

Analysis of Social Network Data: Some Empirical Studies

Tso-Jung Yen

Institute of Statistical Science
Academia Sinica

tjyen@stat.sinica.edu.tw

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Social Networks and National Economy

- Eagle et al. (Science, 2010) “Network diversity and economic development”:
 - Aims:
 - Social network theorists have long been interested in the relationship between network structure and economic activities.
 - One important hypothesis is that diversity of a network position that an individual occupies is positively correlated to the number of opportunities that the individual can explore.
 - However, such hypothesis has not been investigated at the “population” level before.
 - This paper is the first one to conduct such investigation (This may be a possible reason of why the research can be published in Science).

Social Networks and National Economy

- Eagle et al. (2010):
 - Network data:
 - The authors collected mobile phone (communication network) data at the “national” level.
 - The data are collected during August 2005 in the UK, containing more than 90% of the mobile phones and 99% of the residential and business landlines and in the UK.
 - The resulting network has roughly 65×10^6 nodes and 368×10^6 links.
 - Economic development data:
 - The “Index of Multiple Deprivation” (IMD) contains information on income, employment, education, health, crime, housing and environment for total 32,482 communities in the UK.

Social Networks and National Economy

- Eagle et al. (2010):
 - Method:
 - The authors compared the IMD rank of each community with diversity metrics associated with each member's social network. The social diversity of node i is defined by

$$D(i) = \frac{-\sum_{j=1}^k p_{ij} \log p_{ij}}{\log(k)},$$

where $p_{ij} = v_{ij} / \sum_{j=1}^k v_{ij}$, and v_{ij} is the volume between node i and j . The higher $D(i)$ is, the more likely the individual will get opportunities for exploration.

- A similar measure on spatial diversity is also defined.

Social Networks and National Economy

- Eagle et al. (2010):
 - Results:
 - The author found network diversity and spatial diversity were strongly correlated with the IMD rank, $r = 0.73$ and 0.58 , respectively.
 - These imply network diversity is positively related to the economic development.

Social Networks and National Economy

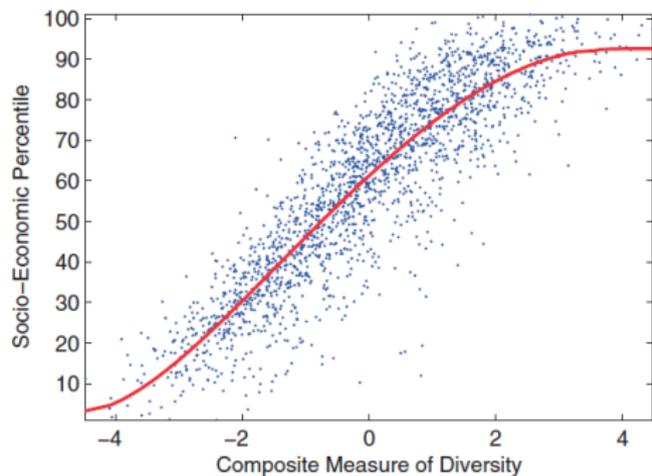
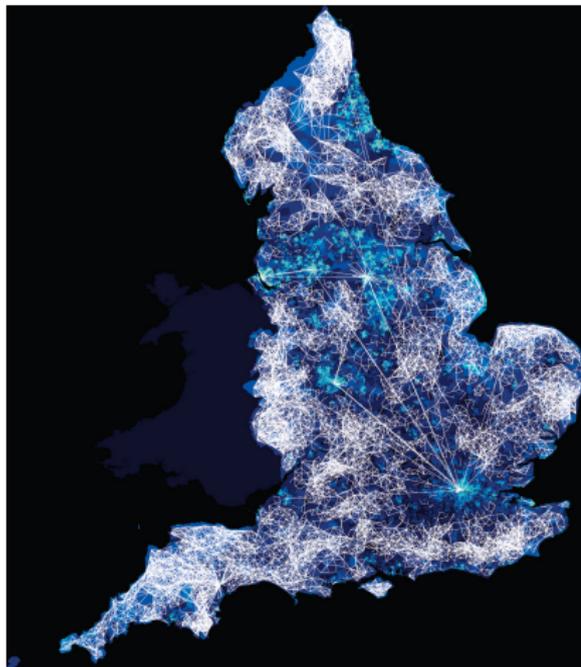


Figure: Sources: Eagle et al. (2010).

Social Networks and National Economy

- Eagle et al. (2010):
 - Quiz:
 - At the individual level, network diversity of an individual is negatively correlated with the social-economic opportunities the individual can explore.
 - At the population level, network diversity of an individual is positively correlated with the social economic rank of a community.

Social Networks in Public Transport

- Sun et al. (PNAS, 2013) “Understanding metropolitan patterns of daily encounters” .
 - Aim:
 - Due to lack of large scale data set, understanding mechanisms behind daily face-to-face encounters is still limited.
 - Understanding these mechanisms are important as they may have further impacts on diffusion and spreading processes of various kinds of things, e.g. transmission diseases.
 - The authors investigated these mechanisms by analyzing travel card information on public buses in Singapore.
 - By analyzing the public bus data, the authors are able to construct a time-dependent social network for further investigation.

Social Networks in Public Transport

- Sun et al. (2013):
 - Data:
 - The main data consist of more than 20 million bus trips from 2,895,750 users over 1 week (about 55% of the resident population) in Singapore.
 - The authors also used data from (a) population census and (b) national household interview travel survey (HITS).

Social Networks in Public Transport

- Sun et al. (2013):
 - Results: Analysis showed that many quantities have regular patterns, for example,
 - The distribution of interevent time between consecutive encounters of paired individuals has temporal patterns with peaks.
 - The distribution of encounter frequencies is heavy-tailed, supporting the hypothesis of familiar strangers.

Social Networks in Public Transport

- Sun et al. (2013):
 - Results (contd):
 - The distribution of the duration of an encounter between a pair of individuals has an exponentially decaying tail.
 - The distribution of the total durations of encounters between a pair of individuals displays a power-law tail.
 - In general encounter patterns are regular and an individual's encounter capability, i.e. the chance of an encounter, is a result of such regularity. In turn, these findings explain the "emergence of familiar strangers in daily life".

Social Networks in Public Transport

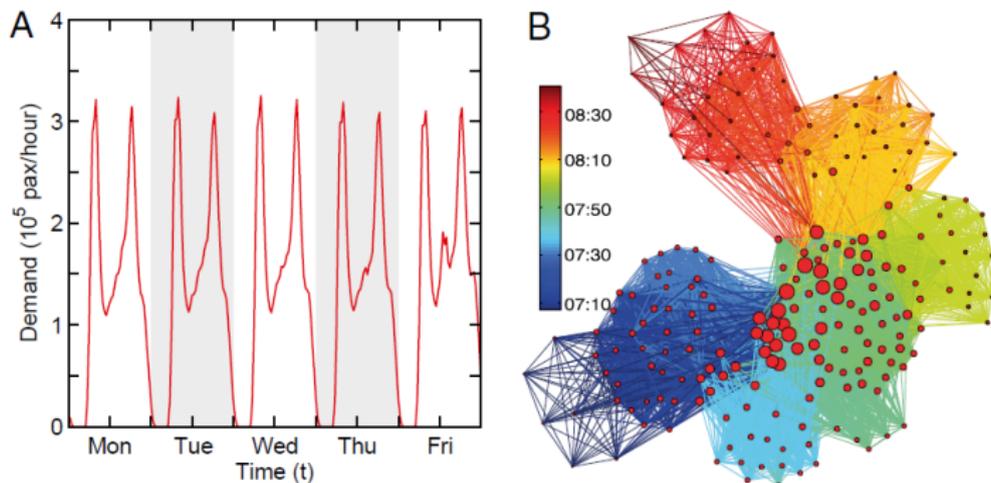


Figure: Left: Departure rate of city bus trips. Right: Time-resolved encounter network on one vehicle service (214 passengers). Sources: Sun et al. (2013).

Social Networks in Public Transport

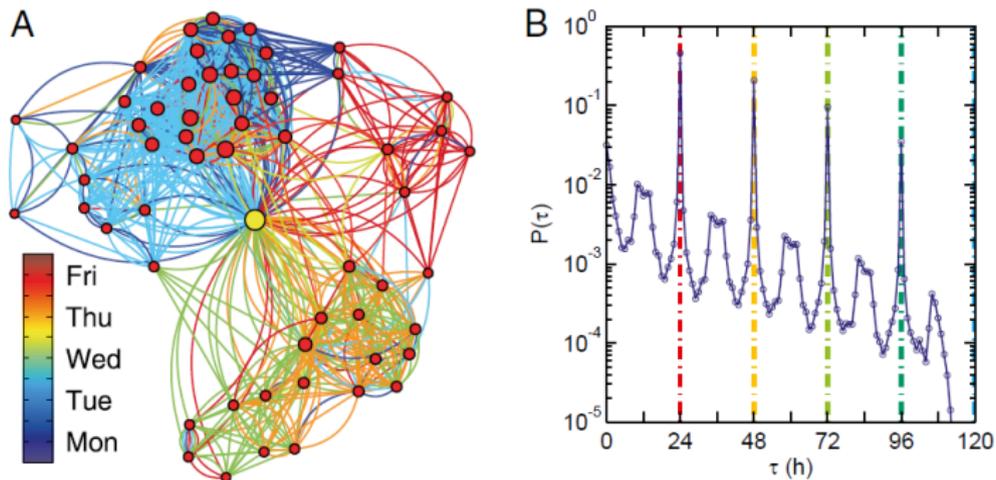


Figure: Left: A typical temporal contact network of one individual with his/her familiar strangers (encountered more than once). Right: Probability density function of interevent time between two consecutive encounters of paired individuals. Sources: Sun et al. (2013).

Social Networks in Public Transport

- Sun et al. (2013):
 - A surprising finding:
 - Individuals with repeated encounters are NOT grouped into small communities, but become strongly connected over time, resulting in a large, but imperceptible, “small-world” contact network across the whole metropolitan area.
 - The authors called such phenomenon the “structure of co-presence” .

Social Networks in Public Transport

- Sun et al. (2013):
 - Quiz:
 - The authors found that there is no clear pattern in daily encounter frequencies between paired individuals.
 - The authors found the distribution of the total durations of encounters between a pair of individuals has a power-law tail.
 - According to the authors, daily encounters do not form a small community, but rather become strongly connected over time, resulting in a “small-world” contact network.

Social Networks and Cultural History

- Schich et al. (Science, 2014) “A network framework of cultural history”.
 - Aims:
 - The authors saw cultural history as “processes of complex interactions among large numbers of individuals in a context that is difficult to quantify.”.
 - They developed a “data-driven macro approach” to find patterns from historical data and determine their cultural relevance.
 - The authors investigated famous individuals’ moves from birth to death locations. They treated individuals as particles and the moves as collective directions of flow toward death locations.

Social Networks and Cultural History

- Schich et al. (Science, 2014) “A network framework of cultural history” .
 - Data:
 - Come from Freebase.com, the General Artist Lexicon and Get Union List of Artist Names.
 - Consist of the birth and death locations of more than 150,000 famous individuals in the last 2,000 years.
 - Focus on birth-to-death migration within and out of Europe and North America.

Social Networks and Cultural History

- Schich et al. (2014):
 - Results:
 - The authors mentioned Heap's law $S(t) = N(t)^\alpha$ with $\alpha \approx 0.9$ when explaining the growth rates of numbers of famous people N and the number of attractive locations S .
 - The relationship is “sublinear”.
 - They argued that “in the long run the growth of already existing attractive locations for famous people dominates over emergence of new attractive locations”.

Social Networks and Cultural History

- Schich et al. (2014):
 - Results:
 - Cultural attractive locations in Europe is characterized by two different cultural regimes: (1) the winner-takes-all regime such as Paris, and (2) fit-gets-rich regime such as cities in Central Europe and Northern Italy.
 - The analysis revealed a consistent pattern of cultural attraction and interaction in space: Many famous people were born over all Europe but died at cultural centers such as Rome, Paris, or Dresden.

Social Networks and Cultural History

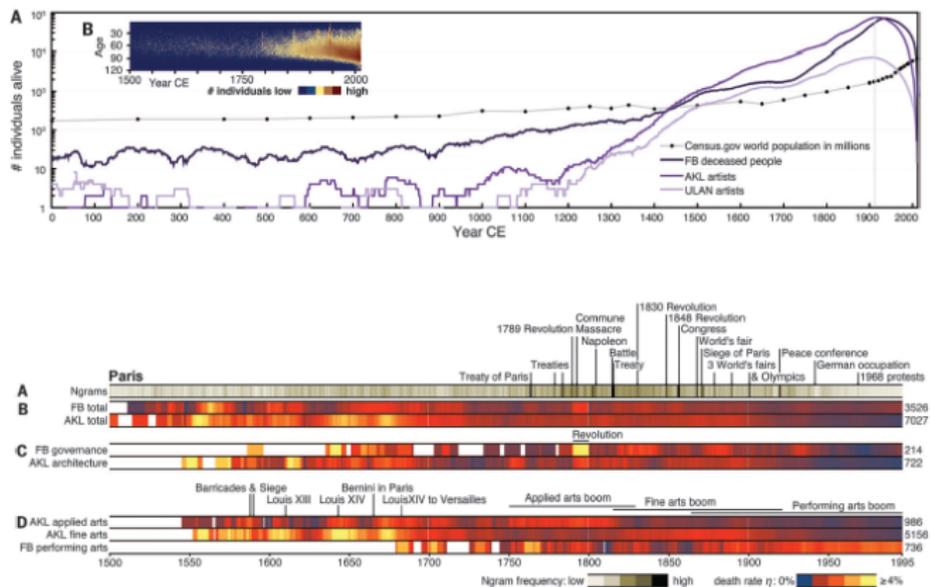


Figure: Sources: Schich et al. (2014).

Social Networks and Cultural History

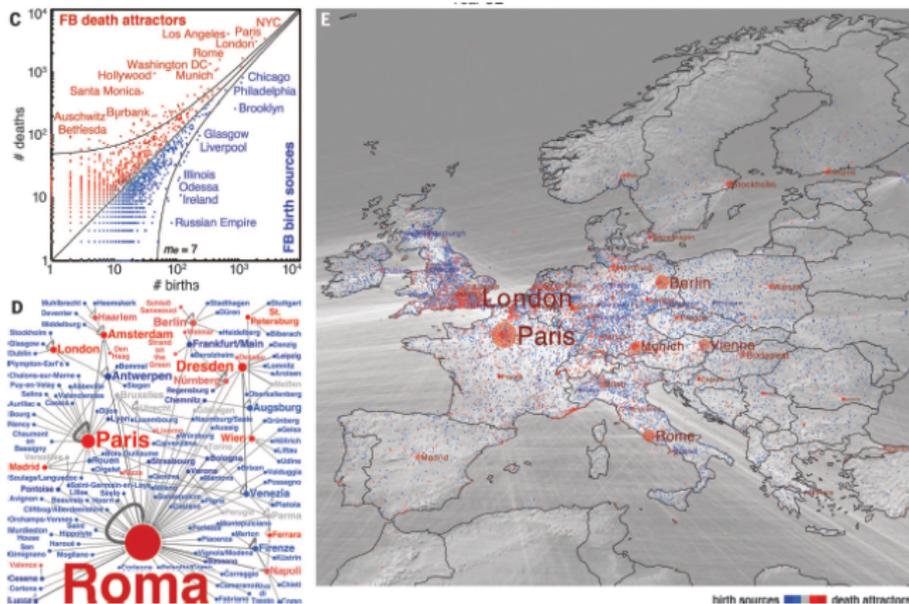


Figure: Sources: Schich et al. (2014).

Social Networks and Cultural History

- Schich et al. (2014):
 - Quiz:
 - The authors focused their analysis on birth-to-death migration of famous people within and out of Asia and Africa.
 - The authors found the numbers of famous people N and the number of attractive locations S have a relationship $S(t) = N(t)^\alpha$ with $\alpha > 1$, reflecting that S will outnumber N in the long run.
 - The authors found that cultural attractive locations in Europe can be characterized by two different regimes: (1) the winner-takes-all regime and (2) the fit-gets-rich regime.

Social Networks and Voting Behavior

- Bond et al. (Nature, 2012) “A 61-million-person experiment in social influence and political mobilization”.
 - Aim:
 - The authors investigated online social influence by conducting a field experiment for spread of political behavior.
 - In particular, the authors wanted to know whether online spread of behavior is carried out via strong ties (ties between people who know each other well) or via weak ties (ties between people who know each other but are not familiar with each other).
 - However, several previous research had showed online spread of behavior does not exist.
 - As pointed out by the authors, it may be due to sample sizes are not large enough to detect such evidence.

Social Networks and Voting Behavior

- Bond et al. (2012):
 - Data: The authors targeted FB users in the United States.
 - Experimental settings:
 - The social message group that shows (a) a message for encouraging voting, (b) a link for voting information and a "I voted" button and (c) six RANDOMLY selected friends of users who have already clicked the "I voted" button ($n = 60,055,176$).
 - The informational group that shows (a) a message for encouraging voting, and (b) a link for voting information and a "I voted" button ($n = 611,044$).
 - The control group without showing any of the above settings ($n = 613,096$).

Social Networks and Voting Behavior

- Bond et al. (2012):
 - Experimental settings (contd):
 - The “I voted” button can be seen as a sign for political-self expression to other users and the community.
 - Clicking on voting information outside shows a user’s desire to find voting information.

Social Networks and Voting Behavior

- Bond et al. (2012):
 - Results:
 - The authors found strong tie effects: the chance of clicking on "I voted" button increases as tie-strength increases. Users are more likely to click on "I voted" button if the "I voted" message is sent by close friends. Confirm peer effects spread more quick on strong ties than on weak ties.
 - Although the percentages are low, friends generated an additional 886,000 expressed votes, close friends generated a further expressed 559,000 votes, and close friends of close friends generated a further 1 million expressed votes.

Social Networks and Voting Behavior

- Bond et al. (2012):
 - Quiz:
 - In authors' experiment, subjects can choose to show "I voted" to their friends.
 - According to the authors, subjects' voting behavior are highly influenced by the people the subjects are NOT familiar with.
 - Several previous research had showed online spread of behavior does not exist. According to the authors, it may be due to sample sizes are not large enough to detect such evidence.

Social Networks and Online Marketing

- Aral and Walker (Science, 2012) “Identifying influential and susceptible members of social networks”.
 - Aim: The authors wanted to measure whether the number of influence-mediating messages has an impact on adoption.
 - Main hypothesis: Influential people diffuse opinions, behaviors, innovations and new products.
 - However, measuring such diffusion effect may be difficult. Possible confounding factors include:
 - Homophily.
 - Effects such as the situation in which both nodes are exposed to the same stimuli.
 - Simultaneity, i.e. nodes behave similarly at approximate the same time.

Social Networks and Online Marketing

- Aral and Walker (2012):
 - Possible confounding factors (contd):
 - Spreaders tend to send messages to those who will be more likely to give positive responses to the messages, leading to an overestimated rate of spreading.
 - Spreaders tend to send messages to those who may have similar attributes, a phenomenon that is induced by homophily and assortativity.
 - Receivers may be influenced by factors such as advertising campaigns or promotions.
 - Randomization: The authors randomly chosen a friend of the spreader and sent the message to the friend from the spreader. This avoided the above unwanted situations.

Social Networks and Online Marketing

- Aral and Walker (2012):
 - Data:
 - Subjects were 1.3 million FB users.
 - Experiment was conducted over a 44 day period.
 - During the 44 day period 7,730 product adopters sent 41,686 automated notifications to randomly chosen targets among the 1.3 million FB users.
 - This resulted in 976 (13% of 41,686) unique peer adoptions.

Social Networks and Online Marketing

- Aral and Walker (2012):
 - Model:
 - The authors adopted a hazard modelling approach to model the data.
 - The model contains (a) the number of notifications, (b) attributes of both sender and receiver, and (c) their interactions with the number of notifications.
 - The model is able to distinguish (a) spontaneous adoption, which may occur in the absence of influence; (b) influence-driven adoption, which may occur in response to persuasive messages.

Social Networks and Online Marketing

- Aral and Walker (2012):
 - Results:
 - Male users are more influential than female users.
 - Younger users are more likely to be influenced.
 - Married users are the most unlikely to be influenced.
 - Female users are more likely to influence male users than to influence other female users.

Social Networks and Online Marketing

- Aral and Walker (2012):
 - Results (contd):
 - Both influential individuals and non-influential individuals have roughly the same probability of being susceptible to be influenced among their peers.
 - But highly influential individuals tend not to be susceptible, and highly susceptible individuals tend not to be influential.
 - More people have higher influence scores, suggesting that target advertising should pay attention on attributes of adopters, motivating them to influence non-adopters.

Social Networks and Online Marketing

- Aral and Walker (2012):
 - Results (contd):
 - Moreover, less susceptible and highly influential users are more likely to cluster together than highly susceptible users.
 - This suggested that target marketing should focus on those who are highly influential and highly susceptible, and have lots of friends who are also highly susceptible.

Social Networks and Online Marketing

- Aral and Walker (2012):
 - Limitations:
 - As mentioned by the authors, their research did not consider the impacts of message content on the diffusion process.
 - It did not study whether the diffusion process is solely dependent on attributes of individuals, as shown in some previous studies, or is jointly influenced by product itself, sender's behavior or more abstract stuff such as ideas.

Social Networks and Online Marketing

- Aral and Walker (2012):
 - Quiz:
 - In the authors' experiment, subject can choose to send messages to those who will be more likely to give positive responses to the messages.
 - According to the authors, highly influential users are more likely to cluster together than highly susceptible users.
 - According to the authors, Married users are the less likely to be influenced than unmarried users.

Censorship in Online Social Media

- King et al. (Science, 2014) “Reverse-engineering censorship in China: Randomized experimentation and participant observation”.
 - Aim:
 - Censorship is an important tool to maintain regime stability, an ultimate goal recognized by the Communist Party of China.
 - What are the mechanisms behind the online social media censorship in China?
 - Two criteria for censoring an online social media message: (a) anti-government critics or (b) collective action potential.

Censorship in Online Social Media

- King et al. (2014):
 - Research ideas: The authors wanted to know how censoring technology works, so they
 - (a) Create many accounts in different social media sites, randomly post different types of posts, and see which kind of posts are more likely to be censored.
 - (b) Purchase URL, build social media site, ask Chinese security software firms to implement censoring software, and conduct actual censoring on their own posts by consulting those firms for censoring tips.

Censorship in Online Social Media

- King et al. (2014):
 - Experimental conditions:
 - Each post is either (a) pro or anti government, and either (b) with or without collective action potential.
 - Each post is controlled under (a) the same keywords; (b) the same writing style; (c) length of posts between 100 to 200 Chinese characters.
 - The whole experiments were approved by IRB at Harvard University.

Censorship in Online Social Media

- King et al. (2014):
 - Data collection:
 - The authors considered 100 social media sites.
 - These include the biggest 97 sites such as Sina Weibo, Tensent Weibo, and Sohu Weibo.
 - The 100 sites contain 87% blog posts in China.
 - About 20% of them are run by government, 25% of them are run by state-own-enterprises, and 55% of them are run by private firms.
 - In total, 1200 posts were written and submitted to the 100 top Chinese social media sites.
 - In practice, three rounds of experiments were conducted (post sent at three different time periods).

Censorship in Online Social Media

- King et al. (2014):
 - Results:
 - Texts which criticize the government, its leaders, and their policies are more likely to be allowed to be published.
 - Texts about collective action potential are more likely to be censored, no matter these texts are pro or anti-government.
 - The authors found no clear censorship of posts about (a) collective action events outside mainland China, (b) collective action events occurring online, (c) critiques of top leader, and (d) highly sensitive topics.

Censorship in Online Social Media

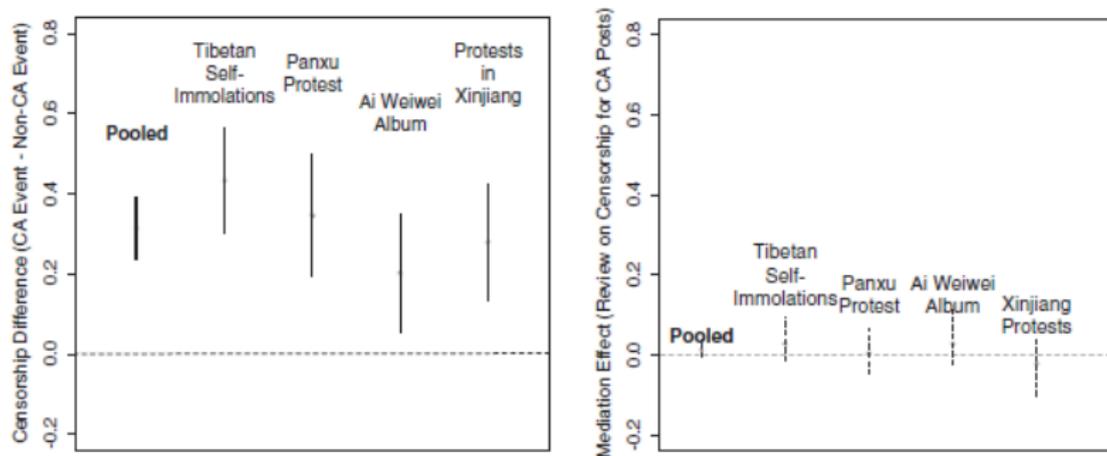


Figure: Sources: King et al. (2014).

Censorship in Online Social Media

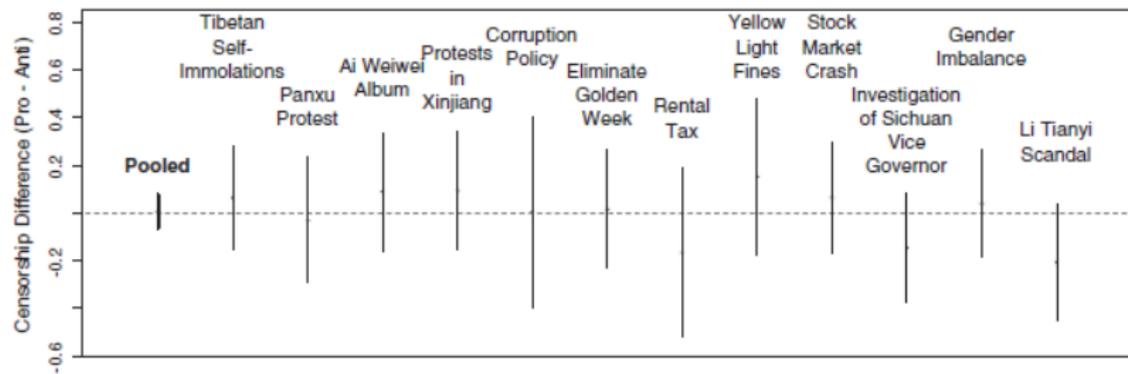


Figure: Sources: King et al. (2014).

Censorship in Online Social Media

- King et al. (2014):
 - Conclusion:
 - The Chinese censorship system detects threads on social media, and if a thread has a potential to trigger collective action, then the whole thread will be removed.
 - Although about two thirds of Chinese social media sites implement automated review based on keyword list, as censoring mechanism, they are not effective.
 - Chinese social media sites are diverse and do not always consistent in censoring.

Censorship in Online Social Media

- King et al. (2014):
 - Conclusion:
 - However, government is still able to control as it employs a large number of human coders to censoring the posts.
 - As pointed out by the authors, the Chinese leaders seem to use those critique texts to monitor performance of government officials.
 - Collective action events outside mainland China, occurring online, or posts criticizing top leaders or about sensitive issues are less likely to be censored.

Censorship in Online Social Media

- King et al. (2014):
 - Quiz:
 - According to the authors, online social media in China tend to censor posts that criticize Chinese top leaders than posts that encourage collective actions.
 - The authors sent posts with length of words between 500 to 10,000 in their experiment because they think length of words of a post may have impacts on the censoring chance of the post.
 - According to the authors, posts on collective actions outside China have the same chances of being censored as the posts on collective actions inside China.

Social Networks and Wealth Inequality

- Nishi et al. (Nature, 2015) “Inequality and visibility of wealth in experimental social networks”.
 - Aim:
 - The authors investigated the dynamic relationship between social networks and wealth inequality.
 - In particular, the authors wanted to investigate whether an individual’s wealth is visible to the community has an impact on the wealth distribution of the community.
 - Possible mechanisms lead to wealth inequality:
 - Difference in individual abilities.
 - Difference in resource access opportunities.
 - Difference in wealth accumulation processes.

Social Networks and Wealth Inequality

- Nishi et al. (2015):
 - Experimental Idea:
 - At beginning of each round, subjects are asked whether they would like to reduce their own wealth by 50 dollars in order to increase wealth of their neighborhoods by 100 dollars.
 - All subjects need to make the decision simultaneously.
 - After that, a subject can decide whether to break old ties with her neighbors or form new ties with other subjects.
 - All subjects then enter into the next round.
 - The authors run the experiment for 10 rounds and record (a) how wealth changes for all subjects and (b) how the network changes during each round.

Social Networks and Wealth Inequality

- Nishi et al. (2015):
 - Experimental settings:
 - The authors considered different inequality conditions, i.e. Gini coefficients equal to 0 (none), 0.2 (low) and 0.4 (high), respectively.
 - They also considered different wealth visibility conditions. i.e. revealed to neighbors (visible) or not revealed to neighbors (invisible).
 - Data collection:
 - There are $n = 1,462$ subjects divided into roughly 80 sessions.
 - The network is generated from the Erdős-Rényi random graph model. The corresponding graph has around 30% dyads that have ties between two sides of the dyad.

Social Networks and Wealth Inequality

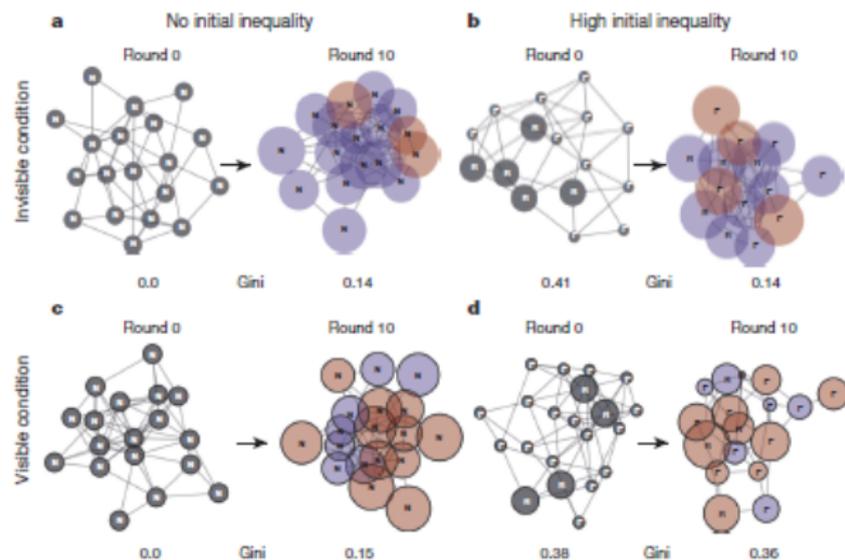


Figure: Sources: Nishi et al. (2015).

Social Networks and Wealth Inequality

- Nishi et al. (2015):
 - Results:
 - At the global level, overall wealth is significantly lower in the visible conditions than in the invisible conditions.
 - Such lower level is due to lower cooperation rates and lower social connectivity, both measures are higher in the invisible conditions.
 - In addition, low social connectivity also cause changes in network topology such as degree of nodes and possibly transitivity of nodes.

Social Networks and Wealth Inequality

- Nishi et al. (2015):
 - Results (contd):
 - At the individual level, when initial inequality is high (i.e. the Gini coefficient is high) and wealth is visible, the richer subjects (those who are richer than the average of their neighbors) are less likely to cooperate than the poorer subjects.
 - As the poorer subjects are more likely to cooperate, the exploitation scenario occurs: cooperation from the poorer subjects makes their richer neighbors become even richer, leading to even worse wealth inequality.
 - On the other hand, when initial inequality is low and wealth is still visible, richer subjects are more likely to cooperate than those who are poorer.
 - As richer subjects are more likely to cooperate, the fairness scenario occurs: cooperation from the richer subjects makes their poorer neighbors richer, leading to better improvements in wealth inequality.

Social Networks and Wealth Inequality

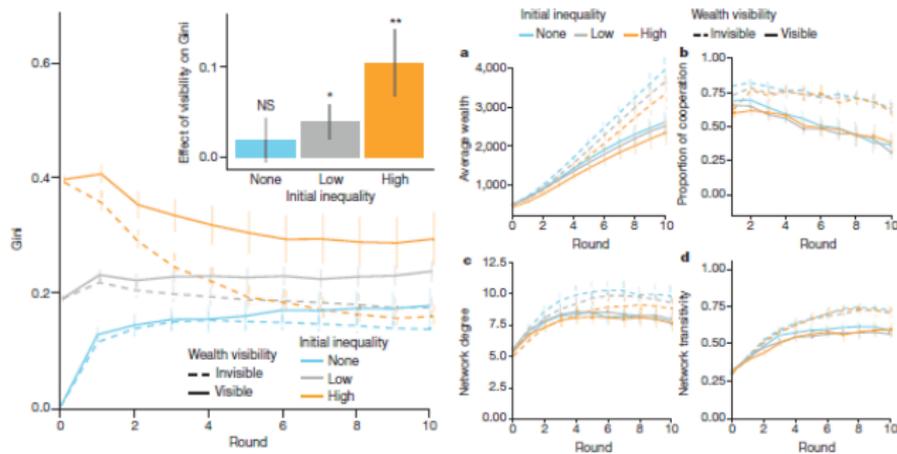


Figure: Sources: Nishi et al. (2015).

Social Networks and Wealth Inequality

- Nishi et al. (2015):
 - Conclusion:
 - The authors concluded that wealth inequality along has little impacts on overall wealth, interconnectedness and cooperation.
 - The authors provided several psychological mechanisms for such wealth visibility, for example, it is a signal of social position, it may be perceived as a competition, and it causes fear of being near last place. All these reduce cooperation.

Social Networks and Wealth Inequality

- Nishi et al. (2015):
 - Quiz:
 - According to the authors, visibility of wealth can increase the Gini coefficient, and therefore deepens wealth inequality in the community.
 - According to the authors, the Gini coefficients will converge in the long run given that wealth of individuals is not visible to the community.
 - According to the authors, when wealth is visible, richer people will be less likely to cooperate than poorer people.

Social Networks and Finance

- Banerjee et al. (Science, 2013) “The diffusion of microfinance”.
 - Aim: Relationship between network position and innovation diffusion (new product adoption).
 - Simulation-based study confirmed initial injection point approach.
 - However, it has not been verified by real world data.
 - Contributions of the paper:
 - Collects real world data for investigating network position and innovation diffusion.
 - Develops models for distinguishing main effects for innovation diffusion.

Social Networks and Finance

- Banerjee et al. (2013):
 - Two mechanisms behind innovation diffusion:
 - Information passing: Individuals have known the new product before adopting it, and they may learn to adopt it from their friends.
 - Endorsement: Individuals may adopt the new product by referring decisions made by their friends.

Social Networks and Finance

- Banerjee et al. (2013):
 - Possible paths for information-passing:
 - A node in the network represents a household.
 - At the first stage initial set of households is informed;
 - Informed households to decide whether to adopt or not;
 - Informed households pass information to others;
 - Newly informed households to decide whether to adopt or not.

Social Networks and Finance

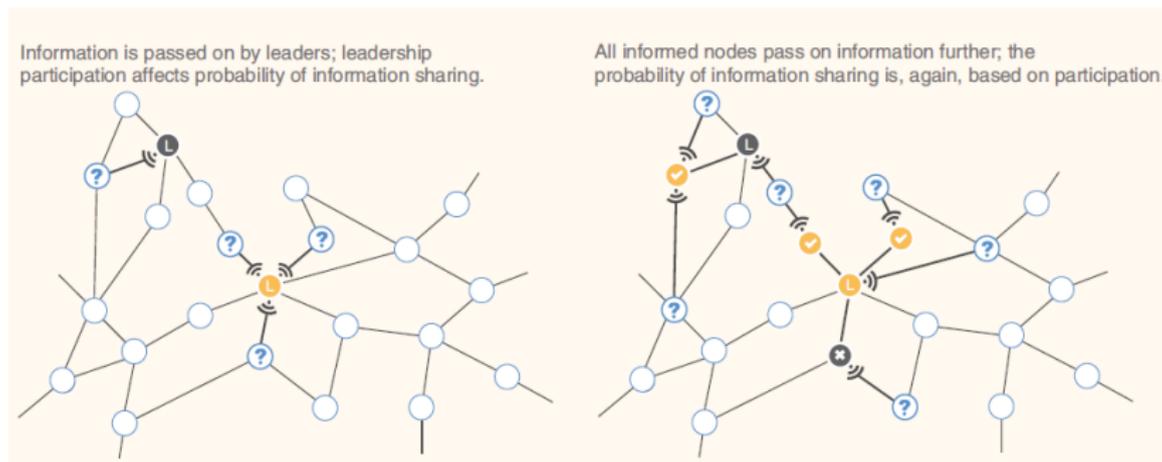


Figure: Sources: Banerjee et al. (2013).

Social Networks and Finance

- Banerjee et al. (2013):
 - Data collection:
 - They collected the data in 43 villages in Karnataka, India. They introduced microfinance service called Bharatha Swamukti Samsthe (BSS).
 - They asked invited leaders to pass the information.
 - They did not rely on the mass media or ads to spread the information.
 - They relied on word-of-mouth communication to spread the information.

Social Networks and Finance

- Banerjee et al. (2013):
 - Model and estimation:
 - A participant household will pass information with probability q^P .
 - A nonparticipant household will pass information with probability q^N .
 - The probability that an informed household will adopt the microfinance service is a function of the number of neighbors who have adopted the service, denoted as F_{it} . The coefficient of F_{it} is a measure on endorsement.
 - The authors adopted a moment-based approach to estimating the model.

Social Networks and Finance

- Banerjee et al. (2013):
 - Key findings:
 - Adopters are seven times more likely than informed non-adopter to pass information to others.
 - No evidence of endorsement effects.
 - Information passing may decrease the endorsement effects.
 - Information passing is not restricted to those who have already adopted but also those who do not adopt.

Social Networks and Finance

- Banerjee et al. (2013):
 - Communication and diffusion centralities:
 - The authors developed a measure called communication centrality to identify how effective a node can spread the information.
 - The communication centrality relies on network structure of the targets and information provided by the sample.
 - The diffusion centrality is a simplified version of the communication centrality, and is defined as

$$DC(g; q, T) = \left[\sum_{t=1}^T (qg)^t \right] \cdot 1,$$

where g is the adjacency matrix, q is the passing probability, and T is the number of iterations.

Social Networks and Finance

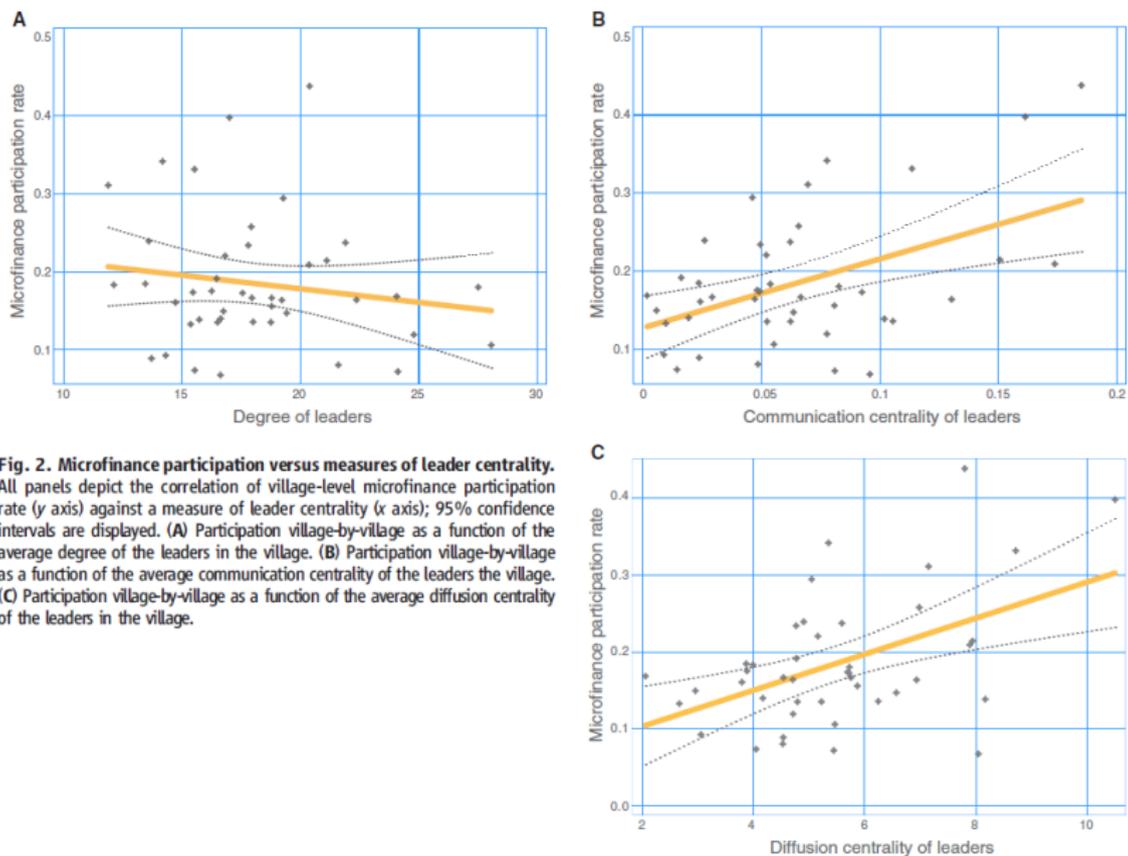


Fig. 2. Microfinance participation versus measures of leader centrality. All panels depict the correlation of village-level microfinance participation rate (y axis) against a measure of leader centrality (x axis); 95% confidence intervals are displayed. (A) Participation village-by-village as a function of the average degree of the leaders in the village. (B) Participation village-by-village as a function of the average communication centrality of the leaders the village. (C) Participation village-by-village as a function of the average diffusion centrality of the leaders in the village.

Social Networks and Finance

- Banerjee et al. (2013):
 - Quiz:
 - According to the author, endorsement refers to a process in which individuals adopt a new product by referring decisions made by their neighbors.
 - According to the author, diffusion centrality of a leader is positively correlated to the innovation adoption rate of the village the leader belongs to.

Social Networks and Environment

- Barnes et al. (PNAS, 2016) “Social networks and environmental outcomes”.
 - Aim: The authors tried to understand how social networks make behaviors different, and how such difference further have impacts on environmental outcomes, by investigating information-sharing networks in the tuna fishery industry in Hawaii.
 - Environmental outcomes–Shark bycatch rates:
 - High shark bycatch rates are bad as shark play a role in balancing ecosystem.
 - Also shark bycatch is cost and dangerous, not economically desirable. It should be avoided.

Social Networks and Environment

- Barnes et al. (PNAS, 2016):
 - Differences in shark bycatch rates:
 - The authors targeted all tuna longline fishery industry in Hawaii. It contains three ethnic groups: European-Americans, Korean-Americans and Vietnamese-Americans.
 - The authors examined shark bycatch rates between the three groups based on a 5-yr period data set. They found no difference between Vietnamese and Korean, but the differences between European and two other groups are statistically significant.

Social Networks and Environment

- Barnes et al. (PNAS, 2016):
 - What causes such bycatch rate differences? Can social network theory provide some explanation?
 - The authors started their investigation by discussing homophily and properties of homophily-driven networks, including highly clustered among nodes with similar attributes.
 - High clustering leads to segregated networks, restricting information flow from other networks.
 - In a highly competitive industry such as fishery industry, behavioral differences will have large impacts on competition results, and therefore making impacts on the environment.

Social Networks and Environment

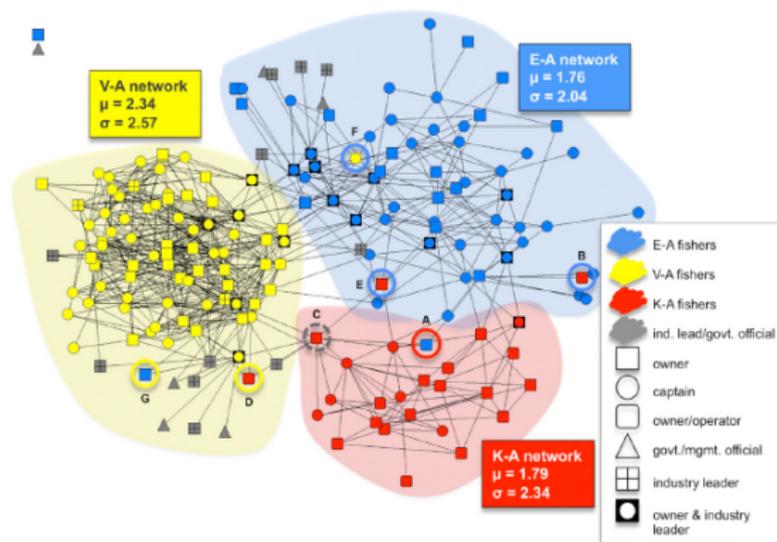


Figure: Sources: Barnes et al. (2016).

Social Networks and Environment

- Barnes et al. (PNAS, 2016):
 - Possible confounding factor: Ethnicity-related cultural norm.
 - How to distinguish the confounding factor effect from the information-sharing network effect?
 - As shown in the data, ethnicity is highly correlated to the information-sharing network.
 - The authors tested the cultural norm hypothesis by looking at outlier nodes, i.e. those who have the same ethnicity but are tied to different ethnic groups.
 - They found in general, these nodes behave more likely to the group they are connected with (rather than the group they are not connected with).

Social Networks and Environment

- Barnes et al. (PNAS, 2016):
 - Limitations and future research directions:
 - Due to data structure, it is impossible to establish the causal relationship between information-sharing networks and environmental outcomes. Further collection on dynamic network data is necessary.
 - For policy makers: homophily-driven information-sharing network seems to prevent information diffusion. It is worth to investigate ways for diffusing information this situation.

Social Networks and Environment

- Barnes et al. (PNAS, 2016):
 - Quiz:
 - The authors found no difference in shark bycatch rates between the three ethnic groups in the tuna loneliness fishery industry in Hawaii.
 - According to the authors, there is no correlation between information-sharing networks and ethnicity.
 - According to the authors, the differences in bycatch rates can be fully explained by the ethnicity-related cultural norm.