The social transformation and your role in it

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Models of people matter

- Models of social phenomena are social theories
- Social theories matter because they influence how we interpret things and hence act
- So models change, not only reflect, the world
- Models influence the design of systems that change things
- You are already using social models

Quote:

"The ideas of economists and political philosophers, both when they are right and when they are wrong, are more powerful than is commonly understood. Indeed the world is ruled by little else. Practical men, who believe themselves to be quite exempt from any intellectual influence, are usually the slaves of some defunct economist."

John Maynard Keynes (English economist, journalist, and financier, 1883-1946)

Quote:

"It is not from the benevolence of the butcher, the brewer, or the baker that we expect our dinner, but from their regard to their own interest. We address ourselves, not to their humanity, but to their self-love, and never talk to them of our own necessities, but of their advantages."

Adam Smith (Scottish economist and philosopher, 1623-1790)

Quote:

"The philosophers have only interpreted the world, in various ways. The point, however, is to change it."

"From each according to his abilities, to each according to his needs."

Karl Heinrich Marx (German political philosopher, political economist, and social theorist, 1818-1883)

Quote:

"during the time men live without a common power to keep them all in awe, they are in that condition which is called war; and such a war as is of every man against every man."

Thomas Hobbes (English philosopher 1588-1679)

Quote

"I made a mistake in presuming that the self-interests of organisations, specifically banks and others, were such that they were best capable of protecting their own shareholders and their equity in the firms."

Alan Greenspan (American economist 1926-)

Individualism v. Collectivism

- In socio-economic systems individual interests may conflict with collective interests:
  - e.g. over exploitation of a common resource (a river, a field, the atmosphere etc.)
  - e.g. banks - lending (to those who they know can not repay) to gain a commission by selling on the debt to other banks
  - e.g. P2P file sharing system - downloading more than uploading

Individualism v. Collectivism

- Consider a P2P file sharing system:
  - It is in the *collective interest* for all to upload to others so everyone gets the file quickly
  - But it is in the *individual interest* to save bandwidth by only downloading and hence free-riding on others
  - Free-riding (or free-loading) is a perennial problem in P2P file-sharing systems
  - Any efficient system needs to tackle it in some way

The tragedy of the commons

- These kinds of situations have been termed "commons dilemmas" or "common pool resource dilemmas"
- Called "dilemmas" because we would all be better off if we "did the right thing" but there is an individual incentive to do the wrong thing
- G. Hardin (1968) summarized the issue in his famous paper: "The *Tragedy of the Commons*"

How to avoid the commons tragedy?

- Central enforcement of correct behaviour (top down)
  - require beneficent centralised agencies and policing
  - ability to identify and track individuals centrally
  - Who polices the police?
  - Absolute authority of the monarch - Hobbs
- Decentralised methods (bottom up)
  - incentives for cooperation based on individual self-interest
  - Complete individual autonomy
  - The market – Smith / Nash equilibrium (game theory)

What is game theory?

- Way to mathematically analyse games assuming we know:
  - number of players
  - possible moves they can make (strategies)
  - outcome of game based on players moves (pay-off)
  - desirability of game outcomes for each player (utility)
  - the players are “rational”, “homo-economicus” agents

Game theory comes with a whole set of assumptions

- Developed as a response to the problem of the cold war within RAND corporation
- Assumes extremely selfish and non-communicating agents
- And extremely intelligent and well informed agents – “rational fools”
- Nice solution concepts elegant mathematics
- Losing credibility in economics (my opinion)

Top down

- Requires commitment to central plan decided in advance and imposed
- Specification of correct behaviour decided remotely in space and time
- Limits autonomy of individuals
- Tendency to treat individuals as homogenous applying universal laws
- A “social contract” exists

Bottom-up

- Assumes agents know what they want
- Don’t care what others want
- Can determine the best way to get it
- no communication
- no coordination
- no constraints on autonomy
- Tendency to treat agents as homogenous
- An incentive structure exists

Combining top-down/bottom-up

- In the real world often both extremes fail
- Hence often find mixtures of the two where top-down imposes the "incentive structure" for bottom-up activity e.g.:
  - "carbon trading"
  - "target based public services"
- But still suffers from top-down problems pushed into "creating the right incentives"

Combining top-down/bottom-up

- Another way is through the bottom-up creation of top-down (like) constraints on bottom-up interaction
- Self-organised groups create norms, structures and institutions which influence individual behaviour e.g.:
  - Stigmergic behaviour in ants (minimal)
  - Group selection, self-organised CPRG groups
  - Wikipedia, open source?

Stigmergy

"Stigmergy is a mechanism of indirect coordination between agents or actions. The principle is that the trace left in the environment by an action stimulates the performance of a next action, by the same or a different agent. In that way, subsequent actions tend to reinforce and build on each other, leading to the spontaneous emergence of coherent, apparently systematic activity."

Wikipedia

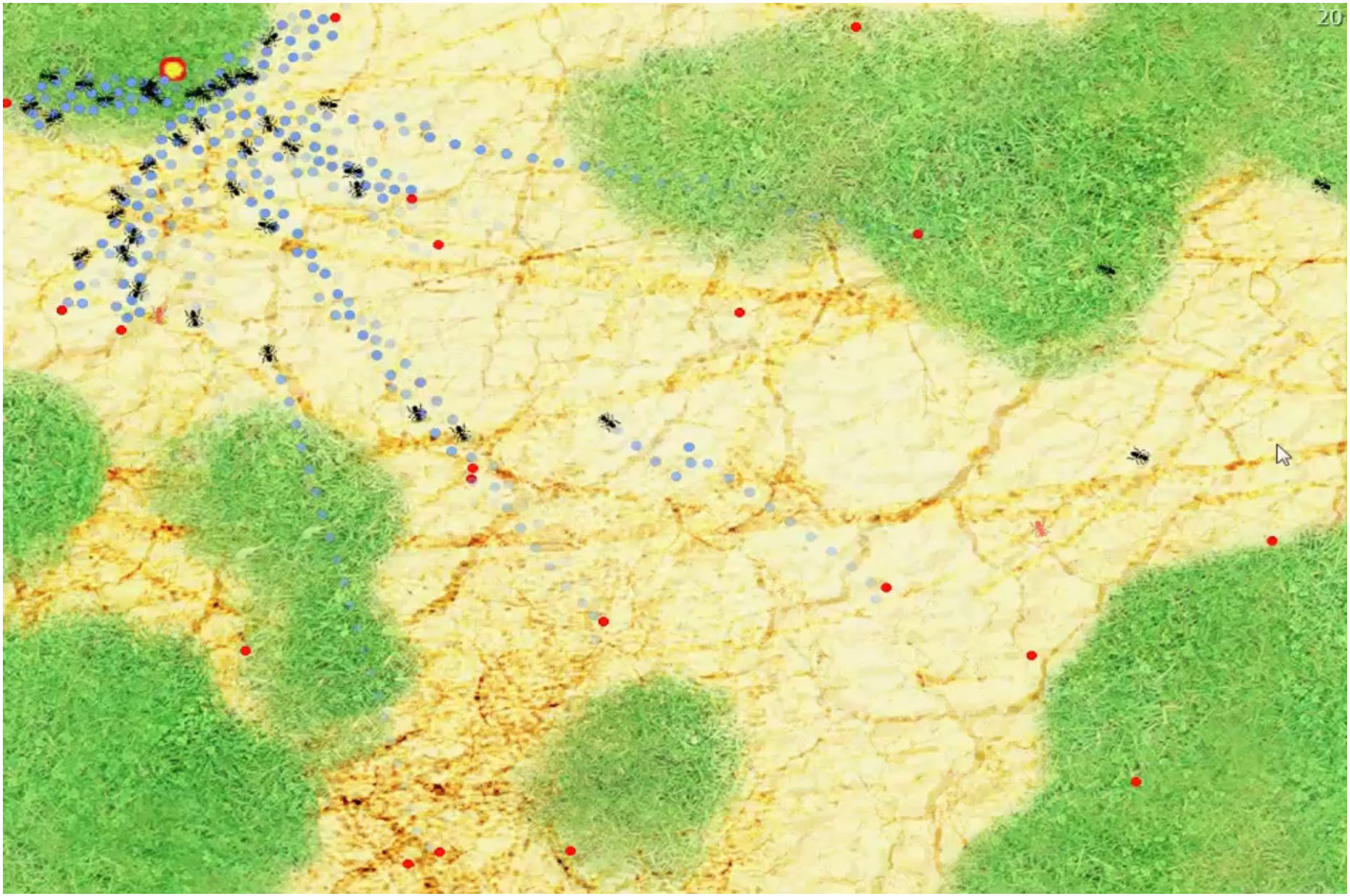
Stigmergic ant foraging

- Consider a colony of ants
- They need to find resources and bring them back to the nest
- New resources may appear and old ones may disappear
- Individual ants may disappear (die)
- How to organise efficient logistics under these difficult conditions without central planning?

Stigmergic foraging

- Consider each ant follows this simple rule:
  - Leave nest and wander around randomly
  - If you detect a pheromone trail then follow it
  - If you bump into a resource
    - Pick it up
    - Deposit a pheromone trail behind you
    - Go back to nest
- The pheromone trail is a signal left in the environment that other ants can follow
- Over time it dissipates away leaving no trace

Stigmergic ant foraging



Governing the commons - Elinor Ostrom 1990

Ostrom identifies eight "design principles" of stable local common pool resource management:

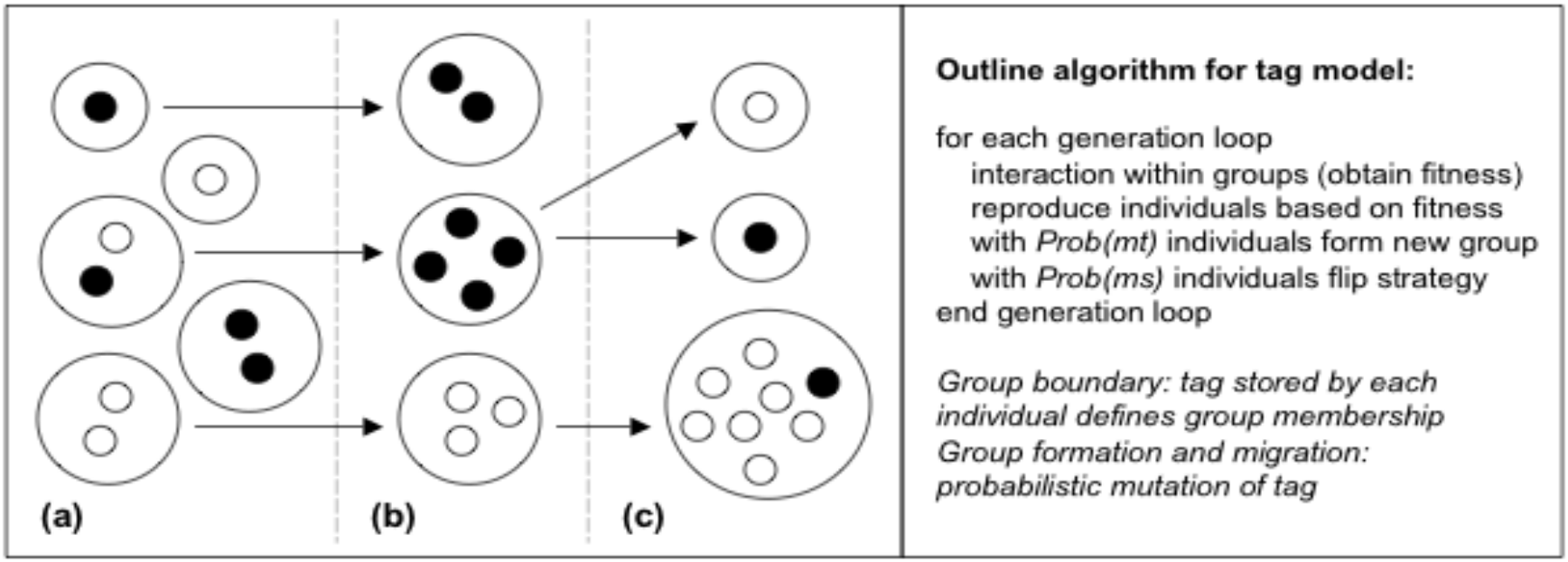
1. Clearly defined boundaries (effective exclusion of external unentitled parties);
2. Rules regarding the appropriation and provision of common resources are adapted to local conditions;
3. Collective-choice arrangements allow most resource appropriators to participate in the decision-making process;
4. Effective monitoring by monitors who are part of or accountable to the appropriators;
5. There is a scale of graduated sanctions for resource appropriators who violate community rules;
6. Mechanisms of conflict resolution are cheap and of easy access;
7. The self-determination of the community is recognized by higher-level authorities;
8. In the case of larger common-pool resources: organization in the form of multiple layers of nested enterprises, with small local CPRs at the base level.

Group Selection Models

- Recent models of “group selection”
- Based on individual selection
- Producing dynamic social structures
- Limit free-riding
- Increasingly group-level performance
- Don’t require reciprocity
- Could be very useful in P2P

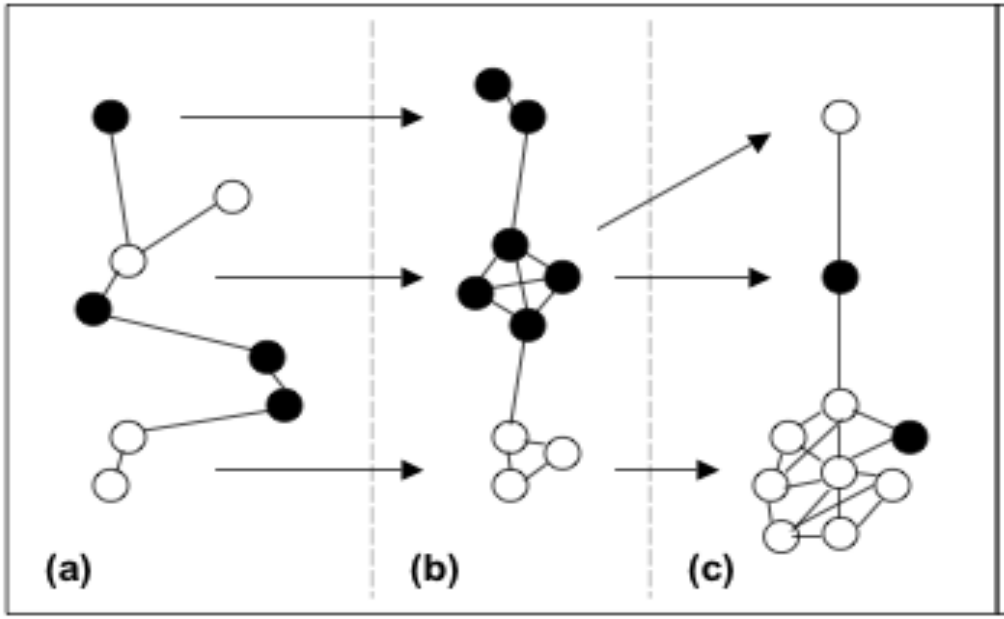
Evolutionary Group Selection Models

- *Group boundary* - a mechanism which restricts interactions between agents such that the population is partitioned into groups
- *Group formation* - a process which forms groups dynamically in the population
- *Migration* - a process by which agents may move between different groups
- *Conditions* - cost / benefit ratio of individual interactions and other conditions which are sufficient for producing group-level selection



Schematic of the evolution of groups in the tag model. Three generations (a-c) are shown. White individuals are pro-social (altruistic), black are selfish. Individuals sharing the same tag are shown clustered and bounded by large circles. Arrows indicate group linage. When ***b*** is the benefit a pro-social agent can confer on another and ***c*** is the cost to that agent then the condition for group selection of pro-social groups is: ***b > c and mt >> ms***

Riolo, Axelrod, Cohen, Holland, Hales, Edmonds…



Outline algorithm for network model:

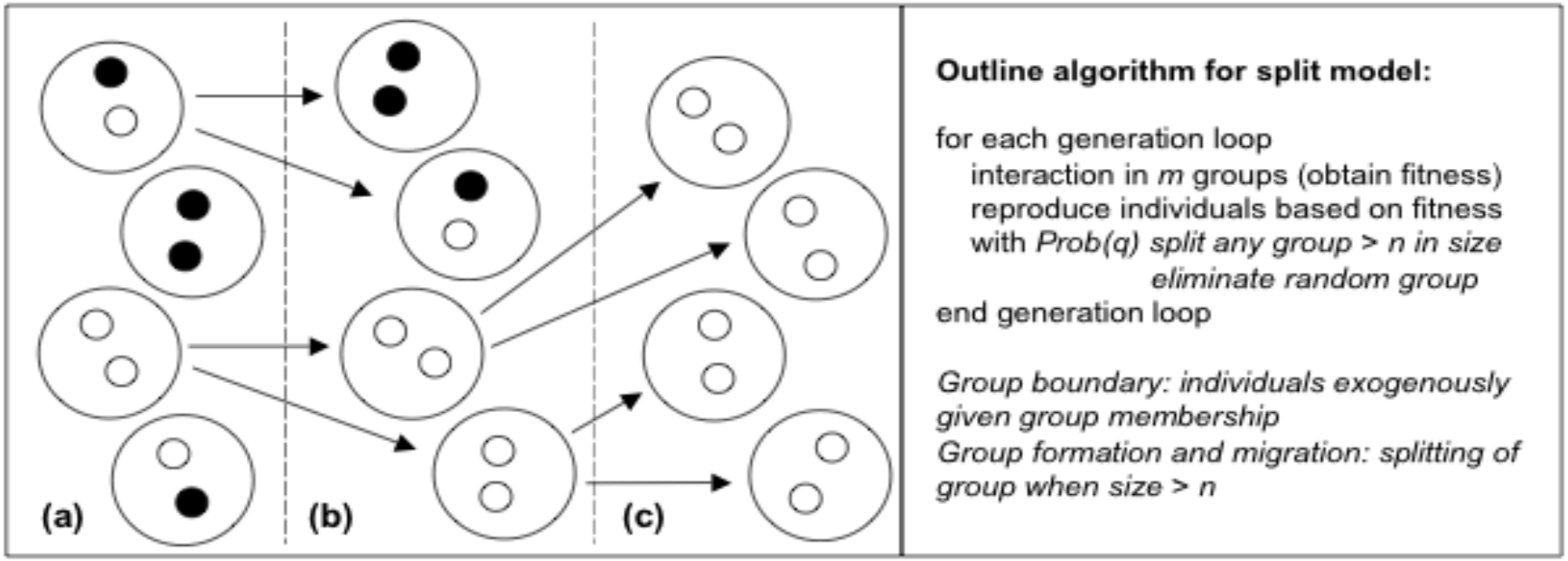
for each generation loop
interaction within groups (obtain fitness)
reproduce individuals based on fitness
with *Prob(t) copy new links*
with *Prob(mt)* individuals form new group
with *Prob(ms)* individuals flip strategy
end generation loop

Group boundary: individuals directly linked in the network
Group formation and migration:copying of links probabilistically

Schematic of the evolution of groups in the network-rewire model. Three generations (a-c) are shown. Altruism selected when:***b > c and mt >> ms.*** When ***t = 1***, get disconnected components, when ***1 > t > 0.5***, get small-world networks

Hales, D. & Arteconi, S. (2006) Article: SLACER: A Self-Organizing Protocol for Coordination in P2P Networks. IEEE Intelligent Systems, 21(2):29-35

Santos F. C., Pacheco J. M., Lenaerts T. (2006) Cooperation prevails when individuals adjust their social ties. PLoS Comput Biol 2(10)



Schematic of the evolution of in the group-splitting model. Three generations (a-c) are shown. Altruism is selected if the population is partitioned into ***m*** groups of maximum size ***n*** and ***b / c > 1 + n / m.***

Traulsen, A. & Nowak, M. A. (2006). Evolution of cooperation by multilevel selection. Proceedings of the National Academy of Sciences 130(29): 10952-10955.

SLAC: Network re-wire P2P model

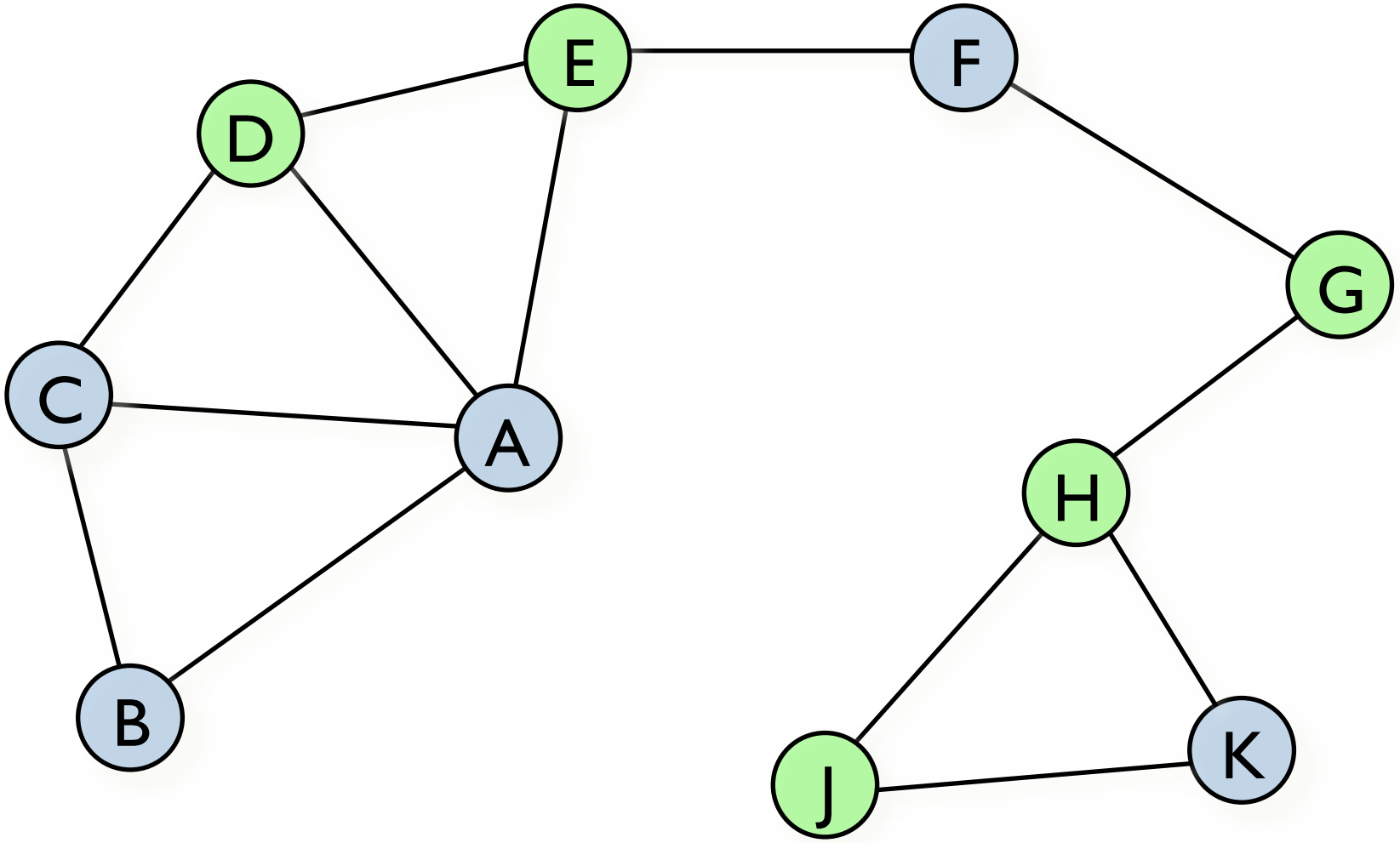
- Agents = nodes in a P2P overlay network
- Each node links to some neighbors (view) in overlay
- Assume:
  - Interaction between neighbors to achive some application task
  - Behavior: Application behavior (i.e. share files or leech files, cooperate or defect)
  - Utility: Evaluated at application level (i.e. number of files downloaded, performace metric)

SLAC algorithm

Each node *p* periodically executes the following:

q = SelectRandomPeer()
if $\text{utility}_q > \text{utility}_p$
    drop all current links
    link to node *q* and copy its strategy and links
    mutate (with low probability) strategy and links
fi

SLAC: “Copy and Rewire”



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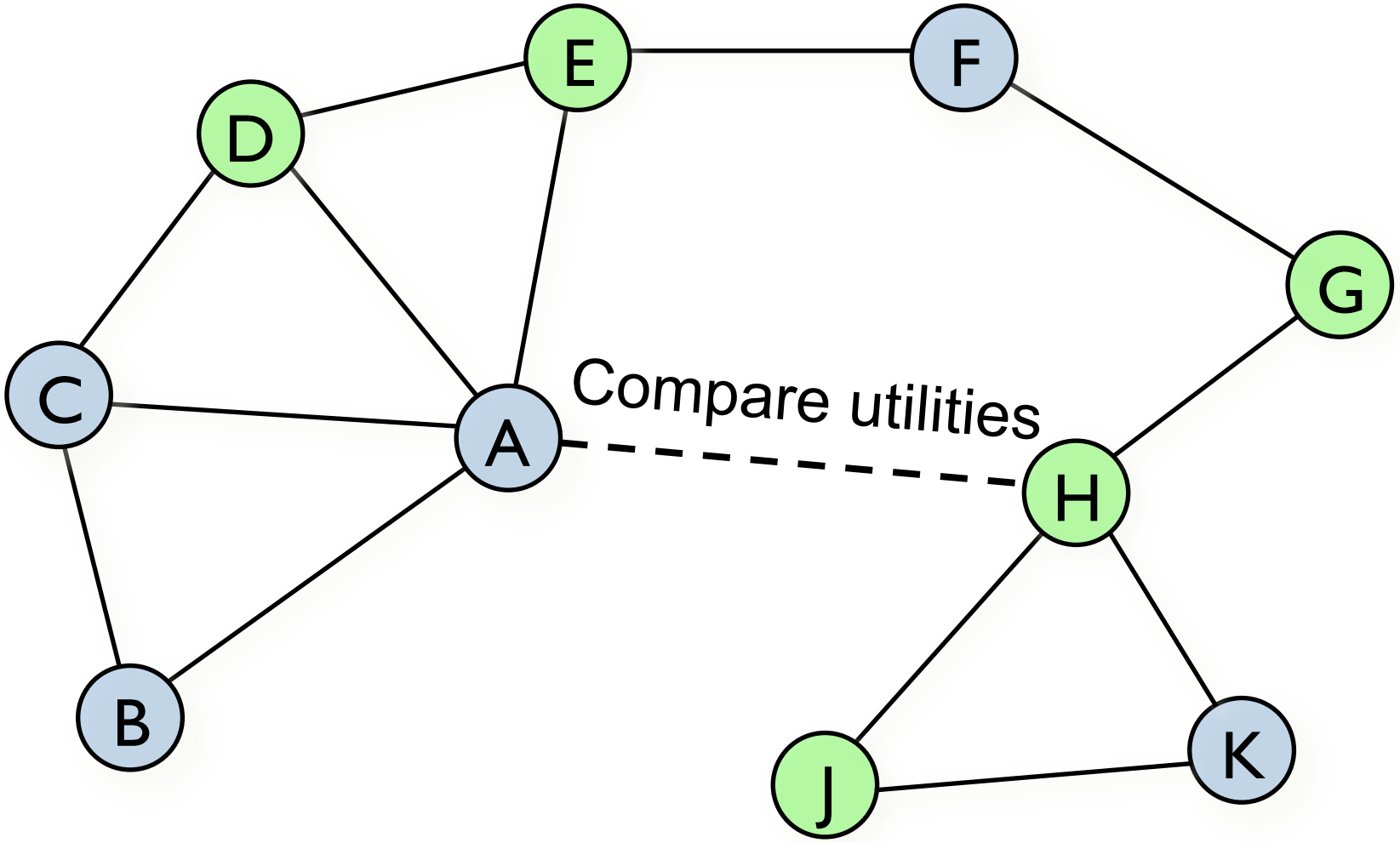

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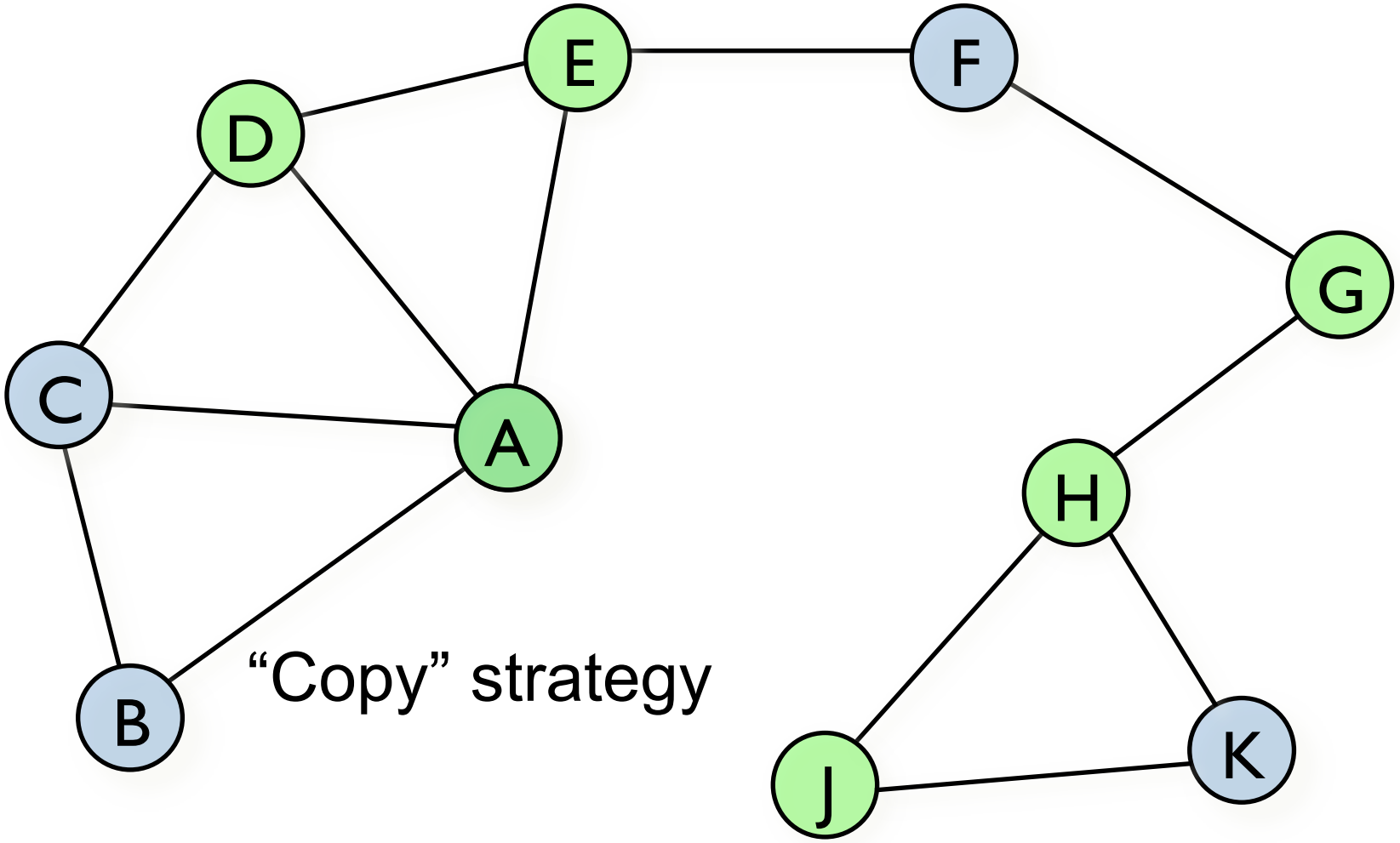

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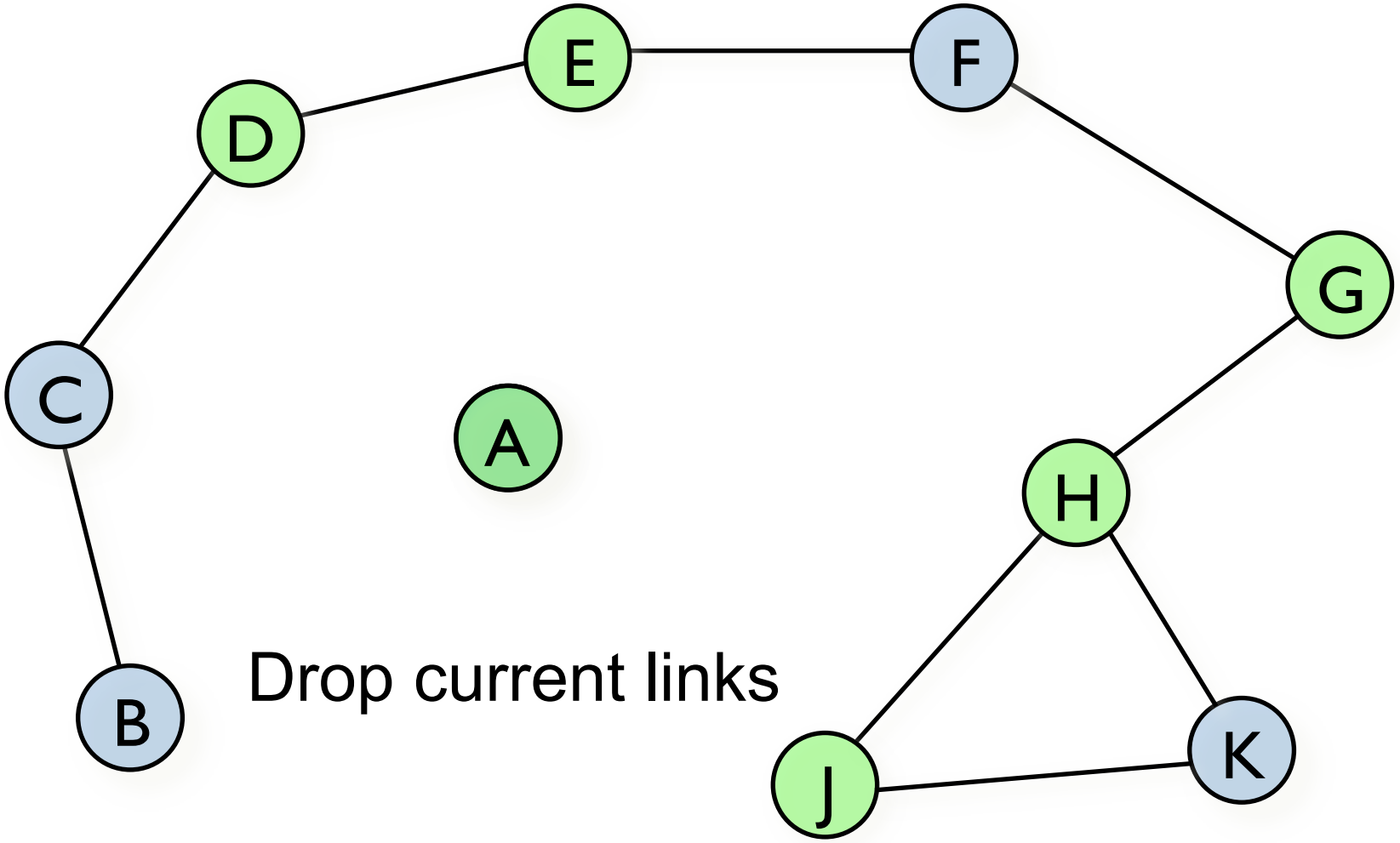

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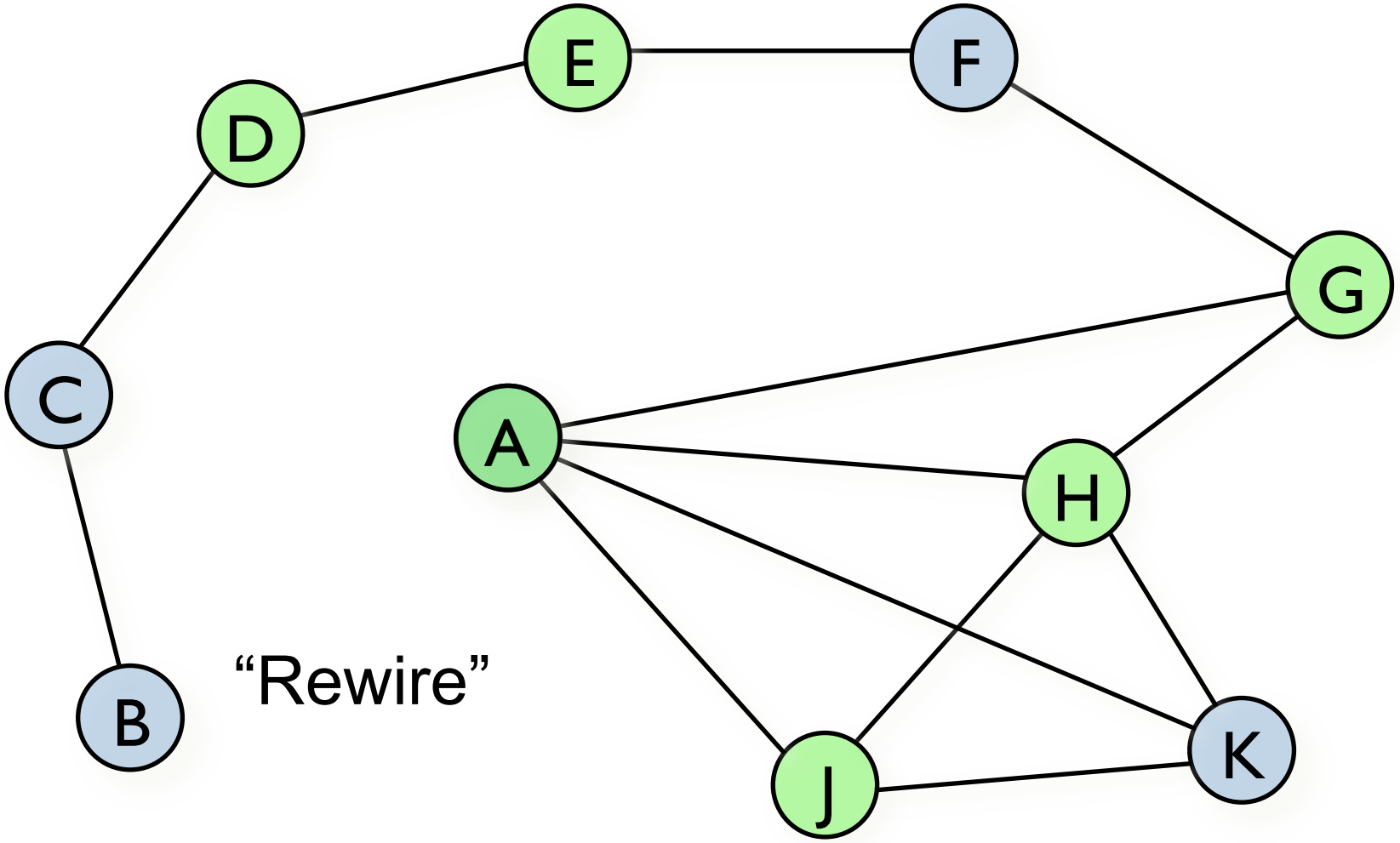
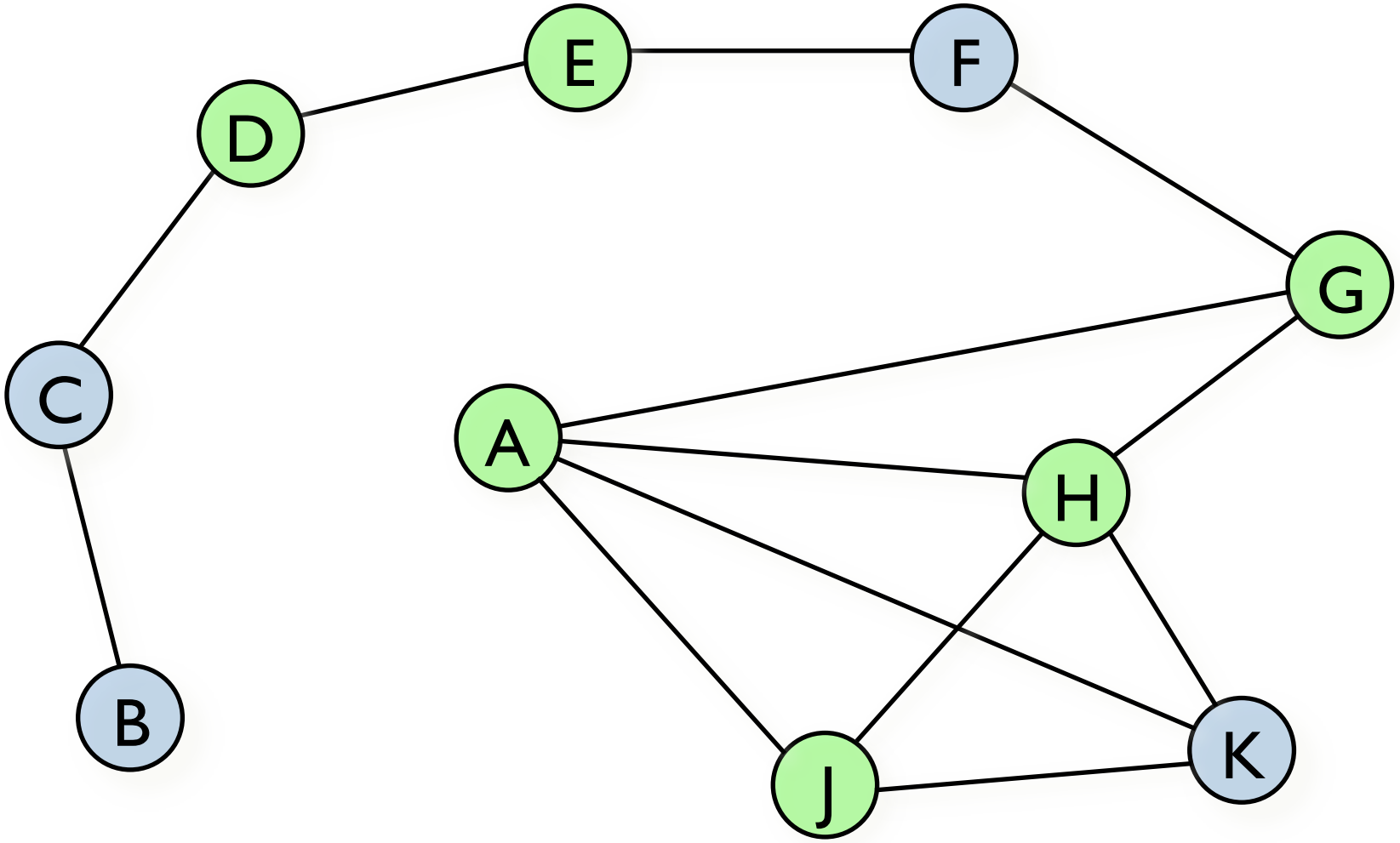


SLAC: “Mutate”



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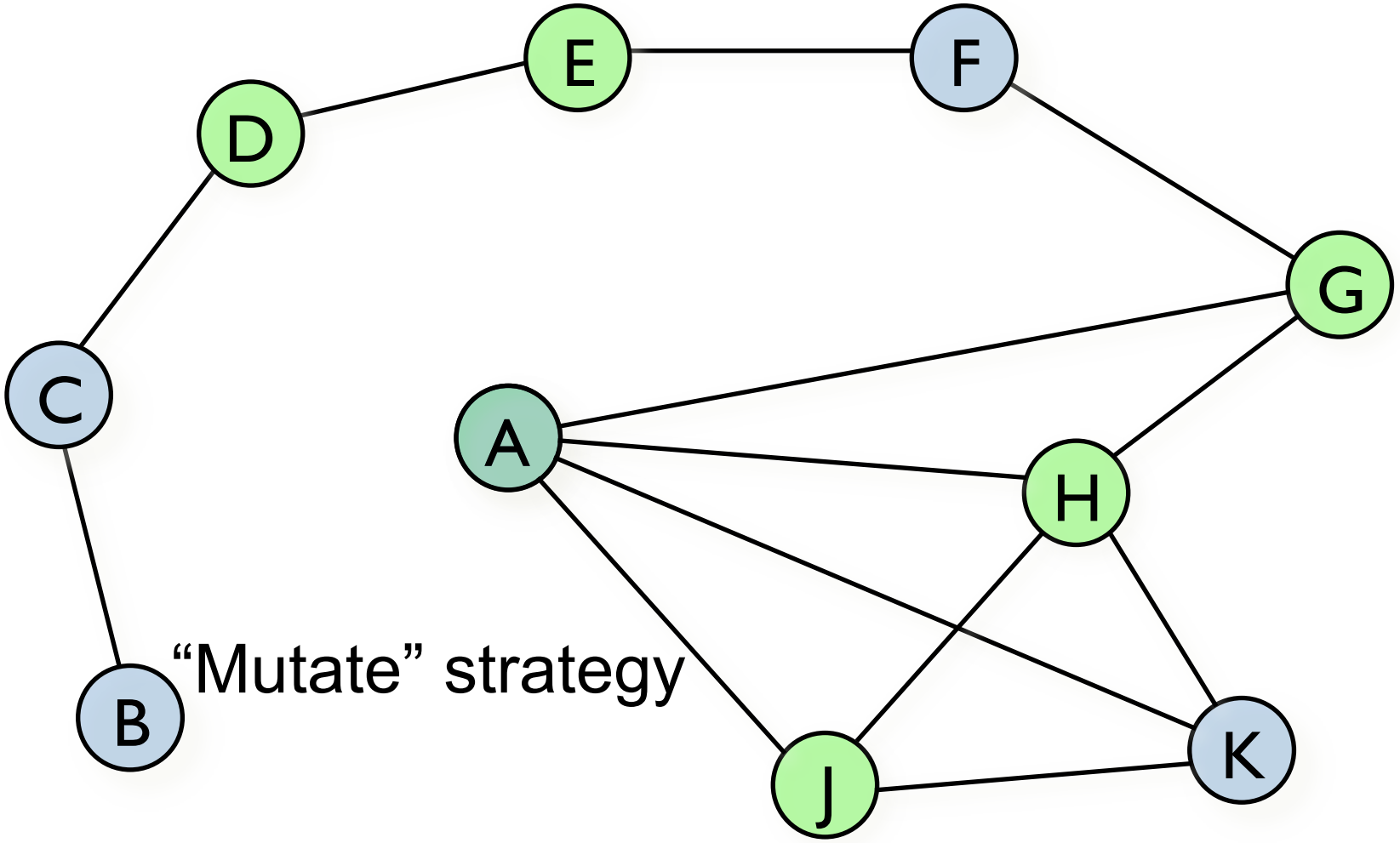

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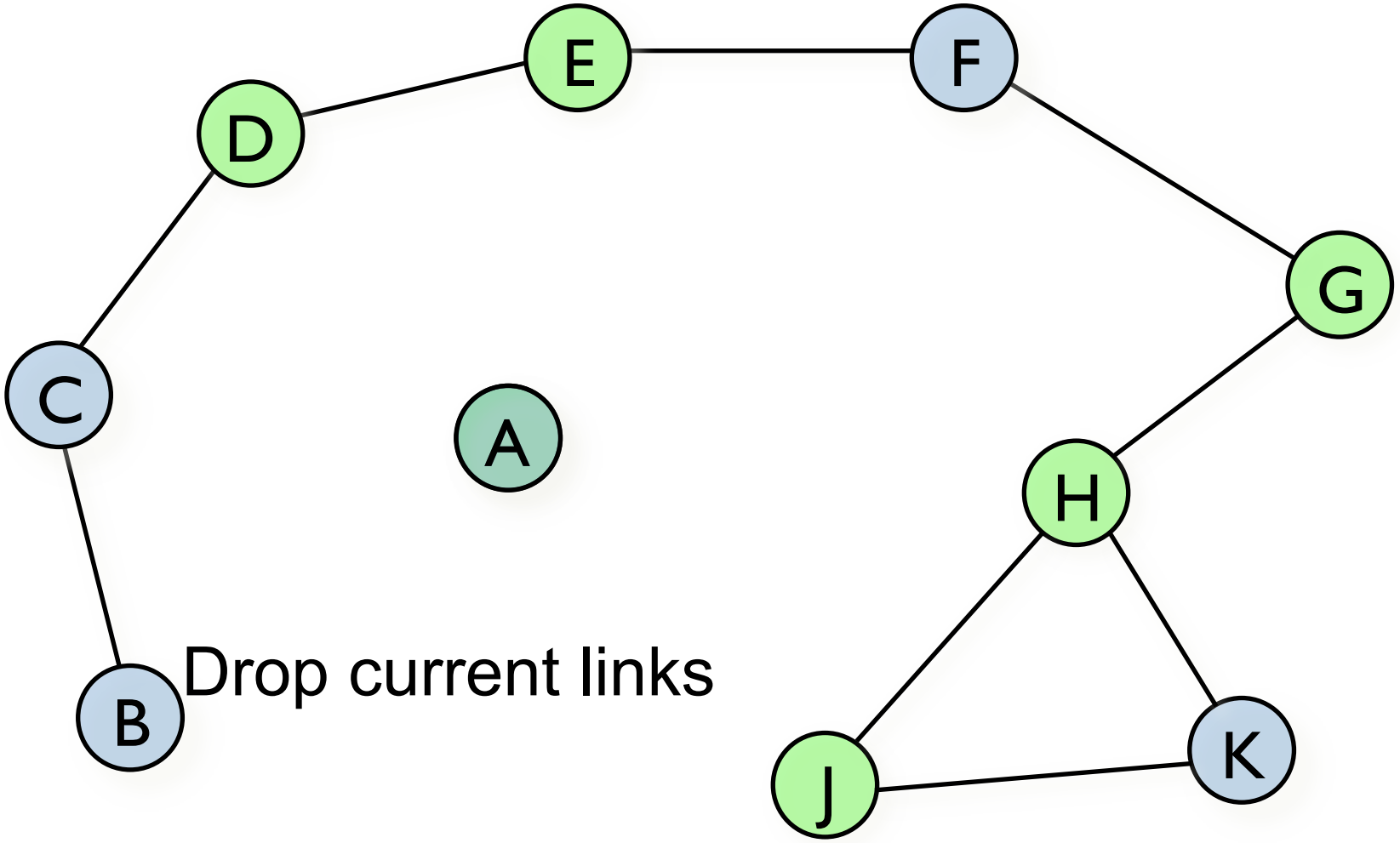

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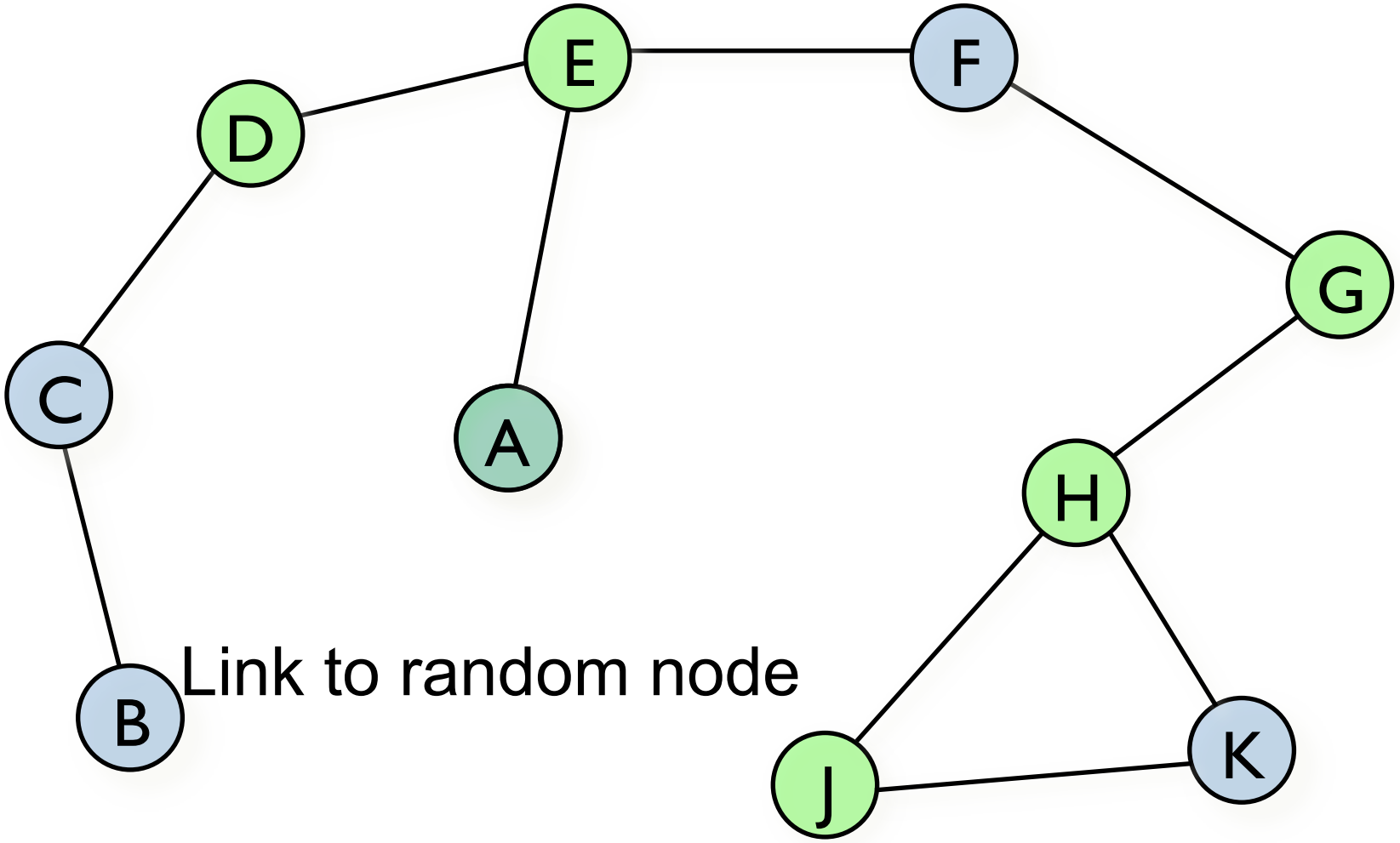
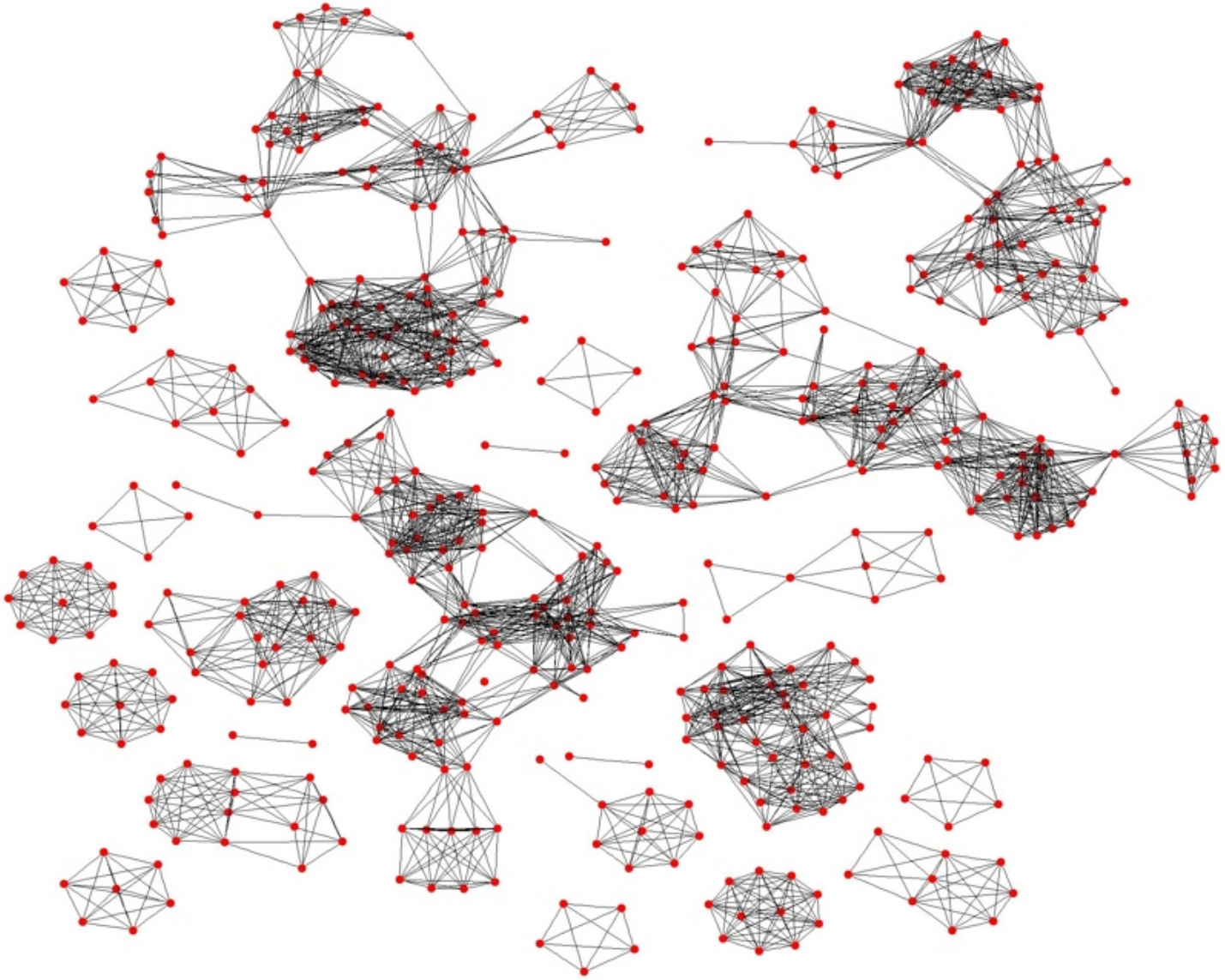


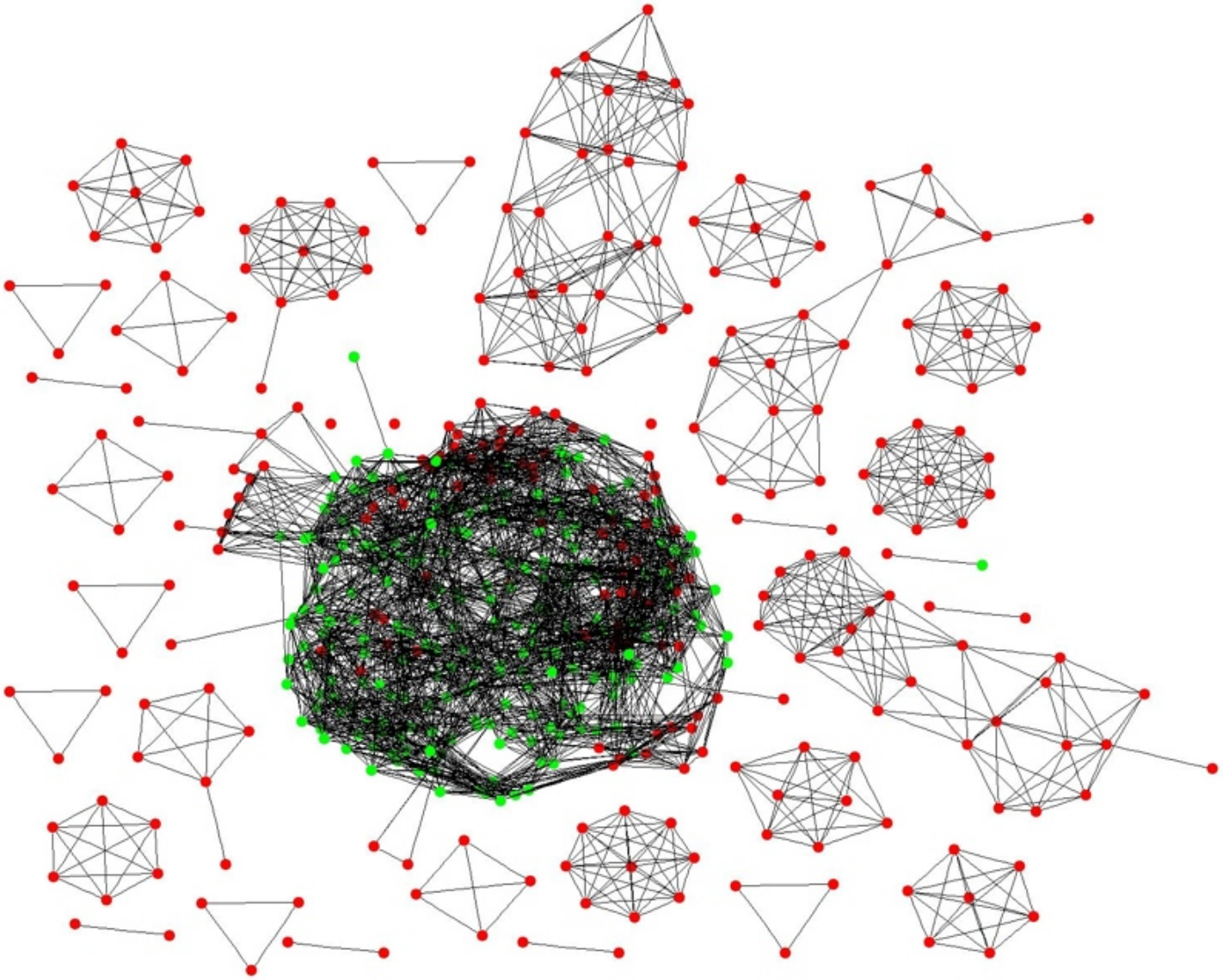
SLAC playing the PD

- We tested SLAC with Prisoner's Dilemma (PD)
  - Captures the conflict between "individual rationality" and "common good"
  - Defection (*D*) leads to higher *individual* utility
  - Cooperation (*C*) leads to higher *global* utility
  - *DC* > *CC* > *DD* > *CD*
- Prisoner's Dilemma in SLAC
  - Nodes play PD with neighbors chosen randomly in the interaction network
  - Only pure strategies (always *C* or always *D*)
  - Strategy mutation: flip current strategy
  - Utility: average payoff achieved

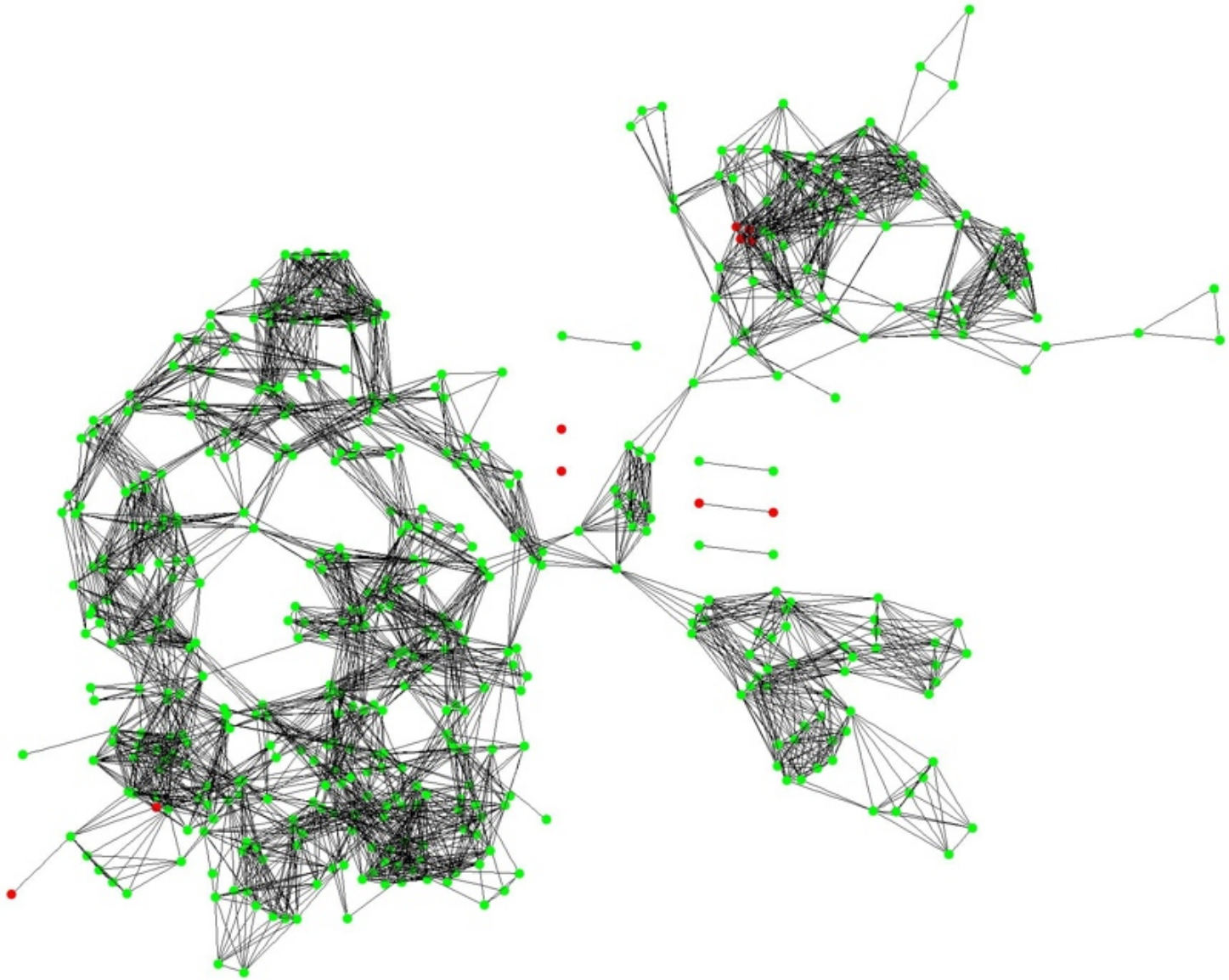
Cycle 180: Small Defect Clusters



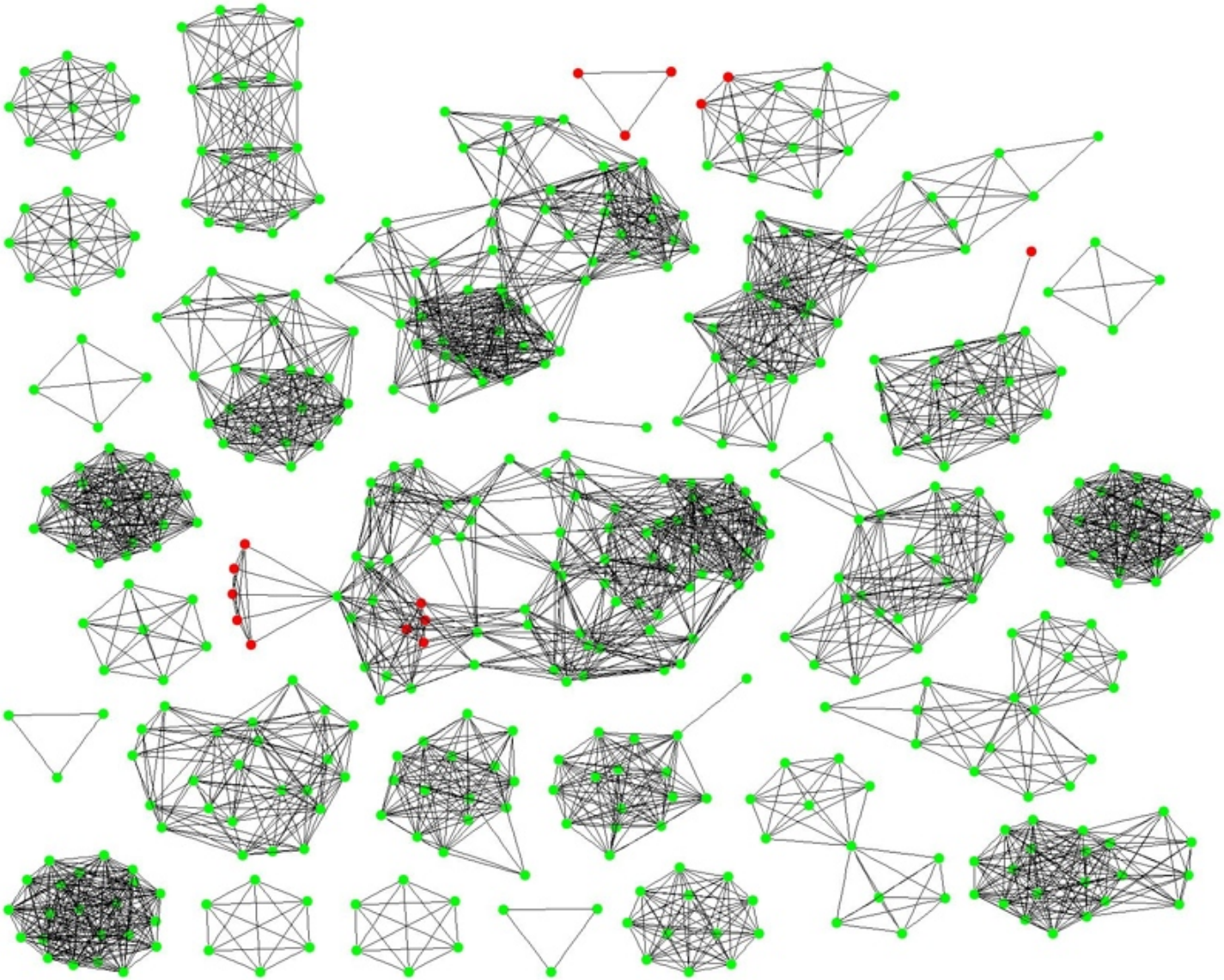
Cycle 220: Cooperation Emerges

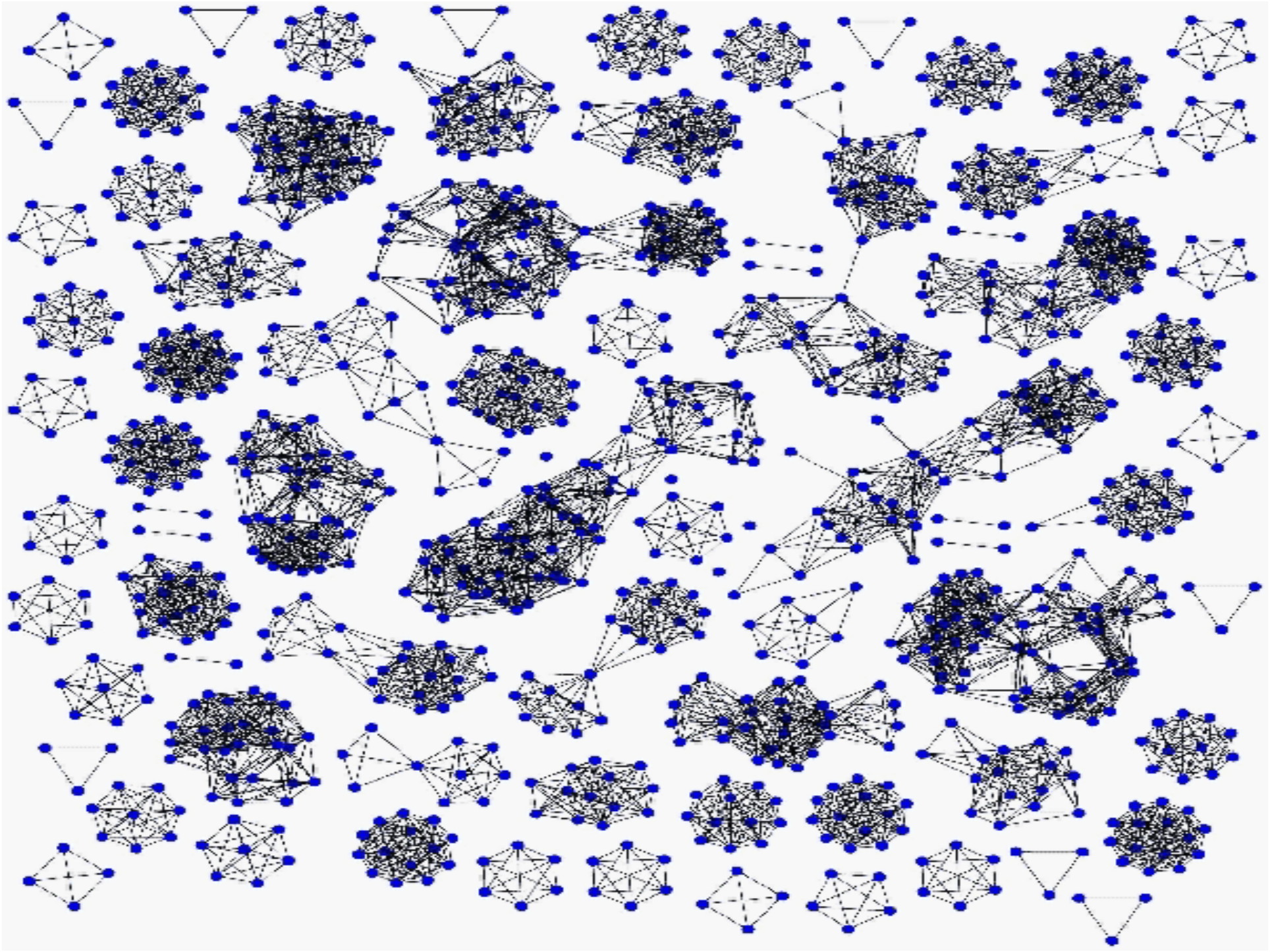


Cycle 230: Coop. Cluster Starts to Break Apart



Cycle 300: Defect Nodes Isolated, Small Cooperative Clusters Formed



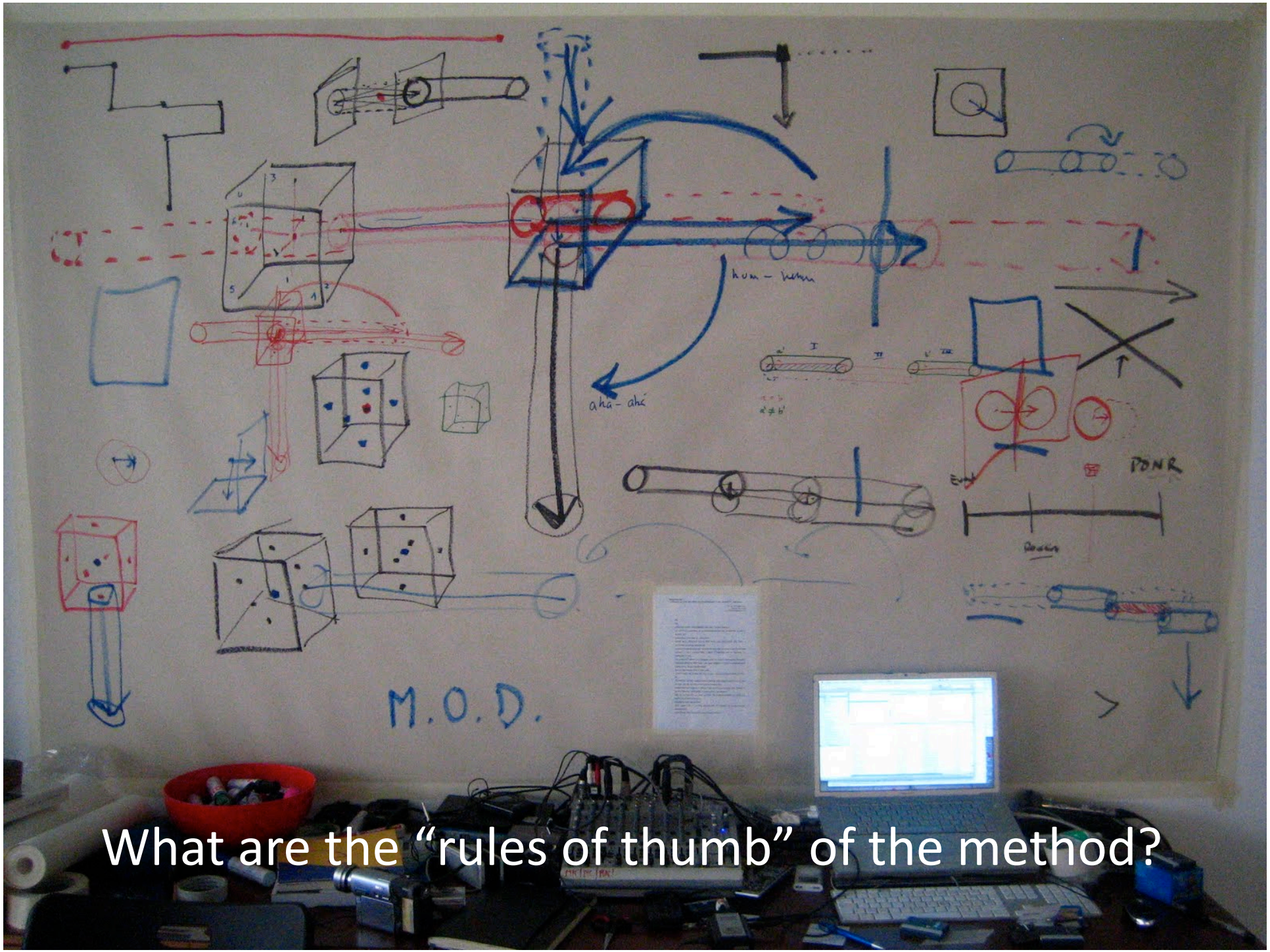


Rethinking “incentives” in individual v. collective dilemmas

- Choreographer João Fiadeiro in developing collective improvisation method:
  - Central control limits individual creativity
  - Complete individual self-expression leads to ego driven incoherence
- Develops and teaches a method called Real Time Composition
- An interesting take on incentives

Real Time Composition

- There is no a priori known collective or individual goal
- No apparent utility or incentive structure
- Through application of a method (a set of rules of thumb that individuals follow)
- Collectively good outcomes often emerge
- It can be viewed as a kind of socio-cognitive stigmergy based on following the rules of thumb



What are the “rules of thumb” of the method?

What are the rules of thumb?

It's complex and evoloving but here is my take on the flavour:

- Observe the environment carefully
- Suppress desire to act spontaneously (not to act is also to act)
- Consider at least 4 actions you can take and consider each in relation to the existing environment
- Your action may:
  - reinforce (copy / add to / continue) an existing pattern in the environment (evidenced from at least two previous actions)
  - Begin a pattern suggested by a first action (make a second action)
  - Start a new action
- Try to make actions clear to observers of the environment
- Try to avoid starting a new action unless the environment suggests it: such as looping or a physical constraint
- Be creative in continuing a pattern with the materials available and the environmental constraints
- Limit your communication to actions within the environment

AND_Lab

- João is currently running a project called AND_Lab (Artistic Research and Scientific Creativity) in collaboration with Fernanda Eugénio (an anthropologist):

http://and-lab.blogspot.com/

Creating tools not incentives?

- In general I see a trend:
- A focus away from incentives, rationality and / or central control to…
- providing tools allowing people to create groups with structured interactions
- Monitoring and communication via a shared environment
- Collective goods (commons based peer production - Benkler)

Briefly…

- Twitter and the “Arab Spring”. Too much has been said already.
- Greek indignados – are they calling for a new government?
- Wikileaks. A tool for crowd sourcing intelligence analysis? Trying again with twitter.
- Avaaz.org – political lobbying
- London riots. BBM used by self-organised groups to go looting?

New tools emerging – fighting corruption

- Crowd source anonymously knowledge linking influential people in official positions
- Potentially identify conflicts of interest
- Influencenetworks.org

INFLUENCE NETWORKS.org

Explore Type a person's name

Email:
Password:
Submit or Sign up

Get involved Contribute Review

Tweet 271 Like 407 Send +1 87

INTRODUCTION

Influence Networks is an open-source, collaborative directory of relationships between people, institutions and companies. Each relation has its own level of trustworthiness, so that facts can be distinguished from noise.

You can explore the database on your own and contribute by adding a relation. If you can't think of any interesting relationship right now, you can also review what other users have input and improve the reliability of the data.

INFLUENCE NETWORKS FOR JOURNALISTS

INFLUENCE NETWORKS FOR CITIZENS

INFLUENCE NETWORKS FOR DEVELOPERS

New tools emerging – open source currencies

- Groups create their own currencies
- Various policies and technologies
- Two on-going projects:
  - BitCoin (community gold function)
  - Ripple (community bank function)

What “social transformation” are you talking about?

- Move away from individualism in the form of markets / game theory type rational approaches
- Move away from state-level collective planning and state actors generally
- More focus on self-organising groups generating their own organisational / governance structures (“polycentric governance”)

What is my role in this?

- We need new models to understand how to design new tools for group coordination
- Not market / game theory OR central control (Agent-based modelling)
- Such models will be significant in shaping the future (even if you don't think they will be)
- Already lots of work drawing on new sources of data harvested from existing social tools
- You have a role because not acting is also acting

Questions?

www.davidhales.com