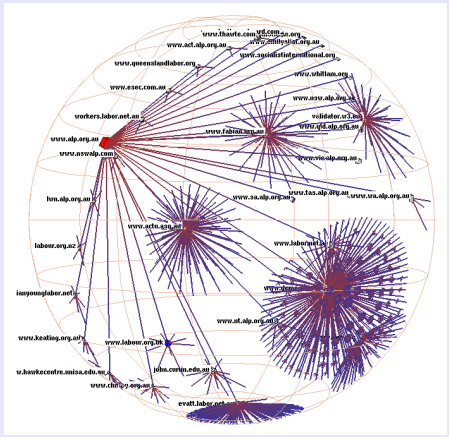
Online Collective Identity: The Case of the Environmental Movement



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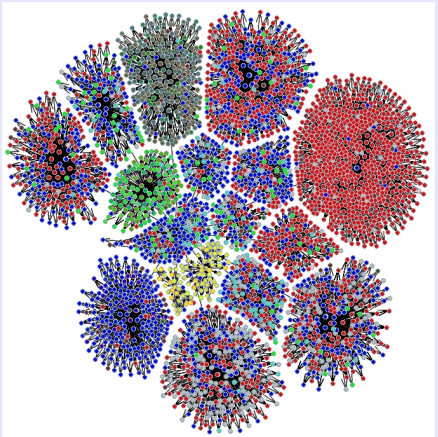

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Actors seeking social change

- Political scientists refer to them as *interest groups*
  - Olson (1965): collective action modeled as public good – free rider problem
- Sociologists label them *social movement organisations (SMOs)*. Two main approaches:
  - Resource Mobilisation (RM): rational actors engaged in strategic or instrumental behaviour e.g. forming alliances
  - New Social Movement theory (NSM): greater focus on expressive rather than instrumental behaviour (collective identity)
- Burstein (1998): from a theoretical and practical standpoint, little distinguishes SMOs from interest groups, and disciplinary boundaries are artificial.

- These actors make extensive use of the Internet for communicative and organisational purposes
  - Castells (2004): Internet enables values such as diversity, decentralisation and grassroots democracy – aligns well with ideological/organisational needs
  - Before rise of the Internet, institutional contexts in which collective identity is created were characterised as “free spaces” (Evans and Boyte, 1986), “sequestered social sites” (Scott, 1990)
  - Internet is clearly such a “protected site” and social movements swim on the Internet “like fish in water” (Castells, 2004)

This paper

- Joint with Mathieu O'Neil
  - available at http://voson.anu.edu.au
  - long history...first presented early variant at 2006 Sunbelt International Social Networks Conference
- Present conceptual framework for empirical analysis of online social movements
  - focus on hyperlinks and website text
- Use NSM approach (in particular Mario Diani)
  - argue that online behaviour of these actors is expressive rather than instrumental
  - different to other research on hyperlink networks (e.g. Shumate and Dewitt 2008) where online collective behaviour viewed as instrumental behaviour leading to the construction of “information public goods”

- Focus on unobtrusive research methods (analysis of digital trace data
  - Janetsko (2009) “...work centering around nonreactive [online] techniques more or less exclusively addresses visualization of phenomena that are perhaps not properly understood”
  - Hunt and Benford (2004, p. 414): social movement scholars studying collective identity typically “appear to take for granted [its] existence without offering compelling evidence that [it exists] outside the minds of the social movement analysts”
  - If belief systems of social movements have been institutionalised in the online environment, we should see evidence of this in digital trace data
- Application to data collected from 161 websites

Social movements

- Diani (2003) – social movement is grouping of actors who:
  - share a *collective identity*
  - exchange *practical* and *symbolic* resources through *informal* networks
  - engage in conflict or *competition* over a social problem
- In this paper, actors are *organisations* rather than *individuals*
  - but fairly loose definition as to what is an organisation

Collective identity

- Mutually agreed upon (and often implicit) definition of membership, boundaries, activities and norms of behavior used to characterize a grouping of actors
- Snow (2001, p. 2213): “...discussions of [collective identity] invariably suggest that its essence resides in a shared sense of 'one-ness' or 'we-ness' anchored in real or imagined shared attributes and experiences among those who comprise the collectivity and in relation or contrast to one or more actual or imagined sets of 'others'”

- Concept of **frame** is central to collective identity
- Goffman (1974, p.21): “schemata of interpretation” enabling individuals to “locate, perceive, identify and label” occurrences within their life and the wider world.
- By rendering events meaningful, frames function to organize experience and guide collective or individual action (Benford et al., 1986). They allow for a social problem to be legitimately identified and addressed, perhaps as the basis for future collective action.

Exchange of resources through informal networks

- **network**: set of nodes (or vertices) and a set of ties (or edges) indicating connections between the nodes.
  - **directed -** e.g. person x recommends person y, but person y may not recommend person x
  - **non-directed** - if person x has a familial relationship with person y, the converse must also be true
- **resources**
  - **practical** - can be valued or measured objectively e.g. money, members
  - **symbolic** – boundaries of inclusion/exclusion (connection to collective identity)

- **organizational practical exchange network:** directed network where ties between organizations reflect exchange of practical resources
  - e.g. Hoffman and Bertels (2007) build a network of board interlocks between the NGOs – reflect access to information and funding
- **organizational symbolic exchange network:** undirected network where ties between organizations reflect mutual recognition of shared characteristics and goals
  - Diani and Bison (2004, p.298) assessed whether the voluntary organizations in their study "...feel links to their partners ...[which] imply some kind of broader and long-term mutual commitment? Do they, in other words, share a collective identity?"

- **informal network**
  - evidence that network ties are easily reconfigured
  - network is fairly “horizontal” (not too centralized)
  - significant evidence of informal network tie formation, as identified using Exponential Random Graph Modeling (ERGM)

Definition of online social movement

- Set of websites of organisations who:
  - share a collective identity
  - exchange practical and symbolic resources via **hyperlink networks**
  - exchange symbolic resources via **online frame networks**
  - engage in competition over a social problem
- Key differences with model of offline social movement (e.g. Diani):
  - hyperlink and online frame networks (see below)
  - presence/absence of collective identity specifically tied to *structural signatures* of hyperlink and online frame networks

Hyperlink networks

- We do not contend that hyperlink networks proxy exchange of real-world resources (e.g. members, money), unlike exchange networks studied by Diani & Bison (2004), Hoffman & Bertels (2007).
- Some authors (more in economics?) model hyperlinks as facilitating exchange of information
  - e.g. if site A hyperlinks to site B, there is information flow from B to A
- With SMOs two types of resource are exchanged in hyperlink networks:
  - **Index authority** (practical resource) – this is what a website gets when other relevant sites link to it
    - inbound links from relevant sites translate to higher ranking in search engine indexes and hence greater online visibility
  - Symbolic resource that helps establish “boundaries of belonging” - “you are who you link to”

- Importantly, we regard that even the exchange of the practical resource (index authority) reflects expressive rather than instrumental behaviour and hence relates to collective identity formation
  - hyperlinking gives index authority to the linkee, not the linker
  - but won't act of website x directing link to another organisation with shared goals result in direct benefit to x, and thus be act of instrumental behaviour?
    - Expressive voting (e.g. Brennan and Hamlin 1998): to the extent that hyperlinking can be seen as contributing to an outcome (i.e. particular viewpoint having index authority), web is vast and a single hyperlink (a single “vote” made by an organisation) has infinitesimal impact. This behaviour is expressive (similar to "cheering at football").

Online frame networks

- Our use of frames draws from “semantic networks” studied in organisational science
  - network concepts used to understand organizational linkages based on shared interpretations (Monge and Eisenberg, 1987; Stohl, 1993)
- **online frame network**: undirected network where the nodes represent organisations and ties represent mutual use of a particular “frame component” (word or term that is part of a frame)
  - e.g if organization x and organization y both use the frame component “frankenfood” on their website then there will exist an (undirected) tie between the two organizations in the online frame network.
- frame components are detected using machine learning technique (support vector machine)

Online collective identity

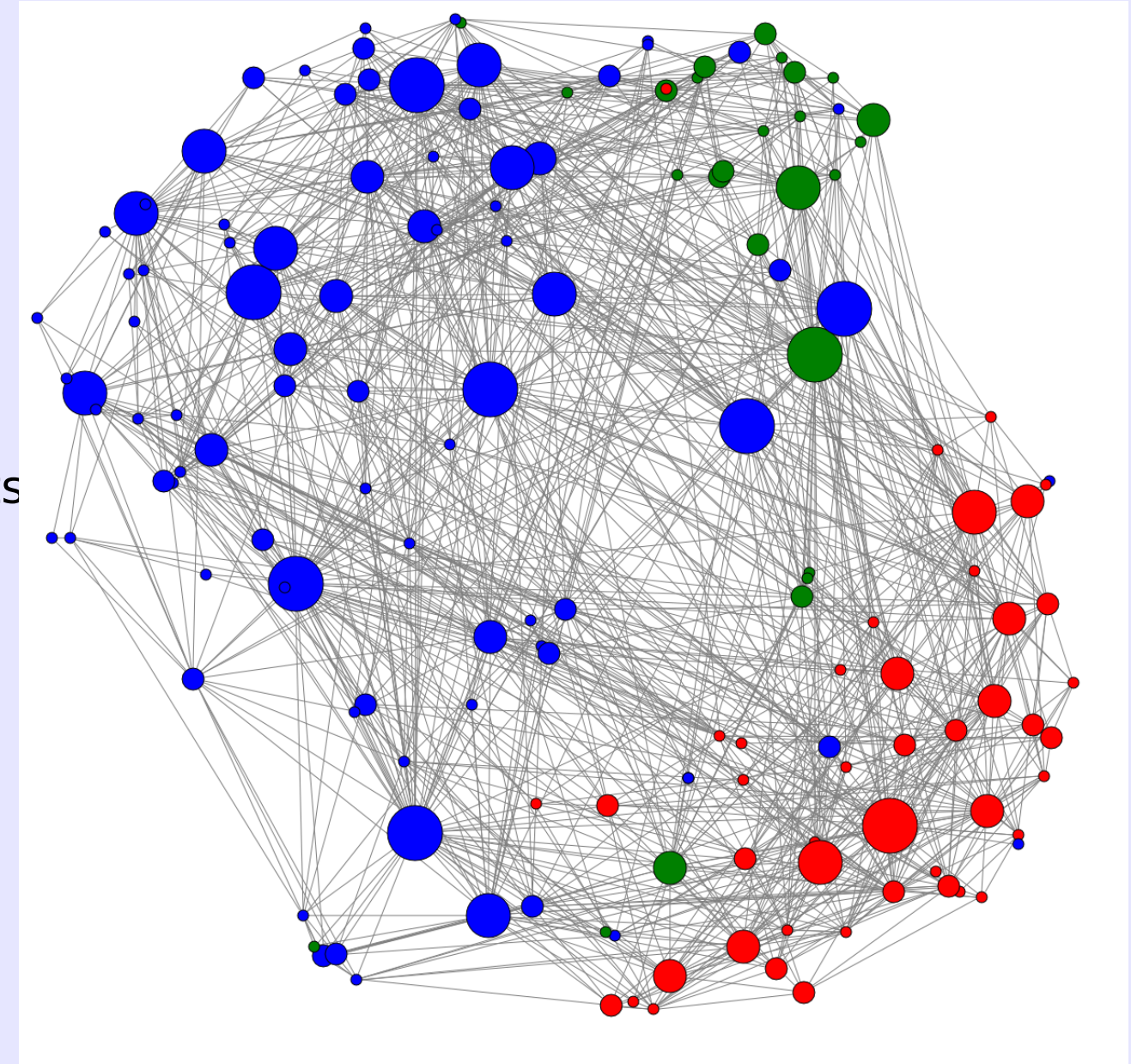
- A given set of websites run by organisations engaged in competition over a social problem can be regarded as an *online social movement* if the hyperlink and online frame networks exhibit particular *structural signatures* (identified using ERGM) of *online collective identity*
  - hyperlink network: (1) exhibits significant **informal/endogenous** or "purely structural" network effects; (2) exhibits significant **homophily** actor-relation network effects (on the *identity* attribute)
  - online frame network: exhibits significant homophily actor-relation network effects (on the *identity* attribute)
  - structural signatures of collective identity are qualitatively different between hyperlink and online frame networks
    - "boundaries of belonging" stronger in hyperlink network (reflects more conscious/intentional expressive behaviour)

Empirical application

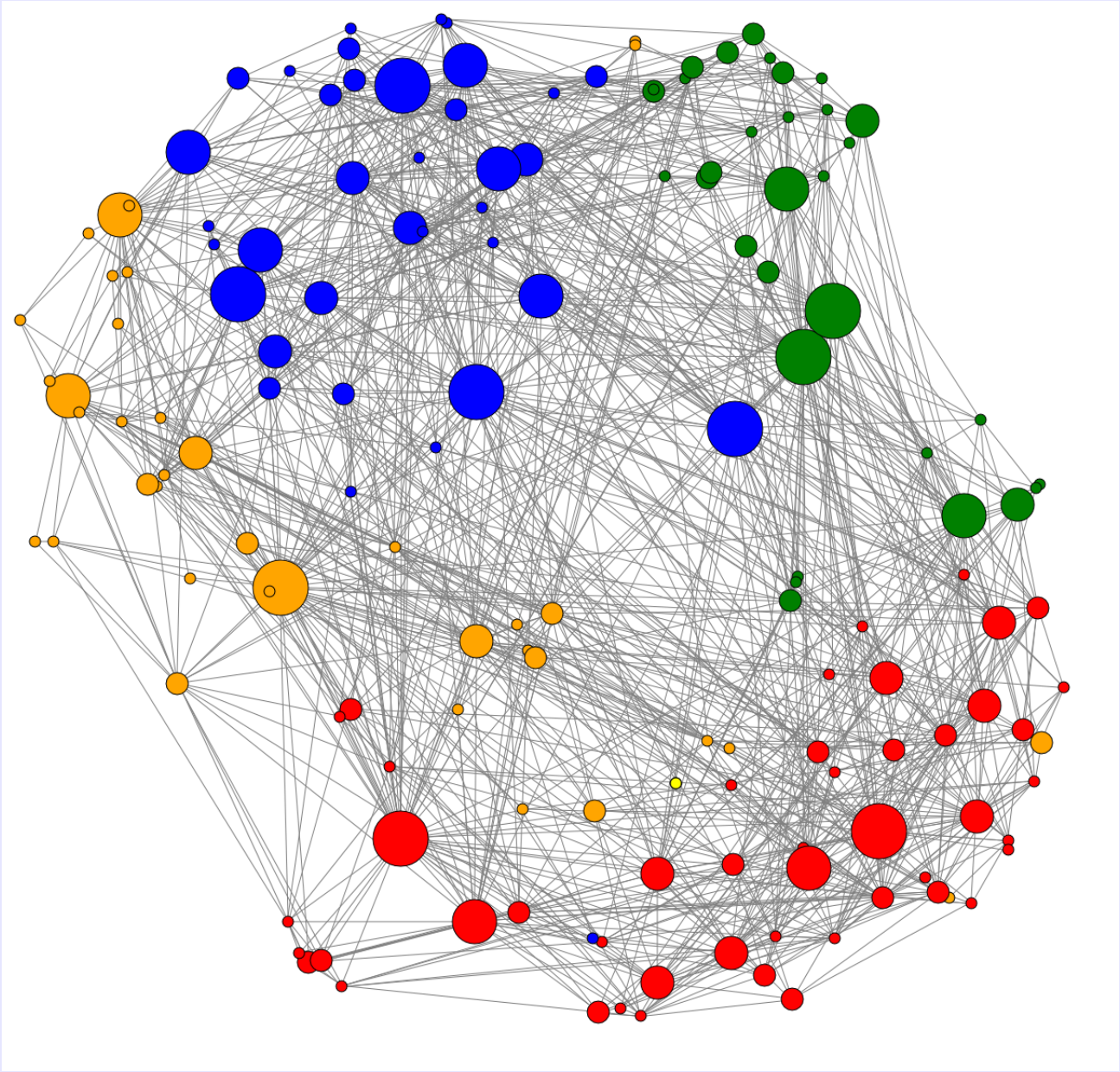
- Used VOSON software to collect data from 161 environmental activist websites in March 2006.
  - websites (“seed sites”) identified using combination of search techniques proposed for researching "issue networks" (Rogers and Zelman, 2002).
- Automatically collected data:
  - Hyperlink data - web crawler used to find hyperlinks between seed sites
  - Text data - collected meta keywords from homepages of seed sites
    - data preparation: synonyms, capitalization, stemming

- This empirical application focuses on collective identity at the sub movement level
- Manual coding of site attributes
  - Hypothesised sub-movements: “Globals” - climate change, forest/wildlife preservation, nuclear weapons, sustainable trade (89 sites); “Toxics” - pollutants, environmental justice (26 sites); “Bios” - genetic engineering, organic farming, patenting issues (46 sites)
  - Country of origin: US-based (72), UK (2), rest from 24 other countries
  - Geo-political north/south classification (e.g. Shumate and Dewitt 2008)

- Hyperlink network FDG map
- node colour reflecting hypothesised sub movements
- Bios (red), Globals (blue), Toxics (green)



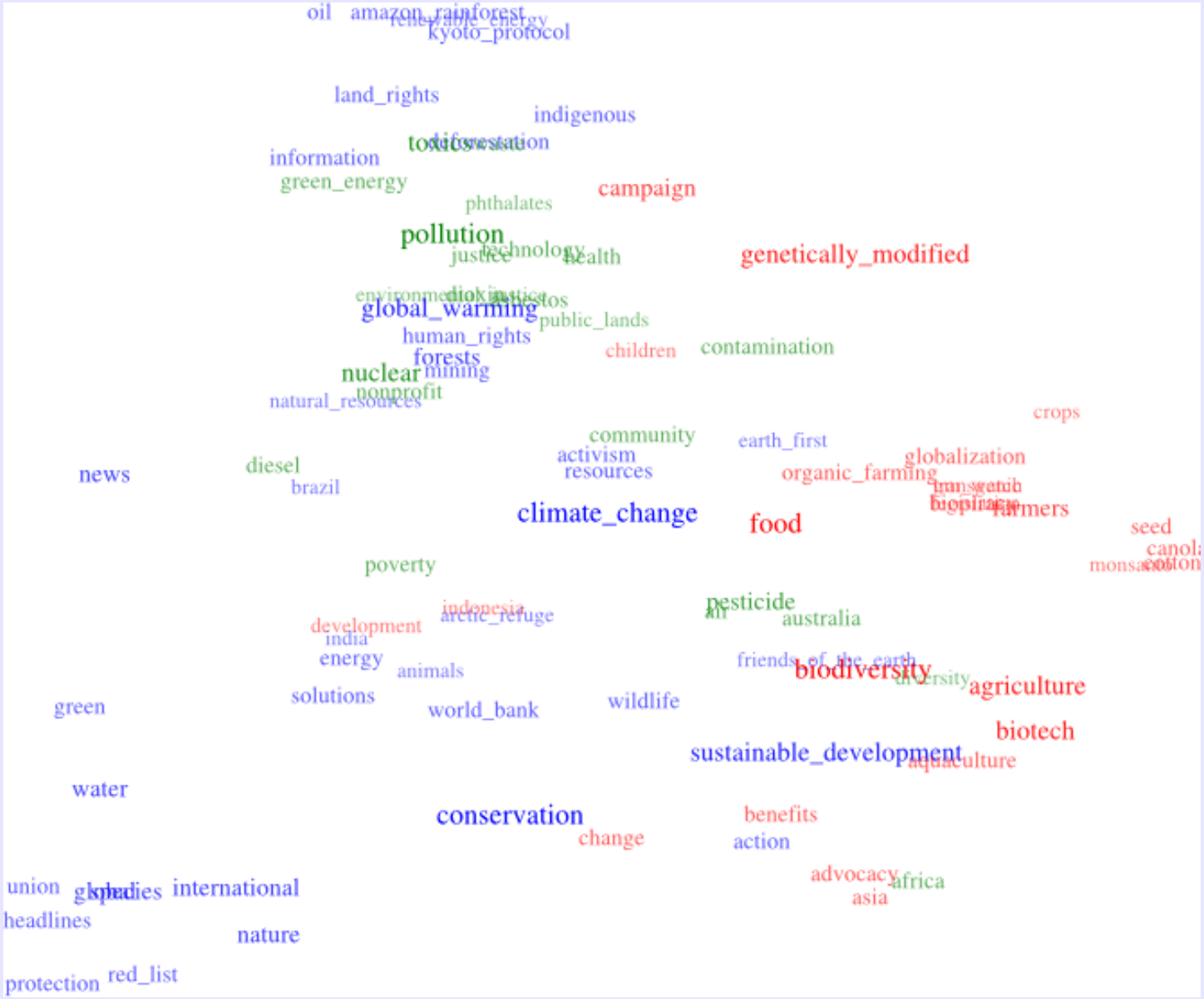
- Hyperlink network FDG map
- node colour reflecting modularity clusters (Newman and Girvan 2004)



Meta keywords - frequencies

Bio	Global	Toxic
genetically modified:67, biotech:14, food:14, farmers:9, environment:9, agriculture:7, biodiversity:6, organic farming:6, sustainable development:4, biopiracy:4	environment:42, climate change:14, conservation:11, sustainable development:10, nuclear:10, global warming:8, pollution:7, genetically modified:7, forests:6, news:6, activism:6, green:5, biodiversity:4, globalization:4, nature:4, wildlife:4, greenpeace:4, species:4, food:4, resources:3, kyoto protocol:3, energy:3, headlines:3, human rights:3, global:3, water:3, international:3, wwf:3, indigenous:3, download:3, dam:3, natural resources:3,	pesticide:16, environment:15, toxics:10, chemicals in the environment:6, nuclear:5, pollution:5, pan:3, nonprofit:3, biotech:3

Concept map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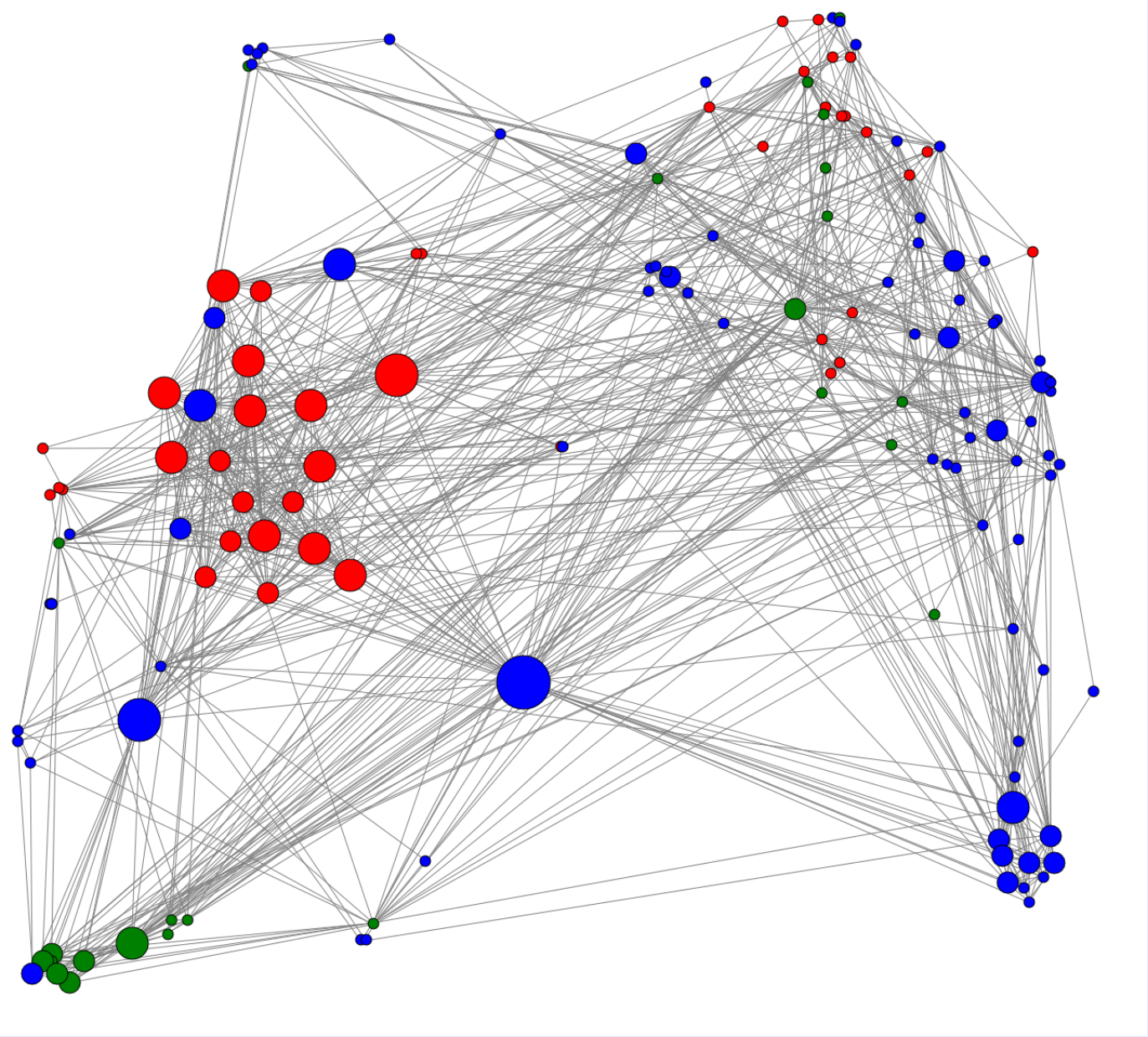
Support Vector Machines (SVM)

- Supervised learning for classification & regression
  - Classification involves “training” and “testing” data.
  - Each observation (“instance”) contains a “class label” (dummy variable indicating Global/Toxic/Bio) and a number of “attributes/features” (dummy variables indicating presence/absence of meta keywords).
- SVM produces a model which predicts class labels of observations in testing set, when given only the attributes.
  - given only knowledge of meta keywords, predict whether site is Global/Toxic/Bio
  - identification of attributes with best predictive power
- Used libSVM (http://www.csie.ntu.edu.tw/~cjlin/libsvm/)
  - Meta keywords with best explanatory power: genetically modified, toxics, food, pesticide, conservation

- Online frame network FDG map
- node colour reflecting hypothesised sub movements



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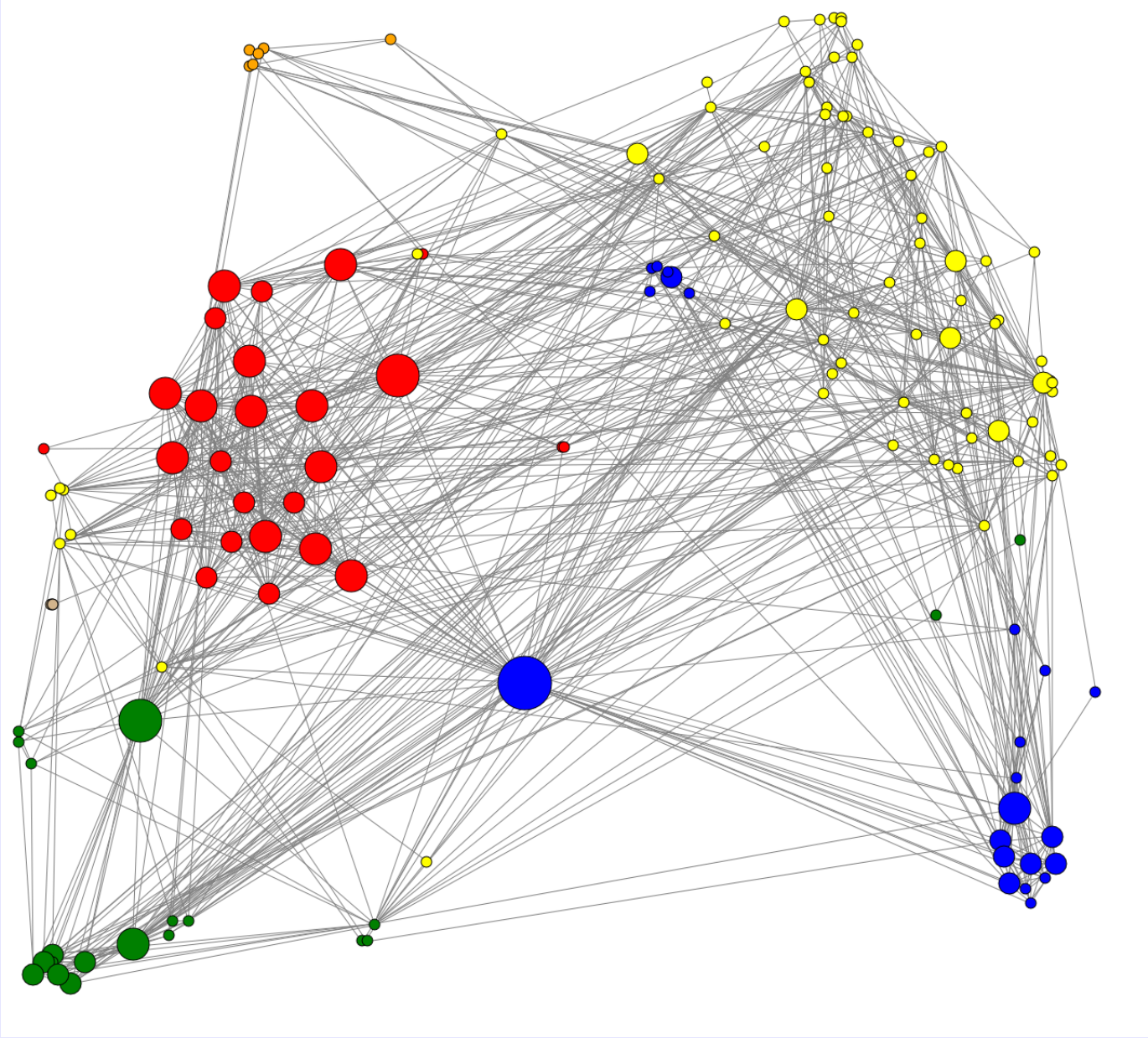

Exponential Random Graph Model

- Use ERGM to statistically “unpack” hyperlink and online frame networks
  - what social forces led to emergence of particular network?
- ERGM determines likelihood of observed network having emerged, out of all possible networks that could have been formed by a random assignment of the observed number of ties across the observed nodes.
- Two categories of network effects (or network parameters):
  - purely structural network effects - network ties that arise from forces unrelated to attributes of actors (such as social convention or norms)
  - actor-relation network effects - network ties that arise as result of attributes of actors sending or receiving the ties.

- Main conclusion from analysis (ERGM and descriptive):
  - Statistically significant homophily (over hypothesised sub-movement classification) in both hyperlink and online frame networks
  - Greater degree of closeness between Bios and Toxics on basis of (unconscious) frame collective identity, compared with intentional expressive proximity displayed in hyperlink network
    - “boundaries of belonging” are stronger in hyperlink network, compared with online frame network
    - existence of “structural hole” (Burt 1992) between Bios and Toxics in hyperlink network, which is not evident in online frame network – possibly evidence that class distinctions are playing a role in structuring the online collective identities of activist networks

Conclusion

- Conceptual framework for empirically studying online social movements
- For a set of websites *hypothesised to represent various social (sub)movements*, provides empirical test of existence of online collective identity at the sub-movement level
  - test involves identification of homophily in hyperlink and online frame networks
- Approach still involves manual classification of websites into social (sub) movements
  - but provides test of validity of that classification
  - allows for empirical comparisons across movements, countries and over time.
  - allows for establishment of empirical boundaries to various network metrics that indicate presence or absence of online collective identity