (by that time scarce) resources in the same market (Tarrow, 1989). Later on, less radical and ideological movements emerged, where the emphasis was on single issues and cooperations between actors with a different political

requiring a higher ideological homogeneity between their supporters. Early research results suggest that social movement structures showed then a more instrumental and less differentiated pattern (see Melucci, 1984), closer in some cases to a bipolar or wheel structure (Diani, 1988).

5. Empirical examples

In this section we are going to discuss some empirical applications of the concepts we have introduced above to the case of the environmental movement in Italy. After a brief introduction to our unit of analysis (section 5.1), we shall reconstruct the network structure of the movement in terms of structural equivalence (section 5.2). We shall then move to an investigation of single actors' properties in terms of centrality (section 5.3). Finally, we shall discuss some issues of how to relate attributes and structural data (section 5.4).

5.1 The unit of analysis

Empirical evidence for our analysis comes from the environmental movement in Milan. Our data set includes data on personal (overlapping memberships and personal ties) and interorganizational (exchanges of information and joint participation in campaigns) ties between 20 groups. They ranked highest in terms of inner degree among 42 SMOs for whom it was possible to gather complete information about all types of ties. Table 4 specifies for each group the version of environmental action it seems closer to (conventional vs political ecology); its organizational features (whether it is a multi-issue organization, usually with some paid staff; a single-issue organization, with some bureaucratic structure as well; or a local, loosely structured, neighborhood group); an identifier number to

allow for a quicker understanding of graphs and tables (the distinction between conventional and political ecology is introduced in Diani (1990b)).

(Table 4 about here)

5.2 Structural equivalence analysis

Structural equivalence methods differ in adopting a partitioning method based on continuous rather than discrete distance between the actors. In the first perspective, an euclidean distances matrix is computed, where the distance between two actors equals the square root of the sum of squared differences across all other actors in the network (see Burt, 1980; Knoke and Kuklinski, 1982, p.61). Actors are then grouped together according to their proximity, by some clustering, principal components or multidimensional scaling procedure. The second perspective is mainly embodied by the blockmodeling approach and the related algorithms CONCOR. It splits a set of actors into structurally equivalent positions by an iterative procedure. Data are obtained from a $N \times N$ matrix reporting Pearson correlation coefficients between pairs of columns of an $N \times N$ (or $K \times N$, if K matrices are stacked) adjacency matrix (both procedures are described in full by Knoke and Kuklinski, 1982, pp.60-77). Original data matrices are then permuted according to the block structure identified by the program, and an Image matrix is constructed, showing relations between blocks which are stronger than a given cutoff value, usually the overall network density. In both cases, there is no objective criterion about when to stop the split or aggregation process; that's up to the investigator, on substantial theoretical grounds. CONCOR has been blamed for being less powerful in statistical terms than continuous distance approaches, and for not offering measures of

proximity between blocks (see Schwartz, 1977; Knoke and Kuklinski, 1982, pp.73-74). However, CONCOR has proved empirically useful to researchers, as its results are often substantively meaningful (Knoke and Kuklinski, *ibidem*). Moreover, the same does not always hold for competing approaches: "While CONCOR has been criticized as inefficient relative to principal components analysis (Schwartz, 1977), our attempts to use the latter method were unsuccessful while the CONCOR results were interpretable." (Knoke and Wood, 1981, p.234). As the same happened to my analysis, I shall focus in this section on the CONCOR procedure.

Two valued adjacency matrices were stacked to constitute the input for this analysis, LATENCY and INTERORG. The former shows latent ties, i.e. interorganizational relations activated by single activists, either through overlapping memberships or personal acquaintances. The latter shows interorganizational relations either in the form of regular flows of information or joint participation in action campaigns (reasons to join originally different matrices are discussed in Diani, 1990a).

The iteration procedure was stopped after four splits had identified the five structural positions showed in table 5. Position 1 includes the three major and most structured organizations of the Italian environmental movement (Italia Nostra, WWF and Environmental League), plus two groups who have played a central role in possibly the two most important long-term campaigns in the Milan area (aimed at keeping private cars off the city centre and to create a big common green in the Southern metropolitan belt). Position 2 is composed of local grass-roots groups active in the Northern neighborhoods of the city, plus the committee who coordinated actions to stop the construction of an urban motorway which was meant to cut through such areas. Animal rights organizations are all in position 3. It also hosts an independent, city-based group (26) which pays a lot of attention to the issue, in spite of covering many others as

well. Position 4 is perhaps the least homogeneous (apart from shared belief systems), grouping the Milan Green List, a neighborhood political ecology group and a leftist citizens' health association. Finally, position 5 includes two nature protection association with some local reputation¹.

(Table 5 about here)

CONCOR also computes intra- and inter-block densities for each input matrices (see table 6). By selecting a cutoff value it is therefore possible to obtain an image matrix and eventually to draw a graph of the network structure both for latent and interorganizational ties. We conformed to the usual convention of posing the cutoff value equal to the overall matrix density; more specifically, we chose the average value for the two input matrices, ie, $0.180 = (0.163 + 0.197) / 2$. Under such conditions the following structures resulted (figure 3).

(Table 6 and figure 3 about here)

We would like to emphasize the following aspects:

- a) both networks show the same connection between 4-1-3, with 1 in central position, but for the unreciprocated tie from 3 to 1.
- b) the Latency network appears less connected in two respects: there are two positions (2 and 5) which have no relevant ties to any other position, while there is only one

¹This partition is slightly different from the one we have described in Diani (1990a). The reason for that is in the input matrices: on that occasion, only the interorganizational ties matrix was utilized.

(2) in the interorganizational network; the same positions are also internally unconnected, while only position 4 is in the interorganizational network;

c) only position 2 has no relevant ties to other positions within either network;

d) whereas position 4 shows low density in the interorganizational network and high density in the Latency network, the opposite holds for positions 2 and 5.

All of these structural properties allow for substantial interpretation. We would like just to highlight the following hypothesis, which are stimulated by the data:

1) position 1 does not perform a more role of coordination between actors who do not want to invest large resources in interorganizational relations. It also represents a bridge between positions which differ in terms of beliefs, like 4 and 3;

2) the lesser connectedness of the Latency network suggests that at least in the Italian case personal networks do not play such a great role in shaping the overall structure as someone has suggested for contemporary movements in general (see eg. Melucci, 1984). We have to consider, however, that this may be due to the characteristics of the unit of analysis, which is restricted to core activists, who are presumably the most committed to their own organization;

3) the persisting absence of ties between local neighborhood groups and other actors in the movement suggests the existence of a deep gap between actors with a national influence and local initiatives. It also suggests that the latter's contribution to the movement must be carefully assessed rather than taken for granted. Indeed, both the growing influence of the major SMOs and the development of new local-based groups and committees have been considered by many observers as an evidence of the global growth of environmental politics in Italy. The absence of relevant ties between the two gives on the contrary some ground to the alternative hypothesis, that growth in local groups

positions rather than five seem thus to emerge in both networks, as the figures above also show.

ii) block 1 retains a central role in both networks. However, it is more evident for personal connections, whereas in the other case centrality is shared with block 4. iii) unconnected positions are no longer there. However, the introduction of weak ties does not affect the internal connectedness of single positions. In other words, density within single blocks is either above the average value or null.

iv) whereas greater connectedness is common to both structures, their shape is not affected by weak ties to the same extent. The interorganizational network is quite similar to a chain as its former version, with 2 and 5 at the extremes. On the other hand, the latency network is even more centered around block 1 than before.

v) the latency network seems less segmented than the other one. In fact, all positions may communicate by only one intermediate step, whereas communication between the extremes in the interorganizational network would require two.

The following comments may be raised:

a) the lesser segmentation of interpersonal bounds in contrast to interorganizational ones suggests that no strong subcultural conflicts are at stake within the latent structure of the movement.

b) the (apparently) greater centralization of such network is more surprising, especially to those who maintain that latency networks are necessarily widespread and decentralized. On the other hand, it appears reasonable that activists of single-issue or neighborhood groups willing to broaden their field of action do so by joining one of the best known and most influential national associations. That's even more true when dominant beliefs within the movement are broadly speaking rather moderate and do not

might witness the development of parochial and NIMBY orientations rather than a real growth of the movement as a whole:

4) the shifts in densities within and between positions when passing from latent to organizational ties are not always easy to interpret. Some remarks may be raised, however. As for position 2, we just noted that local groups within it are likely to cooperate in campaigns, whereas are unlike to have overlapping memberships or friendships. That gives further support to the hypothesis that the growth of local initiatives is very single-issue focused, and does not reflect, but to a very limited extent, a more widespread solidarity (our assumption being that inclination to develop overlapping memberships and friendship ties should grow with collective identity). On the other hand, the absence of interorganizational relations within position 4 may be a consequence of the fact that, due to its recent constitution, the Green List had so far been unable to establish strong connections, apart from personal ties, to all components of the political ecology sector, let alone the more traditional currents of the movement (like those grouped in position 5).

Taking less dense connections into account modifies only partially the insights we have just discussed. Figure 4 shows the new structural patterns.

(Figure 4 about here)

The following aspects must be stressed:

i) both structures seem to be slightly less differentiated than previously. In the latency network, blocks 2 and 3 show exactly the same pattern of ties to other blocks and may therefore be considered as occupying the same role. In the interorganizational network, blocks 1 and 4 are "quasi-equivalent" in structural terms but for the presence of two minor unreciprocated ties (2->1 and 3->4). Four

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imply a strong criticism of bureaucratized organizations, as may be the case during more radical phases.

5.3 Density and centrality indexes

5.3.1 Network properties

In broad terms, the density index may be assumed as an indicator of the degree of solidarity and of inclination to collective action within a given social movement network at a given time. A possible approach may thus consist in comparing densities within the same network at different times, in order to check whether levels of solidarity have changed with changing political opportunities or movement's cultural frames. It might also be possible to compare densities of different movements' networks at the same time, in order to formulate hypothesis about differences in degrees of collective identity. However, in both cases this operation is possible only if the network size is the same or very similar at least. Otherwise, data might be seriously biased. In fact, small networks will have in principle a far higher density than big ones, even though the latter's actors should show a similar or even greater propensity to collective action.²

²Let us think for instance of two networks whose size is respectively 5x5 and 17x17, and whose actors show a propensity to activate ties to 50% of the other actors in the same network. Densities in such networks will be the same, as in the 4x4 network we have $(5 \times 2) / (5 \times 4) = 0.5$, whereas in the 17x17 network we have $(17 \times 8) / (17 \times 16) = 0.5$. However, it would be hard to conclude that actors in the bigger network have the same degree of collective identity than actors in the smaller one, as they are willing to invest resources to activate a much larger number of ties. See also Stokman and van de Veen (1981).

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What may be safely done is to compare density in networks which have the same actors, yet interacting by different types of ties. In our case, comparing densities in the Latency and Interorg matrices provides some intriguing results. In fact, as we have already seen comparing Image matrices, the density of the former is lower than the density of the latter (0.163 vs 0.197). This may sound quite surprising and stimulating at the same time, as it forces us to reconsider the currently widely shared assumption that the visible part (ie., alliances and meetings between SMOs) of social movements is just the peak of an iceberg, consisting of underground personal ties between individuals (see eg Melucci, 1989; Kriesi, 1989). What in our view goes under discussion is not the hypothesis as such, but the idea that it may be tested looking only at regular activists (which, to be fair, is not of the above cited authors). Rather, attention must be paid to the far looser and - undefined sectors of sympathizers and occasional participants (some preliminary efforts in that direction are for instance in Kriesi, 1988b). What our data suggest is, however, that at the level of core activists latent networks may be denser than interorganizational ones in movements with strong countercultural or subcultural orientations, weaker in movements with mainly reformist and instrumental orientations as it seems to be the case in Italy in the 80s.

As for the centralization index, it is higher for latent ties than for interorganizational ones (0.287 vs 0.249), even though to a small extent, and even though both values are quite low, lower for instance than the centralization index of a bipolar structure (let alone a wheel one). Remarks on this point would be quite consistent with those just raised about differences in density and may therefore be skipped.

5.3.2 Actor properties

Data about centrality indexes (inner degree for latent and interorganizational ties, betweenness for latent ties) are reported in table 7. As one can see, there is a small group with high centrality degrees, and a large majority of groups with quite low degrees.

(Table 7 about here)

Comparison between centrality in latent and interorganizational ties may be useful, as it may help us in detecting unusual cases which may be worthy of further investigation: eg. SMOs who are able to play a relevant role even without showing specific personal ties between their and other groups' activists; or, viceversa, SMOs who have quite a central position in the latent network, yet are not able to convert this opportunity into influence over organizational activities. In our unit of analysis, however, correspondence between degrees in different networks is quite high. The Pearson's corr between the two is actually 0.745; moreover, groups above and under the median value are the same in both variables. The major case of differences between the two indexes is provided by the Green List, who ranks first in latent ties and only seventh in interorganizational ones. We shall comment upon it later.

Differences have been emphasized between inner degree and betweenness centrality indexes (see eg Freeman, 1979). In the case of social movements the former may be referred to the capacity of SMOs to attract support from other groups; the latter, to control flows of information between them. As they address different aspects of leadership, one might wonder whether results are very different. However, that is not the case, at least in our unit of analysis, as the

correlation between the two (standardized) variables is $r=0.859$ ³.

A more sophisticated way of analyzing actors' centrality is to look at the patterns of ties their adjacencies have to each other as well as to other actors in the network. This allows the analyst to get better insights into the type of influence the single actor may exert (see Mariolis, 1982). If two actors have the same inner degree, yet the former's connections have no other ties, whereas the latter's are strongly integrated into the global network, then chances for influencing other actors' behavior will be obviously different. To exemplify this approach we shall focus on the three organizations ranking highest in inner degree in interorganizational and latent ties (Environmental League, WWF and Italla Nostra in the former case, Environmental League, WWF and Green List in the latter). In each case we shall investigate the density of ties within and between three positions (or "regions": see Mariolis, 1982) constituted by: the core actor (1); its adjacencies (2); residual groups in the network (3). As the size of positions 2 and 3 is not always the same, comparison between densities will require some care.

Results for interorganizational relations are showed in table 8. Similar remarks may apply to each of the main groups:

- a) their adjacencies are strongly connected;
- b) residual groups are neither internally connected nor have strong ties to position 2.

This supports the picture of a movement with a pyramid-like structure on three stages, the top of which is constituted by position 1 and the basis by position 3. However, if we do

³ By the way, a strong consistency between different types of centrality indexes is emphasised by Mariolis and Jones (1979).

not take in account the mere image provided by the cutoff value, and look more carefully at density figures, we find out that the Environmental League differs from the others in two aspects at least:

- 1) its direct allies are less internally connected than the others'. Even though other networks are slightly smaller (7x6 in IN's case and 8x7 in WWF's vs 10x9), differences seem big enough to allow for this interpretation;
- 2) on the other hand, Environmental League tends to reciprocate links much more often than the other core groups (the density of 0.600 for ties between from 1 to 2 is here perfectly reliable, as it refers to a bigger-sized network than in the case of WWF or Italia Nostra).

(Table 8 about here)

Both properties suggest the existence of different styles of action, which may be perhaps explained by the different organizational nature of the Environmental League. It is actually an umbrella-organization, rather loosely structured. In this respect it is probably more akin both to engage in campaigns with minor organizations and to get support from a differentiated, and therefore less connected, constituency. On the contrary, WWF and Italia Nostra are more structured and more inclined to influence similar and connected groups, as well as stricter in the selection of their partners for joint campaigns.

If we turn to latent connections (table 9) we get a picture which differs in several aspects from the previous one. In fact, only WWF shows the same pattern of ties than in the interorganizational network. On the contrary, Environmental League has a different pattern, similar to Green List's, as their adjacencies are in both cases unconnected. (The strongest tie from EL's adjacencies to residual groups is hard to interpret, as differences in position sizes suggest that the figure might be closer to

the others than one would assume at a first glance). Once again, it seems plausible to hypothesize that more loosely structured organizations like Environmental League and (even more, especially when data were gathered) the Green List will likely get a more heterogeneous support than more established ones. In terms of influence, that means that they will be probably able to exert a more widespread influence on the movement. However, such influence might be less intense and effective in terms of quickly mobilizing one's own support than WWF's or other SMOs' who have strict links to a better defined constituency.

(Table 9 about here)

5.4 Relations and attributes

In previous sections we have already taken into account some actors' attributes, in order to interpret results from relational analysis, and to show how it may be substantively useful in detecting social movement structures. In particular three types of variables have proved helpful:

- a) actors' beliefs;
- b) organizational features;
- c) concern for specific issues.

Our task will be here to take up the point in a more systematic way. The core question in this respect is whether any factor exists, which exerts a special influence on the way SMOs interact to each other. Eg. strong cultural differentiation within the movement might result in groups choosing as partners only, or mostly, actors sharing similar belief systems. On the other hand, actual alliances might reflect pure instrumental approaches from different actors, bringing together groups who are active on the same specific issues, no matter their global views. In this perspective, animal rights groups would give strong priority to alliances

with other animal rights groups, the same would be the case with organizations focussing on problems of urban traffic, etc. Some mixed situations might also occur, if the political and symbolic impact of some issues were so big to shape the interaction patterns within the movement. This happened in a sense in late 70s in Italy, when the nuclear question was so central that orientations towards it set the lines for alliances and segmentation within the ecology movement of the day (see Diani, 1990d).

In order to relate attributes and relations two strategies at least are available. The first consists of comparing actual data to some hypothetical matrix, and check how well the latter fits to the former, by correlation or by some more sophisticated technique. The second requires the observer to identify some subsets of actors on the basis of relevant attributes, and check how strong the ties within and between them are.

5.4.1 Hypothetical and actual matrices

Let us raise for instance the hypothesis that the structure of the environmental movement is largely shaped by the persisting distinction between conventional and political ecology. We may thus construct an hypothetical adjacency matrix where each pair out of the main diagonal is assigned value 1 if both actors share the same orientation, 0 otherwise. Simple indicators like Pearson's r will tell us how strong the correlation between the hypothetical matrix and the actual adjacency matrix is, and how much differences in beliefs are a good predictor for actual ties. Several matrices may also be regressed on the data matrix whose underlying structure we want to point at, in order to assess

their relative influence⁴. In a recent article we have for instance tried to assess the relative influence of latent ties, belief proximity and instrumental opportunities for cooperation on the alliance structure of the Italian ecology movement. The interorganizational relations matrix resulted affected by latent ties, similarity of beliefs and instrumental opportunities for action in the following way: $IOR = 0.189 * \text{Latent ties} + 0.056 * \text{Beliefs} + 0.307 * \text{Instrumental opportunities}$ ⁵.

Let alone the fact that network data may be biased, as they are not fully independent from each other (see eg MacEvoy and Freeman, 1987), the main problem with this approaches is that the results of strong techniques like regression may prove somewhat ambiguous to interpret, especially with little dense (and in general with large) networks. Indeed, the lower the density, the higher the risk that strong correlation coefficients be due to large ratios of 0s, the interpretation of which might be unclear. Let us think for instance of the extreme case of two 10x10 matrices, both with all 0s values but three 1s, assigned to different pairs of actors. The correlation between them will be quite strong, as $r=0.695$. However, it will be hard to assess whether the 0s mean actually the same pattern of behavior in different actors, as the reasons for the absence of ties might be quite different (open criticism in some cases, lack of information or of organizational resources in others)⁶.

⁴ A succinct introduction to these and other techniques also applicable to this purpose may be found in MacEvoy and Freeman, 1987), pp.77-90.

⁵ See Diani (1990a) for a detailed introduction to the model and to its operationalization.

⁶ In the paper I mentioned above (Diani, 1990a) it seemed (Footnote Continued)

It seems therefore possible to conclude that, unless strong criteria to interpret absence of ties are defined since the data gathering phase (see, eg, Bradley and Roberts, 1989), regression techniques should be treated with care. Safer applications may be envisaged, however, eg in the analysis of changes in a given network across time. In this case, the problem would be to compare actual data in different periods, instead of contrasting actual data to hypothetical matrices. Strong indicators might therefore be useful as well as more reliable, in order to assess the impact of previous ties being cut and new ties being activated. Periods of substantial continuity in interaction patterns would be detected by strong correlations between matrices at time t and matrices at time $t-1$. Poor correlations might on the contrary call attention upon substantial innovations in network structures.

5.4.2 Pre-determining blocks

The second option we have pointed out requires the analyst to define in advance what blocks he wants to analyze and then to check how intense their exchanges are. In this section we are going to examine two possible ways of defining such blocks and to contrast them to the picture we have obtained from the relational analysis performed in section 5.2. We shall examine first a partition based on the combination of belief and organizational features. It points out seven positions, corresponding to the cells of table 2 (we refer to this as network 2). Then we shall move to a

(Footnote Continued)

to me reasonable to assume that, given the limited size of the population (the same we are using here), any absence of ties was due to an explicit choice rather than to other factors. The same would not hold, however, for more sized networks.

partition based on issues (network 3). It distinguishes multi-issue groups from groups focusing respectively on traffic problems, animal rights, and neighborhood problems. Both will be contrasted to the actual network structure (network 1). For simplicity's sake we shall refer only to strong (ie, over the cutoff value) interorganizational relations (see figure 5 below).

If we look at network 2, we see that the movement assumes a quasi-clique structure, but for the peripheral position of blocks 5 and 6, corresponding to local groups of political and conventional ecology. All the other blocks are strongly interconnected, with the only exception of the direct link between single-issue groups of the two sectors. As for network 3, it provides a highly understandable picture as well, with both animal rights and "anti-traffic" groups linked to the core multi-issue groups and local groups focussing on themselves. In broad terms these results are not inconsistent with what emerged from the relational analysis, inasmuch they emphasize that there are no big - cultural divides within the movement and that links are more likely to develop when groups share concern for the same issues. However, they may be criticized on the ground that they provide a less precise picture than the relational approach, whose results are also reported in figure 5. I would argue that the major fault in both networks is due to the fact that an aprioristic construction of blocks prevents the analyst from taking differences in behavior within blocks into account. Now, if we look for instance at block 2 in network 2, grouping multi-issue groups from the conventional ecology sector, we find in it SMOs with quite different patterns of interaction, as the relational approach shows (see table 5). In fact, 8 and 10 play a leading role in the movement and have strong ties even to political ecology groups, whereas 25 and 35 are highly peripheral. The same remark may apply to other blocks (eg, 1). The result is that opposite trends within each block

tend to compensate and to provide an overall picture which, while does not hide real processes in full (especially in network 3), nevertheless is less precise than one might obtain from a relational approach. However, attributive approaches may prove useful in the analysis of big networks, when each block includes many actors, whose attributes are not that easy to identify by qualitative inspection like we did in our example.

(Figure 5 below)

6. Conclusions

In this paper we have discussed how to operationalize some basic aspects of social movement networks. We have also provided some examples of empirical analysis, contrasting different approaches to the same issues. We would argue that the major suggestion from our analysis consists in the preference given to relational, rather than attributive perspectives as starting points in this type of investigations. Indeed, given the difficulties in preliminary classifications of social movement actors, adopting an attributive perspective since the very beginning might result in a loss of relevant information.

In spite of our efforts to provide a systematic overview of the topic, our contribution is far from being exhaustive. Central issues in social network analysis have been totally ignored by previous discussion. Among them, we would like to spend a few words now upon the role of strong and weak ties (Granovetter, 1973; Granovetter, 1982). In this paper we have used these terms to distinguish between very dense and little dense ties, within and between blocks (section 5.2). On the other hand, we have by-passed the problem of assessing the strength or the weakness of a tie between two actors *DEI* *EG*. Preliminary to it would be, however, a clarification of what a strong and a weak tie are. Merely

drawing a line between interorganizational (strong) ties and latent (weak) ties would be clearly simplistic, especially if one agrees (as we do) that the latent structure is possibly the main and most persisting component in social movement networks. Other conceptions seem more plausible. One might for instance measure the intensity of a tie between two actors by counting the times they are involved in joint activities, or the number of overlapping memberships or personal ties, and not just the presence/absence of at least one tie. One might later consider strong ties all links which exceed a given threshold (eg, the median value in the distribution). The main objection to this option would be, however, that an accurate measuring requires reliable and highly systematic data, which is rarely the case for social movements (as we argue in the Appendix). Another possible option would consist in assuming that strong ties are only reciprocated ties, ie, when both actors involved agree on their mutual relevance (see eg Laumann and Knoke, 1987). However, this would pose a problem, ie, how to classify relationships between bureaucratized SMOs and loosely-structured groups, which are intrinsically asymmetric (in the sense that what may be very important for a small group who has no relevant resources to invest in alliance building may at the same time be only one among many minor links for a strong, bureaucratized association). Whatever the solution adopted, the next step would be similar, yet. One should have to investigate the distribution of strong and weak ties and check whether strong ties connect similar (either in relational or in attributive terms) actors, and weak ties different actors (as would be consistent with Granovetter's hypothesis, and as seems to be the case in one of the few attempts to apply the concept to social movements so far: Rosenthal et al., 1985). This might probably provide a more detailed picture of a social movement structure than the mere criterion of presence/absence of ties allows for.

Appendix. Organizing and gathering network data.

Network data are usually organized either in square or rectangular matrix form. In the first case, rows correspond to the source of the connection, columns to the target. Figure 6.a below shows eg the matrix description of a bipolar structure, where value 1 in row 2, column 1 points at the existence of a connection from 2 to 1. In rectangular matrices, rows are the actors, whereas columns correspond to events, types of actions or whatever. Figure 6.b shows an hypothetical set of six actors and two different activities. As we see, actors 2 and 4 are involved in both activities, whereas 1, 3 and 5 only in one and 4 in none. Recourse to rectangular matrices may be useful. In fact, we can multiply them for their transpose and obtain square matrices again, whose cells show how many activities (or participations to the same vents, etc.) two actors have in common. By doing so, we can obtain a rough indicator of how strong the connection between different actors may be. In our analysis, however, we have used only square matrices.

(Figure 6 about here)

In order to gather data two basic options are available. One can either conduct a survey or find out data from already existing materials (usually leaflets or documents produced by the actors themselves, or newspaper reports). Survey network data have been under severe criticism on the ground that interviewed people would provide a highly uncorrect description of ties they are actually involved in. Others have opposed, however, that survey data are reliable, provided researchers do not try to achieve an excessive degree of precision. In this view, it might be reasonable to ask a SMO whether their relationships to other SMOs are regular, occasional or absent, but it would be absurd to ask them how many times a year they meet/start joint initiatives with such SMOs (a reconstruction of this debate is in Knoke and Kuklinski, 1982, pp.30-35).

Archival data have on the other hand great advantages, as they allow you to investigate changes over time. There are some problems, however, concerning both self-produced documents and newagents reports. First, SMOs are often very loosely structured and volatile. The presence of systematic archival data is therefore neither certain nor totally reliable, as information about groups who played an important role at certain times, yet did not leave documents, may be missing. The role of biggest organizations seems likely to be overemphasized, to detriment of grass-roots groups who are most unlikely to produce written materials. As far as newspapers are concerned, it is dubious that their reports are precise enough to allow for reliable analysis of interorganizational relationships. Personally, when gathering data for our project we also tried to

reconstruct the structure of the ecology movement in Milan from newspapers local reports. However, our effort proved totally unsuccessful, as such reports mentioned only the best known 5-6 groups, what's more, quite randomly and in a very evocative way (two or three names were mentioned, basically, we guess, to make clear to the reader what the topic of the article was). To summarize this point: as far as we can see, data from SMOs seem in principle more reliable than newspaper sources. Even they, however, may prove useful only if we make it explicit that established organizations are going to be overrepresented in resulting pictures of movement networks. How to study changes of latent and very grass-roots structures over time is a problem which still needs to be taken up (let alone solved).

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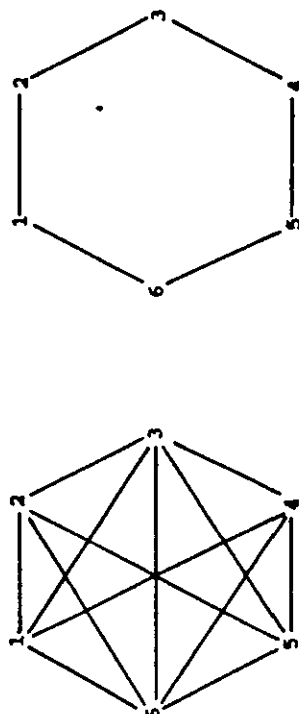
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Table 2

Boundary type	Connection type	
	Relational	Comparative
Nominalist	1	2
Realist	4	3

Figure 2 Basic network models



Clique

Circle

Bipolar

Wheel

Table 3 Basic features of different network structures

	Number of structural positions	Density	Inner degree		Centrality		Centralization
			Max	Min	Max	Min	
Clique	1	1.00	5	5	0	0	0.00
Circle	6	0.40	2	2	2	2	0.00
Bipolar	4	0.33	3	1	7	0	0.40
Wheel	2	0.33	5	1	10	0	1.00

Table 4 The unit of analysis: summarizing features

	Conventional Ecology	Mixed Beliefs	Political Ecology
Multi-Issue Groups	8: World Wildlife Fund - Milan 10: Italia Nostra 25/26/35: other analogous groups	1: Environmental League 16: Green List	
Single-Issue Groups	11: animal rights groups	17: South Milan Park Committee 50: Stop the North Urban Motorway Committee	6: Friends of Bike 27: Democratic Medecine
Local Groups	9: local branch WWF - North Milan	2/3: local branches Environ. League 18/20: independent local groups	

Source: Diani (1990a).

One
emphasis

Table 5 Concor partitions of the environmental movement in Milan

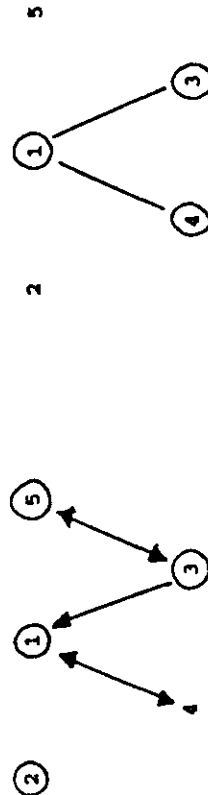
Block	N	[Split]	Members
1	5	[1]	1 6 8 10 17
2	5	[1]	2 3 9 20 50
3	5	[1]	11 12 13 26 37
4	3	[1]	16 18 27
5	2	[3]	25 35

Table 6 Density matrices for Concor blocks

0.850	0.000	0.120	0.200	0.000	0.400	0.040	0.400	0.400	0.100
0.120	0.450	0.000	0.133	0.000	0.000	0.000	0.000	0.133	0.000
0.280	0.000	0.600	0.133	0.300	0.400	0.133	0.000	0.133	0.000
0.533	0.133	0.000	0.000	0.000	0.000	0.000	0.000	0.333	0.000
0.000	0.000	0.200	0.000	1.000	0.000	0.000	0.000	0.000	0.000

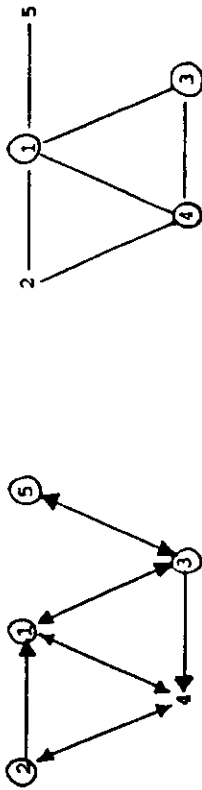
6a. Interorganizational ties 6b. Latent ties

Figure 3 Network structure of the movement (only 'strong' ties)



3a. Interorganizational ties 3b. Latent ties

Figure 4 Network structure of the movement (including 'weak' ties)



4a. Interorganizational ties 4b. Latent ties

Table 7. Centrality for interorganizational relations and latent ties

ID.	INDG	ZINDG	OUTDG	ZOUTDG	DG	ZDG	BETW	ZBETW
1	10	0.5263	6	0.3158	6	0.3158	27.2000	0.1591
2	3	0.1579	4	0.2105	1	0.0526	0.0000	0.0000
3	2	0.1053	4	0.2105	1	0.0526	0.0000	0.0000
6	4	0.2105	3	0.1579	4	0.2105	2.7333	0.1660
8	8	0.4211	4	0.2105	7	0.3684	19.2667	0.1127
9	2	0.1053	2	0.1053	0	0.0000	0.0000	0.0000
10	7	0.3684	3	0.1579	5	0.2632	17.6667	0.1033
11	6	0.3158	9	0.4737	6	0.3158	12.3333	0.0721
12	5	0.2632	8	0.4211	5	0.2632	6.4000	0.0374
13	3	0.1579	3	0.1579	5	0.2632	10.2667	0.0600
16	4	0.2105	6	0.3158	8	0.4211	43.3000	0.2532
17	6	0.3158	7	0.3684	4	0.2105	10.1333	0.0593
18	1	0.0526	2	0.1053	2	0.1053	1.0000	0.0058
20	2	0.1053	2	0.1053	0	0.0000	0.0000	0.0000
25	2	0.1053	2	0.1053	0	0.0000	0.0000	0.0000
26	1	0.0526	3	0.1579	2	0.1053	0.7000	0.0041
27	3	0.1053	2	0.1053	2	0.1053	0.0000	0.0000
35	3	0.1579	2	0.1053	1	0.0526	0.0000	0.0000
37	2	0.1053	1	0.0526	2	0.1053	0.0000	0.0000
50	2	0.1053	2	0.1053	1	0.0526	0.0000	0.0000

7.a Interorganizational relations 7.b Latent ties

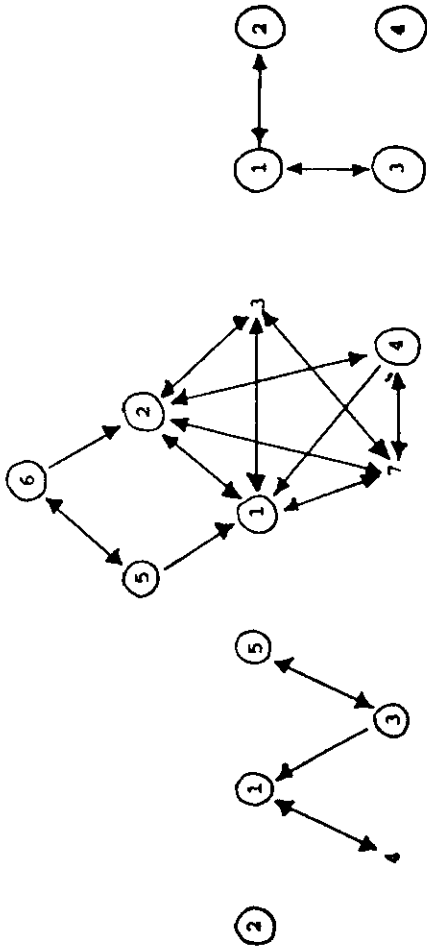
Table 8. Influence structure for interorganizational relations

Environmental League	WWF	Italia Nostra
0.000 0.600 0.000	0.000 0.500 0.000	0.000 0.429 0.000
1.000 0.244 0.133	1.000 0.429 0.136	1.000 0.595 0.131
0.000 0.167 0.139	0.000 0.182 0.100	0.000 0.179 0.106
0 1 0	0 1 0	0 1 0
1 1 0	1 1 0	1 1 0
0 0 0	0 0 0	0 0 0

Table 9. Influence structure for latent relations

Environmental League	WWF	Italia Nostra
0.000 1.000 0.000	0.000 1.000 0.000	0.000 1.000 0.000
1.000 0.133 0.192	1.000 0.238 0.143	1.000 0.143 0.148
0.000 0.192 0.103	0.000 0.143 0.106	0.000 0.148 0.109
0 1 0	0 1 0	0 1 0
1 0 1	1 1 0	1 0 0
0 1 0	0 0 0	0 0 0

Figure 5. Relational vs attributive positions



1. Relational data

2. Beliefs by organizational features

3. Issues

Figure 6. Examples of data matrix representation

0 1 0 1 0 1	0 1
1 0 0 0 0 0	1 1
0 0 0 1 0 0	1 0
1 0 1 0 1 0	0 0
0 0 0 1 0 0	1 0
1 0 0 0 0 0	1 1
6.a	6.b