Collective Network Analysis

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Abstract

This paper describes the results of a research project on the topic of network analysis above the level of individual ties. The goal of the project was to expand on existing methods in which Social Network Analysis (SNA) techniques are used to consider interactions between groups (SNA for identities) and between abstract expressions of behavior (SNA for abstractions). The paper begins with a brief review of literature on the topic of identity and goes on to describe an idea for a new network analysis method called Collective Network Analysis (CNA). This method involves the creation of "identity group constructs" as abstract expressions of group-to-group interactions. It then links these constructs with factual groups through the medium of narrative collection and interpretation. The results of the group descriptions, narratives and interpretations are interpreted using Galois lattices and narrative databases. The paper ends with a report on two preliminary partial uses of the method and considerations for further study.

Citation

Introduction

As part of a larger research project I explored ways to expand the use of Social Network Analysis (SNA) above the level of the individual. Our group had previously (Snowden 2005) developed methods of carrying out SNA in which people were asked questions about groups (SNA for identities) and about abstract representations of behavior (SNA for abstractions). These methods combined SNA with techniques our group had developed for identifying emergent constructs as descriptors of collective behavior (also called non-Jungian archetypes; for information on these see Snowden 2003, Kurtz 2008).

Another objective of the work was to consider ways in which a higher-level SNA could be useful in helping people make sense of the actions of other people, particularly in the spheres of counter-terrorism and policy planning. We had seen network analysis done on terrorist groups, but only by connecting individuals. Could a higher-level focus bring additional insights? Looking into these topics formed part of a government research project in the area of decision support.

The result of the work was an idea for a new form of network analysis called "collective" network analysis, or CNA. I was not able to test the method in full, but I report here on two

partial tests of the ideas involved and consider some ideas for further exploration of the topic.

SNA, individuals and groups

Social Network Analysis is primarily concerned with connections among individuals. The fact that SNA examines *relationships among* individuals instead of *characteristics of* individuals is widely touted as placing SNA above the level of individualistic methods of inquiry. Examining only relationships *among individuals* does not, in the eyes of most SNA practitioners, make it individualistic. Quantitative SNA tools are rarely, if ever, used to explore *relationships among groups* or collective identities of any kind. SNA infers the existence and characteristics of groups, and relationships among them, from connections among individuals. Some studies have asked people about *categories*, such as so-called "How many X's do you know" surveys, but not about specific groups.

Social groups themselves have had a long history of examination. Wasserman and Faust (1994) describe how Simmel first introduced the concept of "social circles" in 1950 as group affiliations which people form and maintain (each person managing many such affiliations). The concept of a "clique" as a persistent group is also widespread and is sometimes used as a unit of analysis, with several methods having been developed for clique discovery.

The SNA literature does hint at other possibilities, though they remain mostly unexplored.

In particular, Degenne and Forse (1999) provide a model of social circles in which people can belong to a group because they know or otherwise are connected to people in it (cohesion), because they identify with something about it (identity), and/or because they fill a role in it (roles). Figure 1 reproduces a figure from Degenne and Forse showing these distinctions. By this definition only cliques have been addressed by standard SNA techniques, with the two other types of "social circles" getting much less attention.
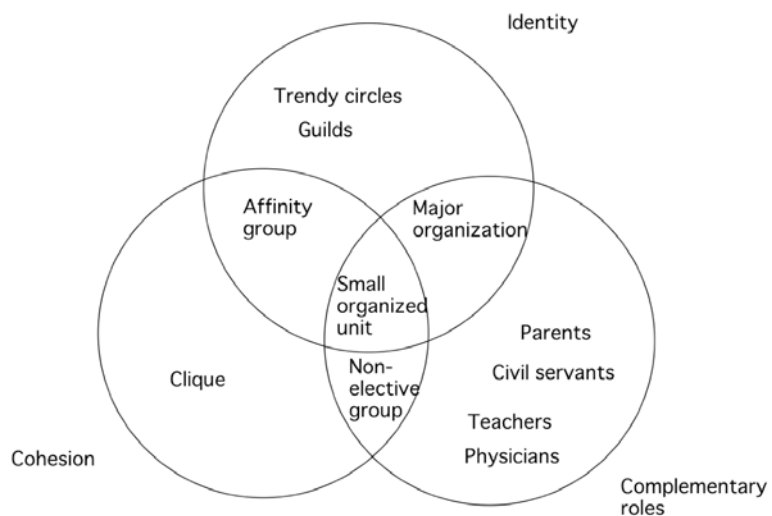
Principles defining social circles (reproduced from Degenne and Forse 1999)

Reymers (2002) divides network analysts into three schools:

1. Some analysts are ***quantitative*** social network analysts, who "are most stringent in maintaining the intellectual position that the structure of social networks is wholly objective in character and they go about studying society in terms of these objective positional linkages." These analysts focus on "mathematical properties, rather than the human qualities, of social networks, in a positivistic attempt to discover rules" of network formation.

2. Some are traditional ***investigative*** network analysts, who use some elements of SNA but don't rely as heavily on mathematical analyses. Says Reymers of these analysts, "They

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employ network concepts, but use them in the context of a focus upon the relations between actors in the networks (as opposed to traditional sociology which focuses on individuals as independent actors), rather than solely the positions they may fill. "

3. A third group is "*cultural* network analysts" whose work is "often descriptive, relying on the network metaphor in a looser context than the former two sub-disciplines." Their focus is on "the cultural and economic institutions which have increasingly organized society itself around a network model."

The first group studies cliques, while the second and third types are more likely to study role and identity based group membership; but those groups are not considered to be conducting strict SNA.

Group-level interactions outside of strict SNA

As soon as you move away from a strict application of SNA techniques (essentially into Reymers' second and third categories), there are quite a few studies of "non-dyadic" network structures and uses of SNA techniques for non-individual inquiries. Here is a sampling.

A study by Mohr and Duquenne (1997) considered how social identities of people in need of help affected the help given them by social workers. This figure (reproduced from Mohr and Duquenne 1997) is an example of a Galois lattice showing how group labels are connected with descriptions (mainly of belief). This study mentions using Galois lattices to study things that have a duality about them, including
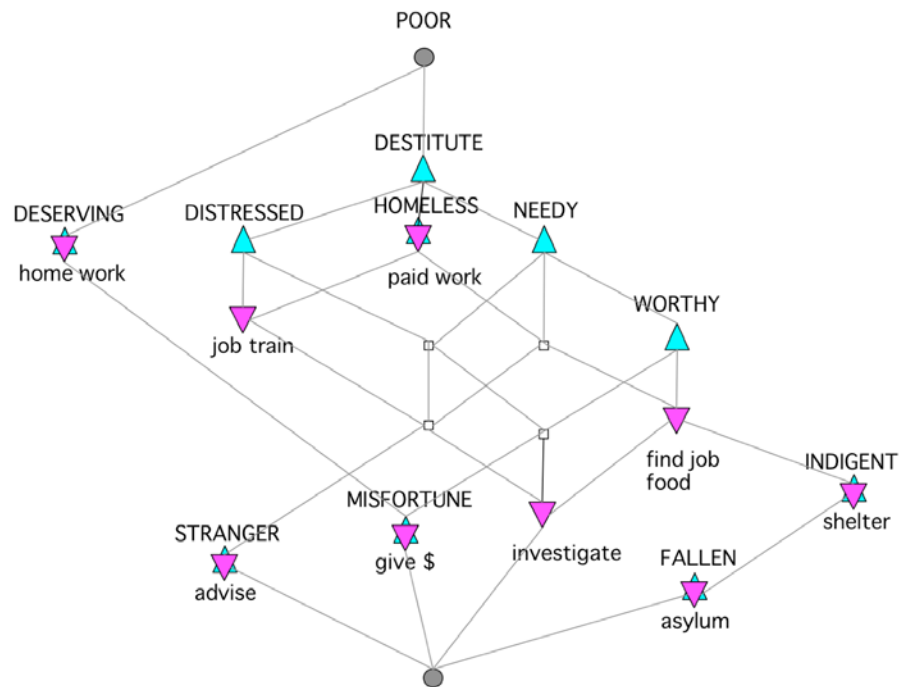
individual and group views on cultural phenomena. Later in this article I will use Galois lattices for the same purpose. Note how this figure juxtaposes belief with fact. For example, when people were described as "worthy" they were more likely to be given food and helped to find a job; but when they were described as "indigent" they were more likely to be simply given shelter and asylum. Also note that those described as indigent, fallen, in misfortune, and strange did not benefit from investigation (of the circumstances causing the problem), while those described as deserving, distressed, destitute, homeless, needy and worthy did. The lowest-placed four categories seem to denote a sense of hopelessness, or perhaps lack of worthiness, or placement outside of the norms of society. Job training and paid work seem to be reserved for those considered to have higher potential for benefit.

Mohr and Lee (2000) and Mohr et al. (2004) published a series of studies that examined changes in admission practice at California universities following a law requiring blindness to race and

gender. Mohr et al. (2004) compared terms used in describing applicants before and after the change. They observed a change "from an individualistic emphasis on race to a corporatist discourse of class" by the use of a "new set of procedures for mapping the implicit meanings of a system of identity discourses." In other words, the means of differentiating among identity categories, which had been explicit, went underground and reappeared in oblique but well understood terms, such as "cultural heritage" and "bilingual" and "underserved." This study is especially interesting in that it considers how people indicate the presence of collective identities indirectly and negotiate a shared language for such indications.

Ferrand and Mounier (1993, cited in Degenne and Forse 1994) asked people about the reactions of family, friends, and coworkers to an account of a fictional acquaintance having an affair. In the words of Degenne and Forse:

> *Friends are perceived as more sexually tolerant.... But family is seen as stricter... But in a way, no one in particular actually comes to a respondent's mind when thinking of friends, family and coworkers. The actual people involved are friend to one respondent, coworker to a second and family to a third. When a respondent lends a particular opinion to someone, it is actually lending it to the circle the people are cast in.*

This is one of the few studies I have seen in which people were asked questions about roles or identities; but it seems to have been a means to an end (to study sexual attitudes) and was not meant as a methodological exploration.

Carley (1994) used "map analysis" (a combination of content analysis and network analysis) to map the structure of relations between conceptual terms used in narratives to identify shifts in cultural perceptions – a shift for example from the portrayal of robots in science fiction as negative, mindless machines to positive, emotional beings. One could imagine doing this sort of thing to identify shifts in identity references (or identification itself) in news articles or in correspondence.

Martin (2000) used SNA software to map the social class structure inherent in the behaviors of animals portrayed in childrens' fiction, showing that class expectations are indoctrinated through role play before children could be expected to have understandings of them. Again this suggests interesting possibilities for detecting not only the presence of identities but also connections between them through direct inquiry about group characteristics and interactions.

Padgett (1998) analyzed patterns of banking in the Florentine Renaissance and showed how banking was affected in four eras by connections of (respectively) family, guild, social class, and patronage. In each era bankers used their identities as players in each of these arenas to participate in the salient identity arena of the time. Says Padgett:

> *It is not as if bankers in all four periods were not simultaneously fathers, neighbors, friends, and patrons. They were all of these things all of the time. Multiple, overlapping social networks shaped banking because they defined the generative context or raw material out of which banks emerged.*

This suggests that the identity interactions important for understanding a political or military issue at one time (say, the use of kinship circles in Islamist monetary exchange, or the dependence of dissident intellectual circles in Iran on foreign university connections) may change over time, and attention to such shifts through periodic inquiry could avoid following the wrong sets of identities.

Group-level interactions and identity theory

Identity theory (e.g., Stryker and Burke 2000) and social identity theory (e.g., Tajfel and Turner 1986) have much in common. Hogg et al. (1995) compare them and say:

> *Identity theory and social identity theory are two remarkably similar perspectives on the dynamic mediation of the socially constructed self between individual behavior and social structure. Yet there is almost no systematic communication between these two perspectives; they occupy parallel but separate universes.*

In both of these traditions, the individual is seen as having any number of identities which come to the foreground in different situations. Some speak of a "personal identity" which is separate from "social identities," and some make no such distinction.

In any case there are some fundamental useful concepts we can draw on from these theories. These issues are of interest:

1. Identity *salience* is the relative importance of a particular identity to an individual, or "the probability that a given identity will be invoked in a variety of situations" (Stryker 1968). People also speak of the salience of an identity in a particular context, so there is overall salience and context-dependent salience. Rohde and Shaffer (2004) give the example of the heterosexual couple walking up to a "Women Only" swimming pool. Gender identity becomes more *salient* in that context than the identity of the two people as a couple – though the couple identity may still be more predictive of the behavior of both people. Gender identity "matches up" with the women-only pool situation.

2. Identity *relevance* is whether a given situation is relevant to a particular identity, or how much it matters whether the individual displays the correct identity in that situation. This is connected to psychological stress and the *consequences* of identity-based behavioral choices. If an identity is either chosen or presumed upon (forced to be active) in a situation in which it is not relevant, stress results. This is actually a situation much exploited in fiction for comic relief – the absent-minded professor forced to deal with ruffians on-board a pirate ship; the society matron in heels and lipstick cleaning out a pigsty; and so on.

3. Identity *commitment* is a sort of loyalty, or "the degree to which an individual's relationships to particular others are dependent on being a given kind of person" (Stryker and Stratham 1985). Identity commitment determines how tightly a person will cling to an identity in a mismatched situation — i.e., even when that identity is not salient or relevant. Commitment does not depend on matching up or consequences, but comes more from internal characteristics of the individual. For example, some identities may be so strong for some people (and in some mental states) that they prescribe behavior in every situation.

To put these together, imagine a parent who is a professional musician walking into a recital in which his or her child is performing. The parent's behavior will be influenced by the two identities to which they are highly *committed* (parent and musician), the *salience* of each in the context (and each would prescribe different and possibly conflicting behaviors — parent to encourage, musician to appreciate and perhaps criticize), and the *relevance* of each set of behaviors (perhaps more stress is present in this context than when the parent accompanies their child to a non-musical activity).

Actor-network theory is a theory of networks (see Law 1992 for a review) in which elements can

include people, artifacts (including technology) and organizational elements, in any configurations and groupings. This is an interesting aspect to consider when looking at networks among identities. For example, perhaps an identity network among government agencies might need to include elements such as bodies of law or constitutional arguments, or even software which connects such agencies.

For example, Lamb (e.g., 2005) has been attempting to replace the "user" as the unit of analysis in technology design with a "social actor" concept. In fitting with actor-network theory, a social actor can be any combination of people and cultural or technological artifacts, including identities. This brings up another interesting possibility for use in collective network analysis: what about using ritual to negotiate information sharing among identities? Perhaps identity A can share data freely with identity B, but with C only under certain conditions, and with D only to a certain limited extent, *unless* any of these identities opens a negotiation session (for which protocols have been defined).

SNA for identities and abstractions

Previous practice in carrying out SNA for identities (as described in, for example, Snowden 2005) attempted to avoid the face-saving problem of having people describe their individual relationships with others (who would say they don't get information from their boss?) by asking people about groups. SNA for identities asks people questions not about their relationships with other individuals but about relationships among groups. This proved to be a useful complement to traditional SNA among individuals. However, the issue remained that people might protect groups to which they belong as well (who would say their group didn't provide information considered critical?).

This issue was addressed in the development of "SNA for abstractions," or asking people questions about emergent constructs as abstract expressions of behavior. In SNA for abstractions, people in the overall organization are guided to develop constructs as ways of characterizing aspects of the organization. Then people in each group are asked questions about how those constructs interact, and differences between interactions from the perspectives of people in different groups is used to understand those groups more clearly. Says Snowden (2005), "The power of this technique lies in the depersonalization of the material and the capacity to show objective comparisons from multiple comparisons."

The idea of CNA

Collective Network Analysis (CNA) adds three elements to previous practice. First, CNA makes use of *collective constructs*. People are asked to talk about groups with relatively consistent identities based on organizational roles, memberships, or context; then they are asked to describe those groups in a process of two-stage emergence whose output is a set of emergent constructs that characterize the collective behaviors of the factual groups (see e.g., Snowden 2001). By using constructs, CNA avoids referring to *particular* groups, which removes the problem of people protecting identities to which they belong. By definition everyone belongs to every construct.

CNA also adds the distancing technique of asking questions about stories, not about groups. The comparative safety of truth telling through narrative (as opposed to direct questioning) is well known and heavily researched. Thus a CNA that relies on narrative will result in a more authentic picture of the ties among groups than any approach that relies on direct question

asking. It also produces as a major output a body of stories which can be plumbed to answer questions in more complex ways than simple diagrams or measures can be. When the body of stories is combined with diagrams showing linkages among factual and construct-based groups, the result is a complex portrait of a community.

Another important element of CNA is that because story collection, construct derivation and question answering are separate, they can be done by different groups. In this way the comparison of multiple perspectives can be incorporated into the design, as can the use of proxies to represent the perspectives of groups to which access is difficult. For example, one might collect stories from terrorist sympathizers and have both terrorist proxies and government analysts derive constructs and answer questions about them. This might reveal "danger spots" where analyst thinking needs to take the worldview of the terrorist better into account. Other groups could also be used; say businesspeople, journalists, military people, religious scholars, reform activists, and so on.

The final addition in CNA is the juxtaposition of factual and construct-based groups by the sharing of stories between them. This has turned out to be the most useful aspect of the method: the ability to see connections between factual groups and representations of group behavior.

CNA method description

Here I will describe the "maximal" version of CNA before detailing how certain components can be trimmed out if the scope and purpose of the CNA do not require them.

1. **Derive factual groups**. The first phase of the process can take place in a physical or virtual workshop setting. Standard techniques are used to elicit the names of formal and informal groups or communities in each Cynefin domain. (For more information on the Cynefin framework and Cynefin domains, see Kurtz & Snowden 2003 and Snowden & Boone 2007).

2. **Collect factual-group stories**. In this phase a group of people is asked to tell stories about interactions among two or more of the factual groups in the derived list. Stories are elicited by asking questions like, "Can you remember a time when any two or more of these groups interacted in some way, and things went very well or very poorly?" Ideally at least 100 stories are collected in this phase, and an attempt is made to cover a range of people who have knowledge of the named groups (e.g., at least one or a few people who belong to each group should be included).

3. **Derive identity group constructs**. In this phase the stories told about interactions among factual groups are used to generate attribute descriptions of the groups; then the attributes are clustered to form *identity group constructs* or IGCs. This is a standard two-stage emergence process as used to generate every other type of emergent construct. IGCs, like all other emergent constructs, are expressions of collective identity which transcend particular individuals (or in this case groups) and can be used to explore behaviors and motivations. Using narratives about groups improves the derivation of the IGCs by improving the resonance of the attributes listed for the factual groups. The use of narratives also works via a more emergent, complex method of deriving the IGCs, especially when people from more than one community are participating in the IGC derivation.

4. **Collect construct-group stories**. The questions used to elicit stories about IGCs are the same as those used to elicit stories about factual groups (e.g., "Can you remember a time

when any two or more of these groups interacted in some way in which things went unexpectedly well?"). The only difference is that the "groups" being asked about are identity group constructs. The stories collected earlier (about factual groups) can be brought together with these stories in order to make sure that both factual and construct-based groups are included in the main database.

5. **Ask questions about factual-group and construct-group stories**. In this phase people are asked to answer questions about all collected stories in such a way that the answers create links among groups — factual and construct-based. The questions are geared to aspects of group interaction most relevant to the goals of the project. For example, questions might ask about information exchange, collaboration, trust, and boundaries between groups in the story.

6. **Analyze patterns and present results**. In this phase the results of the narrative capture and question answering are used as inputs to network analyses and statistical processes to provide summarizations of the trends found in the exercise. CNA results take the form of two-mode visualizations connecting the two types of groups through similar answers to questions about stories. The results of any CNA in which narrative is involved will also include a narrative database which can be used to explore relationships among the IGCs and groups in serendipitous ways and ask specific questions whose answers are not apparent in the overall summaries.

Lesser configurations

The CNA process has three components, one required (groups) and two optional (constructs and narratives). The process can include all three elements as described above (call this "maximal CNA"), or it can combine any two (groups and constructs, groups and narratives), or it can be slimmed down to its required component only (call this "minimal CNA"). These are the configurations possible and the steps involved in carrying them out. Deciding which of these varieties fits the needs and resources of any particular effort will be the first step in any CNA process.

	factual groups	*identity group constructs*	*factual groups and IGCs*
without narrative	List factual groups Ask questions about factual groups Analyze patterns *"minimal CNA"*	List factual groups Derive IGCs Ask questions about IGCs Analyze patterns	List factual groups Derive IGCs Ask questions about all groups Analyze patterns
with narrative	List factual groups Collect factual-group stories Ask questions about factual-group stories Analyze patterns	List factual groups Derive IGCs Collect stories about IGCs Ask questions about construct-group stories Analyze patterns	List factual groups Collect factual-group stories Derive IGCs Collect stories about IGCs Ask questions about all stories Analyze patterns *"maximal CNA"*

Preliminary tests

This portion of the paper serves two purposes: it describes two experiments in applying the ideas of CNA to real groups and constructs, and it explores methods of visualization of CNA results. These explorations are hard to disentangle so I present them here together.

A typical SNA generates one-mode data, in which the network under consideration is made up of one category of entity, such as individuals or committees. In the lesser versions of CNA which do not involve looking at both factual and construct-based groups, standard one-mode graphs (and the summary measures such as centrality that can be drawn from them) are adequate summaries of the observed network.

Two-mode data are those in which two categories of entity are examined in the same network. In SNA, two-mode analyses usually involve individuals and groups considered together. In the case of CNA the two-mode data involves factual and construct-based groups.

Galois lattices

A Galois lattice is simply a method of visualizing overlapping sets of items. These lattices, also called concept lattices, are used in Formal Concept Analysis, which is a means of mapping relationships among objects and attributes for artificial intelligence and knowledge representation.

The easiest way to introduce Galois lattices is to show some simple examples. In this simple example objects (dog, cat, bird, person) are associated with attributes (four paws, barks, meows, chirps, two feet). Xs mark cells of the table which represent true states (e.g., a dog has four paws and barks).

The Galois lattice for the dog-cat-bird-person table looks like the figure on the right.


In this lattice the two sets (objects in white, attributes in gray) are arrayed in space. The attributes come down from the top, such that the top element (the little circle) contains all possible attributes, and as you move down the diagram each element level contains fewer items. The bottom element (the little circle at the bottom) contains no gray attributes. The lattice employs "reduced labeling," meaning that the only label shown on any element is the one that is newly added as you move from bottom to top. In other words, the set for the element labeled "four paws" also includes the attribute "meows" and "barks," but those attributes are not listed there because they are already listed under it.
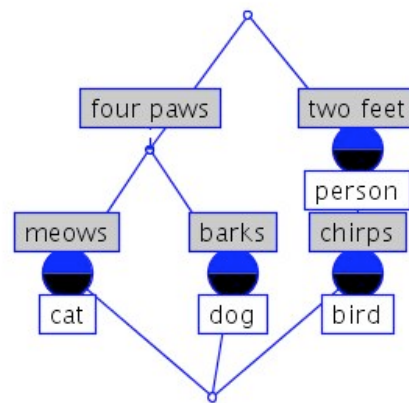
The white object sets are shown moving from bottom to top, meaning that the little circle at the bottom describes all objects (cat, dog, bird, person) and the top circle describes no objects. By looking at the diagram we can make observations such as: dogs and cats both have four paws; birds and people both have two feet; birds alone chirp; and so on.

Now applying this to two different types of category instead of to objects and their attributes, we have an example such as this, which is adapted from an example in Freeman (2000). This table shows corporate directors (numbers) and the corporate boards to which they belong (letters). I've removed the details of company and director names.

	Directors									
Boards	1	2	3	4	5	6	7	8	9	10
A	1	1	1	1						
B	1				1					
C		1	1			1				
D				1			1			
E				1	1		1			
F				1		1	1	1	1	
G									1	1
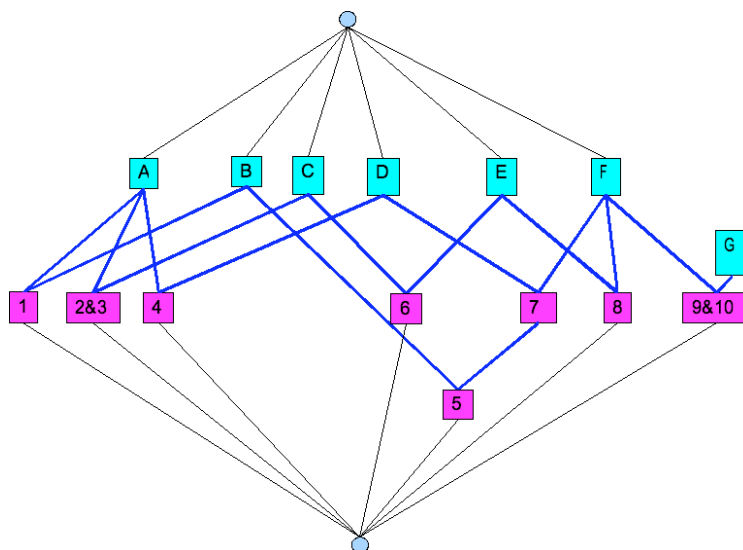
This diagram (reproduced from Freeman 2000) shows the same set of data as a Galois lattice. Freeman points out that several trends can be seen in the diagram. Two sets of directors (2&3, 9&10) have identical linkages and can be considered together. Boards A and F have no directors in common. This is because they are both banks in competition. Director 7 never serves on a board of which 5 is not a member (5 links to B, D and F; and 7 links to D and F). Board G has a similar relation to board F. Director 6 is the only one who does not serve on either bank board (A or F). Board D is the only one that shares a director with both banks. As Freeman says, "All this reveals a great deal about this corporate structure that is not necessarily apparent" in the simple coincidence table.

## First test: Using questions about narratives as a linkage mechanism

My first exploration of CNA ideas was to look at how Galois lattices might play out when comparing factual and construct-based groups linked to the same narratives. The easiest way to do this was to compare two sets of answers to questions on an existing set of narratives. I chose two sets of linkages to compare, as shown here.

	Cowboy	Double dealer	Entrenched bureaucrat	Lackey	Mahdi	Patriot	Threat network	Martinet
Accelerators		X	X	X	X	X	X	X
Asymmetric warfare			X				X	
Chronic situation		X	X	X	X	X	X	X
Decision			X				X	
Economic stability			X	X	X	X	X	X
Evolving strategy		X	X	X	X	X	X	X
Implementation		X	X	X	X		X	
Opinion								
Tools of Power		X	X	X	X		X	
Values		X	X	X	X		X	
Day-of-terror		X	X	X	X		X	
Dissatisfaction		X	X			X	X	X
Safe haven			X	X	X	X	X	X

The rows are situational constructs derived from several large group sensemaking workshops as part of a research project which involved analysts and historians. The columns are character constructs derived by two analysts simply talking together about some of the people involved in foreign affairs. Because they arose in simple discussion these can be seen as less emergent and more likely to be stereotypical. For clarity I will refer to the two sets as construct-based (rows) and factually based (columns).

The grid was produced using a reference set of 100 narratives that was collected from newspaper accounts of a particular terrorist act. A grid cell was given an X when both of the groups had been given a strength of at least 20 (out of 100) in at least six narratives. Otherwise the cell was left empty. The thresholds of 20 (strength) and 6 (narrative count) were arrived at entirely by experimentation; higher thresholds produced no correspondence and lower thresholds filled in every value in the grid.

You can see just from looking at the grid that there are a few patterns which no visualization is needed to see. First, the Cowboy stereotype coincides with none of the situational constructs. This implies that the Cowboy stereotype had to do with a topic not considered when the situational constructs were derived. Similarly, the Opinion construct (which implied public world opinion) showed no correlation with any of the stereotypes. This is interesting because the two analysts who came up with the list of factual groups might have had a different view of the forces at hand in the situations considered than for example historians might.
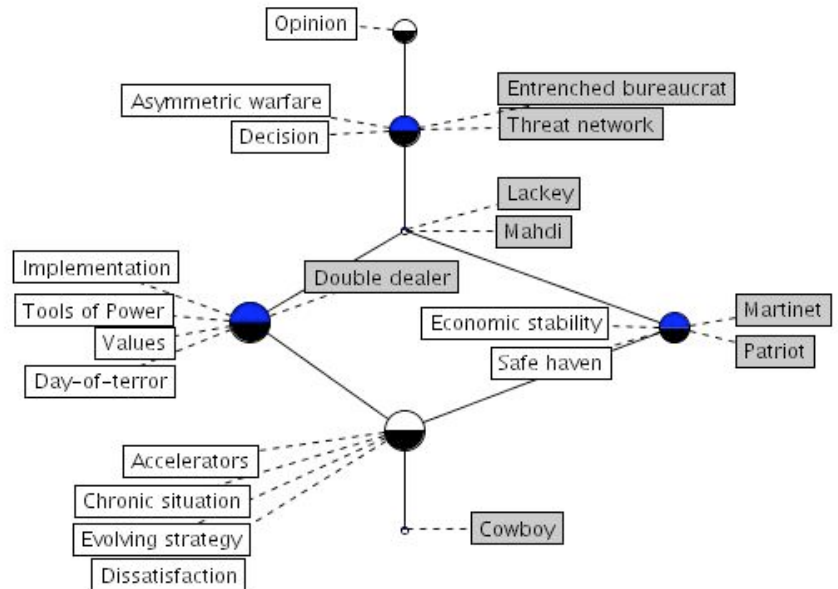
We can see more interesting trends when we look at the Galois lattice for this matrix. As we saw in the grid, the Opinion and Cowboy filters are at the extremes of each set. But there are other things we can see as well. Martinet and Patriot are associated with Economic stability and Safe

haven, both having to do with safety (Patriot because it is in the country's best interest, and Martinet because it is in the martinet's best interest). But these stereotypes are not associated with either what could be called the "realpolitik" cluster (Implementation, Tools of Power, Values, Day-of-terror) or the "systemic" cluster (Accelerators, Chronic situation, Evolving strategy, Dissatisfaction), possibly because they are stereotypical in nature.

The Lackey and Mahdi stereotypes are interesting: first, that they are associated with each other (perhaps showing a belief that religious leaders are the pawns of terrorists?); and second, that they are central to both realpolitik and systemic clusters. Clearly in the minds of those who indexed these stories according to the factual groups Mahdis are important and shrewd players in the political sphere.

The cluster near the top of the lattice could be termed the "crisis" cluster; these seem to be the elements that, from the perspective of both groups of participants, have to do with critical factors. In a sense there is agreement between the two groups here, because Asymmetric warfare corresponds with Threat network and Decision (or lack thereof) corresponds with Entrenched bureaucrat.

The general feel from this diagram is that the perspective of the analysts who created the factual groups comes across as more narrow in its emphasis than the perspective of the other group – which is exactly what we should expect, because the function of the complex process of group sensemaking is to broaden perspectives and consider a more systemic view.

These screen shots, by the way, are taken from software called Concept Explorer. I tested four pieces of software for building lattices (Galicia, ToscanaJ, Linostat, and Concept Explorer) and found Concept Explorer to be the best and most understandable.

## Second test: Deriving factual and construct-based groups

The second test came about through carrying out a partial CNA exercise with a client. Workshop participants were first asked to list factual groups by placing them on the Cynefin framework and making sure all domains were covered. Then people were asked to tell "a few brief stories" about interactions among the groups (any interactions that came to mind). As they told the stories, attributes of the groups (descriptions of the collective behavior of groups) were written down. Then people clustered all the attributes together to form identity group constructs.

During this exercise we were not able to collect the stories that were told or ask questions about them, but we did collect the *attributes* that described both factual and construct-based groups. I then created a Galois lattice showing the results of the linkages between factual and construct-based groups. This process was repeated in two separate workshops, working with participants from two different divisions of the client's organization. Both exercises were partial applications of the "maximal CNA" design (derive factual groups, collect factual-group stories, derive identity group constructs).

This lattice shows relationships in the first data set. Note that the two sets of data I show here have been reduced by nearly half in volume and heavily anonymized for publication, but the relationships in them are similar to those originally collected.
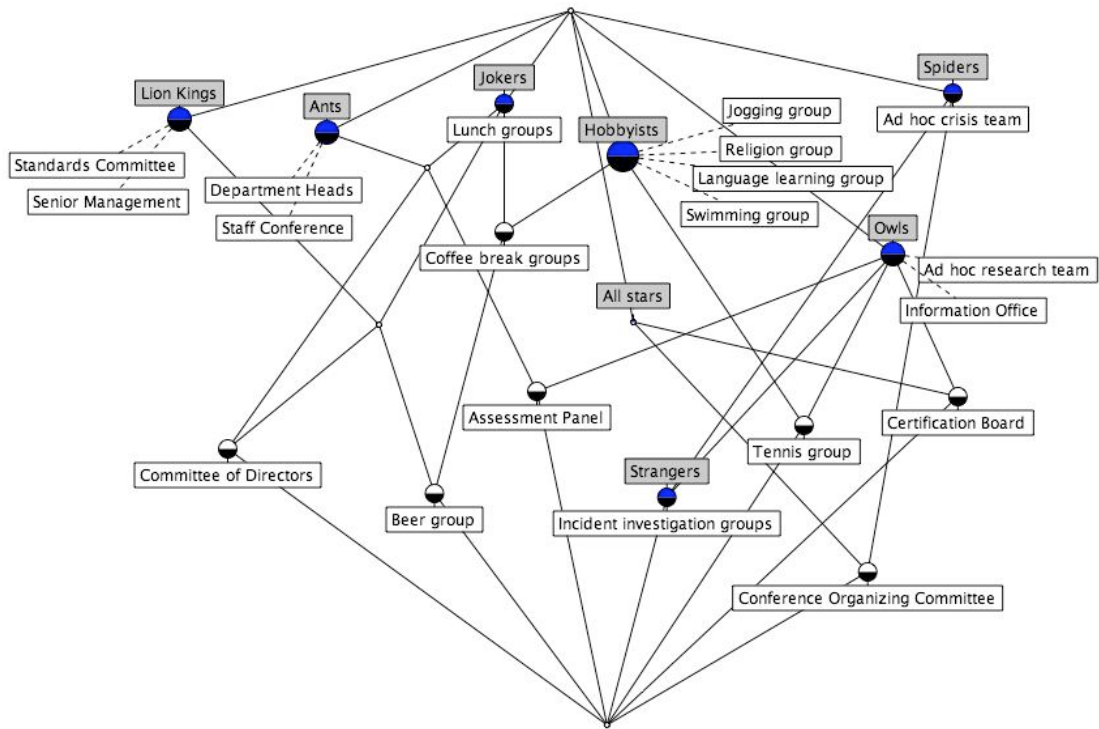
Factual groups are shown in white-background boxes, and identity group constructs are shown in gray-background boxes. It is difficult to follow this complex diagram all at once, so I used Concept Explorer to highlight some items of interest. The next diagram highlights items related to the Committee of Directors group.
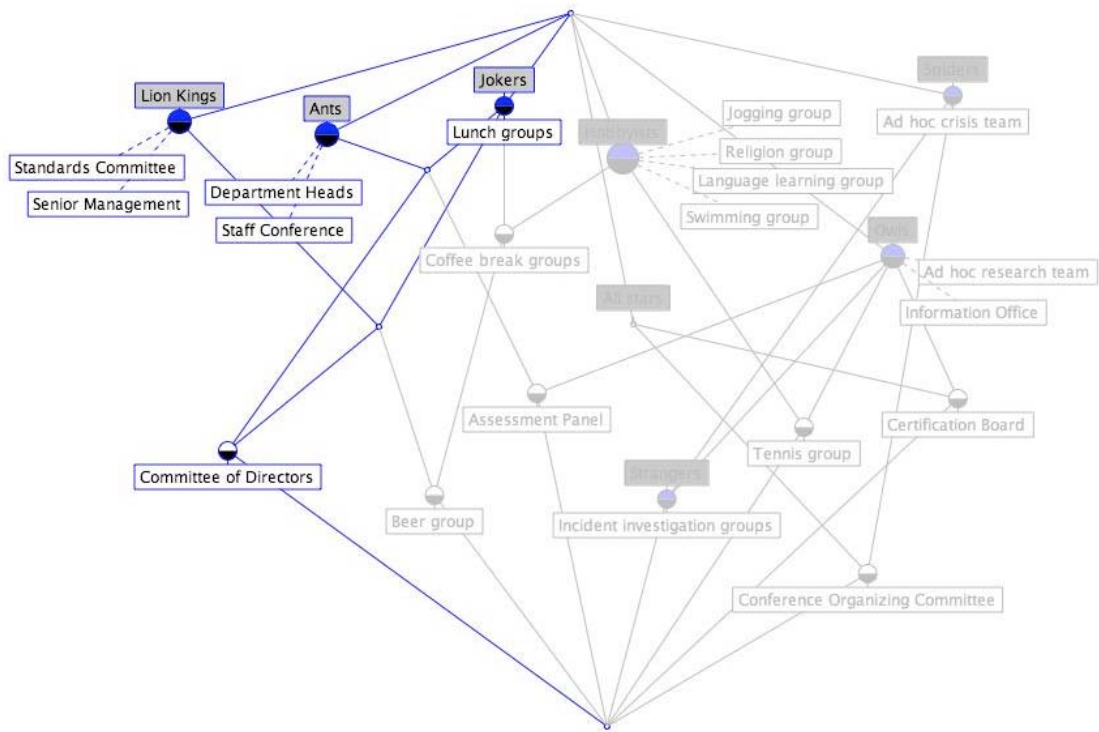
This shows that (from the perspective of those doing the attribute naming) the Directors group

has a complex and possibly conflicting identity. They are important (Lion Kings) and hard working (Ants) but either exhibit a sense of humor or are seen as ridiculous (Jokers). (Answers to questions about stories would probably resolve that mystery.) Note that the Senior Management and Department Heads share the "Lion Kings" and "Ants" attributes with the Directors, unlike for example the Certification Board and Information Office, which may be less able to gain those titles.

This next diagram shows the "Owls" construct highlighted.
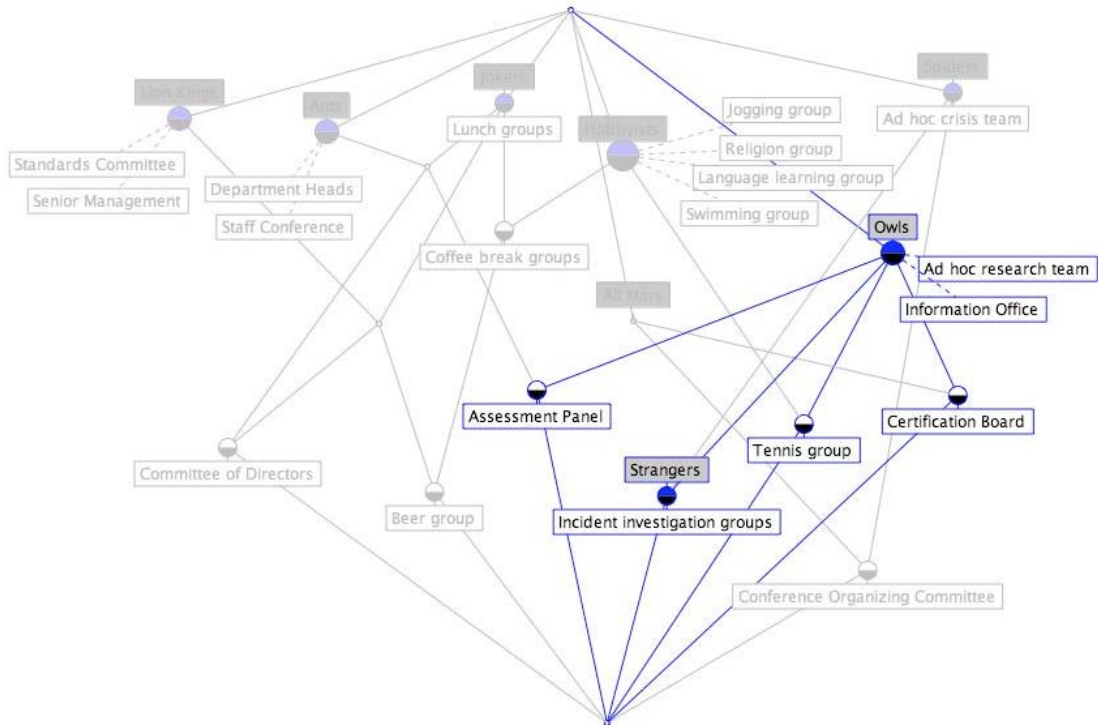
An interesting connection is between "Owls" and the "Tennis group." In general one can see from this lattice a sort of hierarchy of casual groups, ranging from the Tennis group and "Beer group" as more involved in weighty matters to the several groups clustered with the "Hobbyists" construct. One might then surmise that important avenues of casual manifestations of work have to do with conversation and "serious" games like tennis. Interestingly, the "Religion group" is not involved in the "serious" area. Also note the relative lack of involvement with "Owls" of some factual groups which one would expect would be aligned with the more powerful constructs, such as the "Ad hoc crisis team."

The second lattice, from a different client division (again heavily anonymized), looks like this:
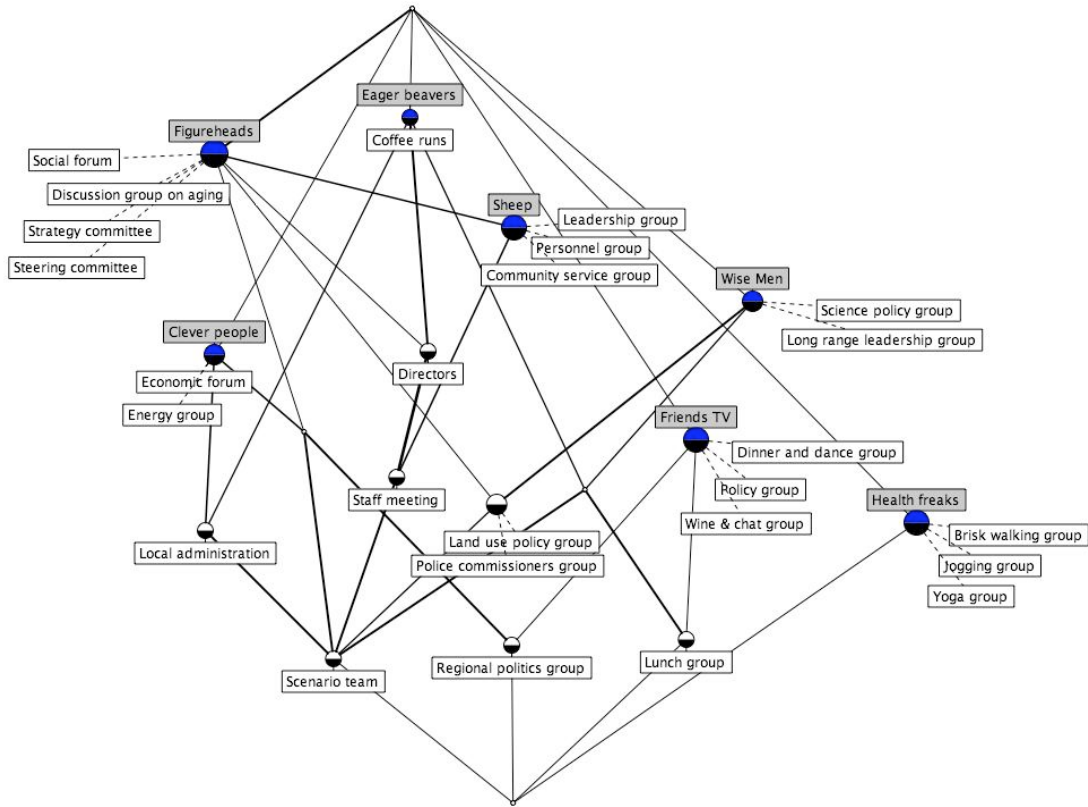
One interesting factual group in this diagram is the "Scenario team." If we highlight that element of the lattice, thus:
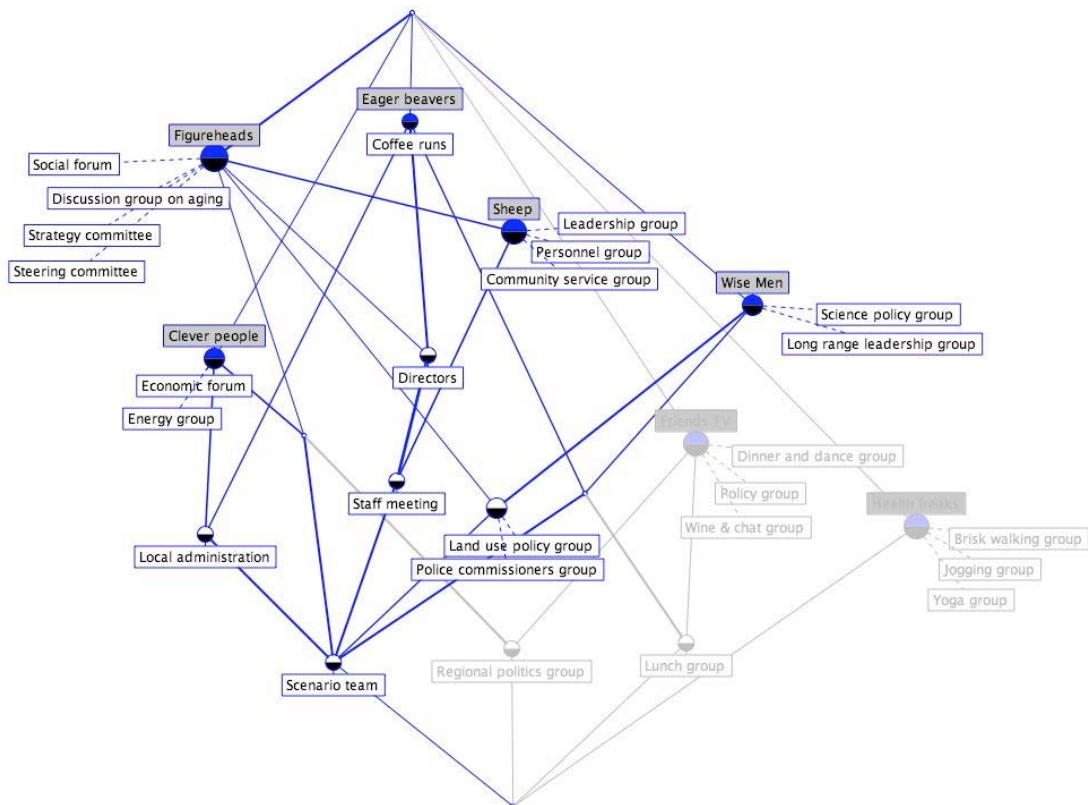
we can see that the Scenario team is linked to several constructs and has quite a complex portrait. For example, it links to five of the seven identity group constructs. Contrast that pattern to linkages with the "Health freaks" construct, here:
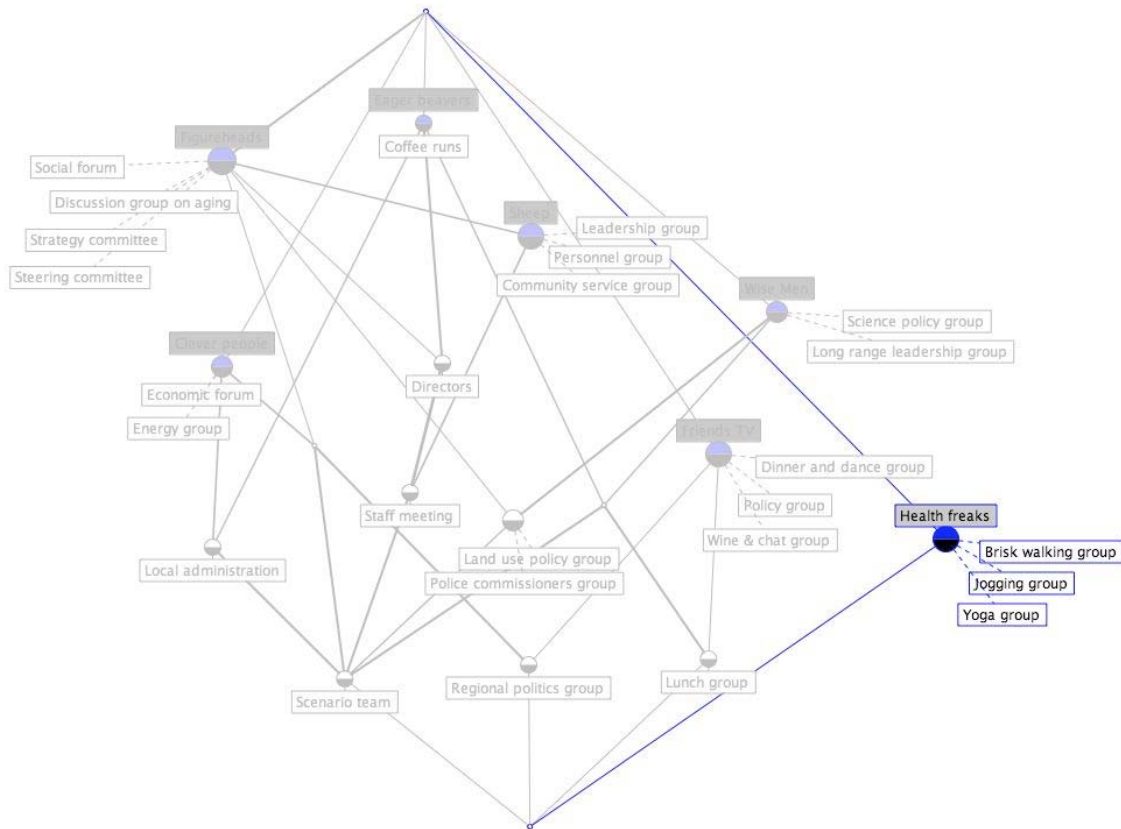
The "Health freaks" construct is completely disconnected from the rest of the lattice. (Quite a difference from the Tennis club in the first example.) Some other patterns are evident, as follows. The importance of conversation over food or drink is again apparent in the centrality of the "Lunch group." The "Policy group" might not be taken seriously, since its only link is to the "Friends TV" construct (referring to the television show). The cluster that begins with "Land use policy group" seems to show a tension between "Figureheads" (leading) and "Sheep" (following).

There are also some interesting patterns between the two divisional diagrams, besides the "Health freaks" difference. The two communities have some obvious construct-based analogues in the Sheep/Ants, Owls/Clever people, and Lion kings/Figureheads. This points to the possibility of creating multi-division or even multi-organization lattices that show attribute connections between the constructs of each community.

Ideas for further exploration

In the literature on the interaction between individual and collective perspectives on human identity and agency, a distinction between categorical identity (what you are) and relational identity (where you belong) is prominent. In general categorical identity is associated with individualism and connective identity is associated with collectivism. These are some of the manifestations of the distinction:

- Durkheim (1893) originally proposed the distinction between *mechanical* and *organic solidarity* in society. Mechanical solidarity is entirely relational and non-categorical (we are all the same, yet I know these people), while organic solidarity rests on what "organ" or type a person belongs to in society (I am a "lungs" person and thus I implicitly know all "lungs" people but not "heart" people).

- Stryker's (1987) definition of identity commitment differentiates between "interactional" commitment, or the number of relationships affected by whether an identity is kept or lost, and "affective" commitment, or the emotional cost involved in gaining or losing an identity. One of these effects connection, the other characteristics.

- Kashima et al. (2005) speak about the difference between the "true self" and the "self-in-context". The true self is seen as an invariant categorical type whose contextual variations are experienced as "not really me". In contrast, the self-in-context is seen as being both true *and* contextual — "there is a true self in every context" — meaning that relational aspects of identity predominate.

- Moody and White (2003) distinguish between "cohesive" groups formed through relationships among members and "adhesive" groups formed through identification of members with a central person or idea.

- This also relates to the difference between those who claim that a "personal identity" is required for a theory of identity and those who insist that it is not. A personal identity, like a "true self," is more likely to include categorical elements.

This dual perspective on identity has cultural repercussions. Quite a few researchers have found evidence that people raised in Western cultural backgrounds experience identity as based more on the categorical component, while Easterners experience identity as based more on the relational component. Ayyash-Abdo (2001) found relational/collectivist conceptions of identity predominating in Middle Eastern Muslim societies as well.

These views on the nature of identity are strongly correlated with cultural differences in beliefs about the importance and agency of individuals and collectivities, which has also been well explored (Kashima et al. 2004 is a good example). For these reasons Yuki (2003) argues that social identity theory is inadequate as an explanation for universal human identity processes, because it gives greater attention to category-based identification. For example, identity relevance changes as a concept if it has more to do with connections to people in a group than with characteristics of people in the group.

If people experience identity differently based on their cultural background (which may be much more varied than "Eastern" or "Western", and indeed that distinction has been shown to be over-simplistic), how will they respond to questions about the presence and interaction of collective identities? Does a method of asking questions about collective identities need to be aware of those differences?

Looking at the two previous practices of SNA for identities and abstractions, the first seems to address relational aspects of identity more, and the second categorical aspects. In combining these elements CNA balances both aspects; but it is conceivable that the results of CNA would be improved if there was a sort of matching between the cultural background of a question answerer and the questions asked. One possibility is to pre-test people who are about to respond to a SNA survey, ascertain whether they define themselves more categorically or relationally, and vary the questions they are asked in order to work most effectively with their prevailing concept of self.

Other considerations

These are some other scattered thoughts about asking people questions about collective behavior which may be useful for further elaboration of the basic ideas presented here.

- When people are asked to answer questions about a collective identity, a range of salience and relevance of that identity to the question-asking activity may be present. One could also envision a method of determining how salient an identity is to a person (at that moment and in that context) before asking the person to answer questions about it. When people say things like, "This doesn't seem the time or place to talk about this" it is an indicator that there is a salience/relevance mismatch between the identity being considered and the context. Asking questions about varied identities might require varied methods of asking, even simple variations like the timing and surroundings of the question asking.
- The situation of question-answering itself is more relevant to some identities than to others. For example, if you ask someone how different identities relate and ask them to consider the point of view of the "research analysts" identity, they might answer the questions in a more careful way than they would if you asked them to come from the point of view of the "wine lovers group", since the identity of a researcher is heavily bound up in providing answers and opinions, but a wine lover's identity is not.
- It would also be useful to gauge the *commitment* of an individual to an identity they are describing, and use that to place their remarks into context. Descriptions, for example, of the community surrounding a city's symphony orchestra will be different depending on whether the respondent finds their work there central or peripheral to their overall identity.
- Several studies (for example Maddux and Yuki 2006) have showed that (again, acknowledging that these labels are too simple) Westerners tend to perceive the impact of individual actions as limited to a smaller group of people (and interestingly, to a smaller time frame) than people raised in an Eastern culture. For example, Westerners might see a tourist traveling in a war-torn area as courageous (and affecting no one) while Easterners might see them as recklessly endangering the welfare of others (who would be affected if they were kidnapped or hurt). Would different people answering questions about identity relationships consider different scales of community? Would different people find that different scales of identity resonate better than others? Would the identities they think of (or see expressed in narratives) vary based on these perceptions of connectedness? How would this affect the overall results of the SNA?
- Moody and White (2003) propose a measure of cohesiveness by how many people have to be removed before the group ceases to exist. Might identities might also have measures of cohesiveness or strength? And might measuring this be useful?
- Brown and Duguid (2001) mentioned the fact that people can't just assume an identity as an act of choice, but others have to recognize it and accept them in that identity. Might it be useful to have people *nominate* people who would be good representatives of each identity?

Conclusion

The goal of this research project was to explore the issue of how network analysis might operate not on individuals or groups but at the level of collective identity. The concept of a new type of network analysis I propose in this paper uses identity group constructs to complement the consideration of factual groups. Since construct-based groups work at a different level of

identification than factual groups, doing this reduces the likelihood that respondents will hide information in order to protect groups to which they belong. Factual-construct linkages can reveal more telling detail about collective behavior and identification than can attention to either type of group alone. CNA also replaces direct questioning with elicitation and interpretation of narratives. This creates a distancing effect that allows respondents to safely dig deeper into issues of identity — beliefs, expectations, values, feelings, unwritten rules — than is possible with direct questioning.

At the start of this paper I described three categories of network analysts described by Reymers (2002): quantitative (objective and positional), investigative (relational and behavior-based) and cultural (descriptive and metaphorical). I don't think the idea of CNA exactly matches any of these categories. It seems to include elements of all three. Cultural analysis is present in the metaphorical and multiple-perspective nature of emergent constructs. Investigative analysis is represented by the linkages between factual and construct-based groups and between narratives and their interpretations. Some aspects of CNA are quantitative as well, namely the consideration of patterns in hundreds or thousands of interpretations of narratives.

When the goal of exploration is surveying the landscape of identification, belief and collective behavior, CNA may be able to provide a bridge connecting Reymers' three types of network analysis. Its use of narrative distancing and construct-based abstraction can add perspective and meaning to quantitative approaches, and its consideration of quantitative patterns can add objectivity to cultural approaches.

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