



# Social Networks

POLI 100F

# Course Plan

- ▶ 8/1 – Course introduction, student polls
- ▶ 8/3 – Network analysis: basics
- ▶ 8/8 – Network analysis: static networks
- ▶ 8/10 – Network analysis: dynamic networks
- ▶ 8/15 – Social norms: evolution
- ▶ 8/17 – Social norms: diffusion
- ▶ 8/22 – Social norms: planned change
- ▶ 8/24 – Political networks
- ▶ **8/29 – Political networks**
- ▶ 8/31 – Political networks, network theory

# Evaluation

- ▶ Here's how your **final grade** will be calculated:
- ▶ Problem Set #1 - 30% [due August 12 @ 11:59pm]
- ▶ Problem Set #2 - 30% [due August 19 @ 11:59pm]
- ▶ **Research proposal - 40% [due September 2 @ 11:59pm; no final exam]**
  
- ▶ **Attendance** at lecture is not required, but it is recommended because you'll have the opportunity to ask questions. All lectures will be **recorded** and posted on the corresponding Canvas page.

# Office hours

- ▶ I'll be holding **office hours** on Wednesdays from 9-11 am. You can sign up at the course Canvas page (“Start Here”).
  - ▶ If that time's inconvenient or if all the slots are full, we can set something up by appointment. Message me on Canvas or email me at [mdraper@ucsd.edu](mailto:mdraper@ucsd.edu).

# Yang et al. – Political Networks

- ▶ Political science applications of social network analysis:
  - ▶ American politics
    - ▶ Political behaviors and attitudes
    - ▶ Networks between politicians
    - ▶ Campaign networks
    - ▶ Policy networks
  - ▶ International relations
    - ▶ Power and hierarchy
    - ▶ Diffusion of practices (like democracy)
    - ▶ Trade and alliance networks
    - ▶ Inter-city networks

# Yang et al. – Political Networks

- ▶ “Our political behavior, much like other social behavior, is influenced by those around us: Friends, family members, classmates, or co-workers often have a direct influence on our political view and behavior. Political scientists have long subsumed this influence under the term **social environment**. They’ve noted that parents’ social economic status, measured by education, occupation, and income, affects their children’s political participation and views, as does their civic engagement, political knowledge, and political participation.”
- ▶ “Network analysts tend to see this as a **contagion** effect more than as influence by a vaguely defined environment: David Nickerson (2008) found, for example, that college students living with someone who frequently discusses politics become more likely to do so as well. Casey Klofstad (2011) found that college students who have more political discussions with their roommates are more likely to vote or participate in civic associations.”

# Yang et al. – Political Networks

- ▶ “Being socially connected, in and of itself, is important for individuals to develop prosocial behaviors, which in turn leads to a greater level of civic and political engagement.”
- ▶ “Social integration in a friendship network also encourages **social capital development** and **fosters norms** of political participation. Social networks formed during adolescence affect civic and political engagement in adult life, embodied as trust in governments, volunteerism, voting, and partisanship (Settle, Bond, & Levitt, 2011).”
- ▶ “It is often thought that homogeneous social networks have a stronger effect as the individual will not experience cross-cutting (i.e., contradictory) pressures. But even **politically heterogeneous social networks**, in which members of the networks hold different political views, tend to increase political interests and activity among its members...researchers consistently have reported that political disagreement within a community network sparks greater political engagement (Anderson & Paskeviciute, 2005; Campbell, 2006; Oliver, 2003).”

# Yang et al. – Political Networks

- ▶ **Voting:** “Perhaps the most studied political behavior is voting. Other than the question of partisanship (i.e., who an individual votes for), political scientists are also interested in why voters vote in the first place. A large-scale study (Bond et al., 2012) revealed that **voting is contagious**, and that all voters can thus potentially start a “voting” cascade in their social networks: Their act of voting might be enough to convince their hesitant friends to vote, whose trip to the ballot box then causes their friends to join, and so on.”

# Yang et al. – Political Networks

- ▶ “The finding of the **indirect effects of voting** confirms existing studies (Nickerson, 2008), which claimed that each act of voting on average generates three votes as the behavior spreads through the network. It is not clear whether this is a case of online political mobilization, though: The study speculates it works mainly through strong ties, which exist offline but have an online representation.”

# Yang et al. – Political Networks

- ▶ “But traditional, offline mobilization through door-to-door campaigns seems to have indirect effects as well. In Denver and Minneapolis, Nickerson (2008) sent assistants to two-person households, encouraging some of them (in the treatment group) to vote and others (in the control group) to recycle. Individuals in the treatment group who opened the door were 10% more likely to vote. But the **other people living in the same household** were also 6% more likely to vote. Thus, 60% of the effect on the persons who answered the door is passed to their flatmates who had never directly interacted with the canvasser.”

# Yang et al. – Political Networks

- ▶ “Exactly what type of network configuration is conducive to such contagious or cascading effects for voter turnout? Nicholas Christakis and James Fowler (2009) investigated network data from studies conducted in Indianapolis and St. Louis and found that **the cascading effect is the strongest when the network transitivity is at 0.5**, when half of an individual’s friends know each other. The cascading effects are weak when the network transitivity is at 0 and none of the ego’s alters know each other or at 1 and the individual is surrounded by a network of contacts who all know each other as well. When the network transitivity is at 0, the network is disjointed and no communication or cascading can materialize. But when transitivity reaches 1, the network becomes too tightly knit to connect with the outside world.

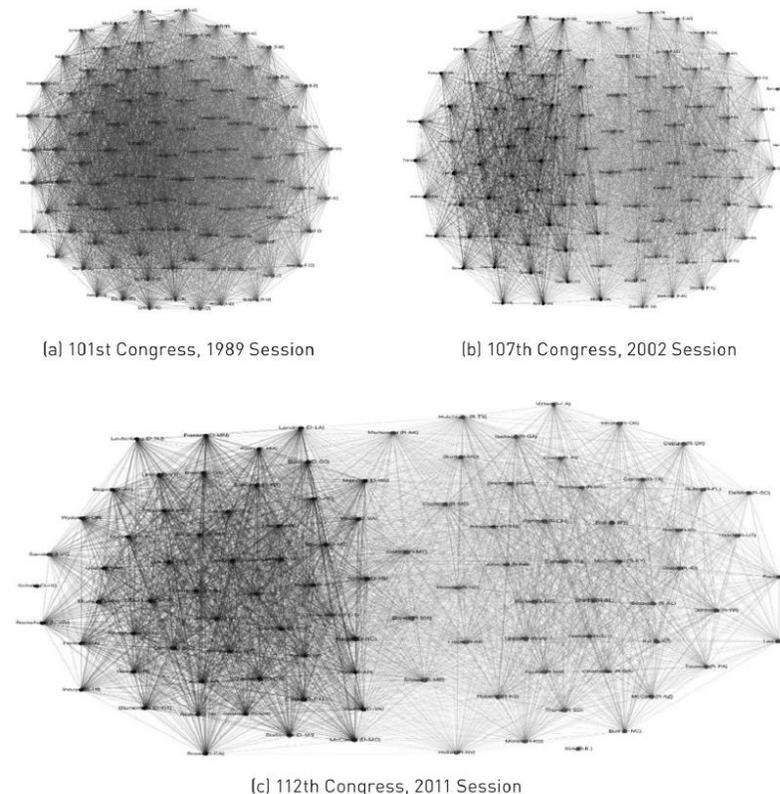
# Yang et al. – Political Networks

- ▶ **Protest:** “Although little consensus has emerged beyond the conclusion that protests are “contagious” and social networks important, some researchers have revealed interesting preliminary findings: Sandra González-Bailón, Javier Borge-Holthoefer, and Yamir Moreno (2013), for instance, found that “**hidden influentials**” exist.”
- ▶ “These Twitter users look like ordinary users (i.e., have few followers but follow a lot of others), but they are **often mentioned** by others and, thus, could be driving forces of the movement.”
- ▶ “David Siegel (2009) showed theoretically that certain network-level characteristics make it **easier for the opposition to coordinate** and that having a denser network can—counterintuitively—sometimes decrease political participation. The network structure also influences how government repression influences the movements: whether it falls apart or reacts with a backlash (Siegel, 2011).”

# Yang et al. – Political Networks

- ▶ **Legislative cosponsorship:** “Social network analysis of co-sponsorship networks divulges more than just the dynamics of pairs or positional characteristics of individual legislators: We can also examine how the external environment shapes or is shaped by the structure of the whole network.”
- ▶ “Justin Kirkland and Justin Gross (2014) explored changes in the co-sponsorship network over time and found that they are correlated with congressional approval rates. When the rating declines, legislators become willing to work across the aisle; the co-sponsorship networks become less clustered, more spread out; and there is less homophily along partisan lines.”

Figure 8.3 Social Network of Co-voting Between Congresspersons Across Four Decades

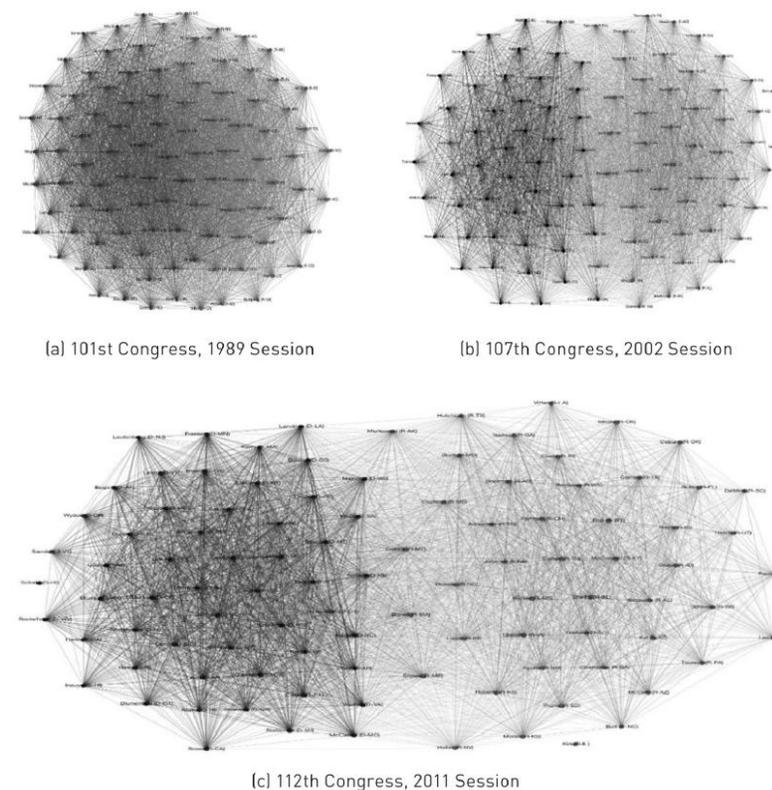


Note: Dark grey = Democrats; light grey = Republicans. © The Economist Newspaper Limited, London (12/7/2013).

# Yang et al. – Political Networks

- ▶ “The increased partisan bickering after Barack Obama’s election produced a negative public view of Washington, which results in a low approval rating for Congress. Thus, we should expect less partisanship and more working across the aisles between politicians under Obama’s administration. On the contrary, a recent article in The Economist (Lucioni, 2013) reported increasing partisanship in co-voting between congresspersons over the decades (Figure 8.3).”

Figure 8.3 Social Network of Co-voting Between Congresspersons Across Four Decades

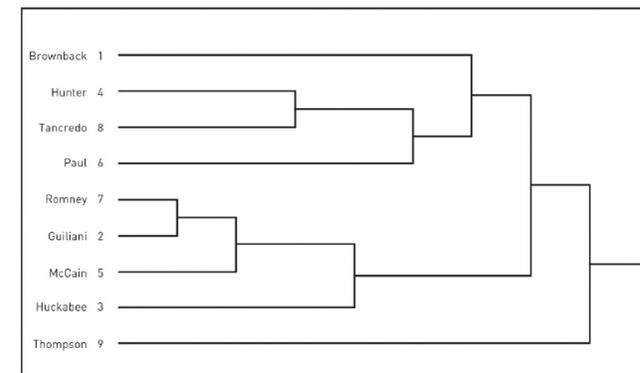
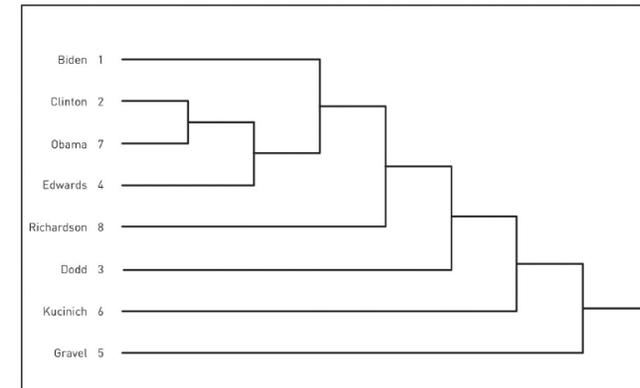


Note: Dark grey = Democrats; light grey = Republicans. © The Economist Newspaper Limited, London (12/7/2013).

# Yang et al. – Political Networks

- ▶ **Campaign contributions:**
- ▶ In a **dendrogram**...candidates who received funding from the same, or similar, subsets of donors will quickly merge, whereas candidates with fewer shared donors join later, as the merging criteria are weakened. Individuals at the center of a cluster have the biggest chance of ending up victorious: As other candidates give up the race, they are most likely to “inherit” the supporters of those drop-outs.

Figure 8.4 Dendrogram of Democratic Party (above) and Republican Party (below) Presidential Candidates in Their Shared Donor Network 2007

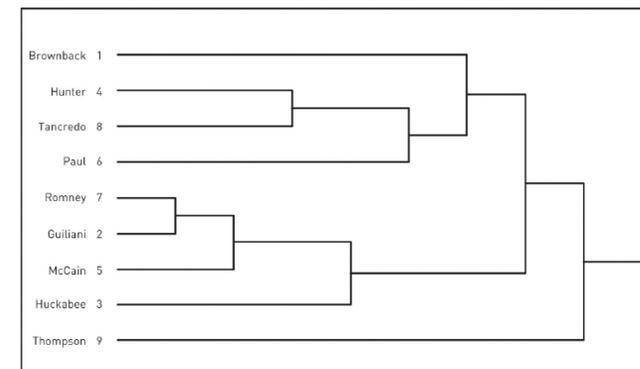
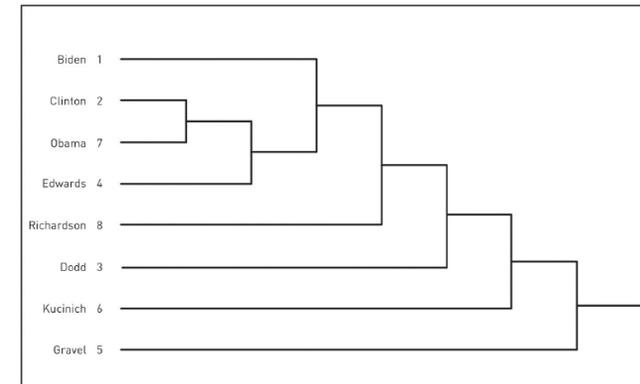


Note: Adapted from p. 79 of Dowdle, A., Limbocker, S., Yang, S., Stewart, P. A., & Sebold, K. (2013). The invisible hands of political parties in presidential elections: Party activists and political aggregation from 2004

# Yang et al. – Political Networks

- ▶ “Figure 8.4 shows that the dendrogram of the preprimary shared donation networks for the Democratic Party and the Republican Party in 2007 have marked differences: In the Democrat's dendrogram, the top contenders Obama and Clinton share the most donors and, thus, merge first. The remaining candidates join this “core” one after the other.”
- ▶ “In contrast, the Republican Party witnesses two competing cores, with Duncan Hunter, Tom Tancredo, and Ron Paul remaining in a separate cluster from that with the most promising candidates (Mitt Romney, Rudy Giuliani, and John McCain) until the second-to-last step.”

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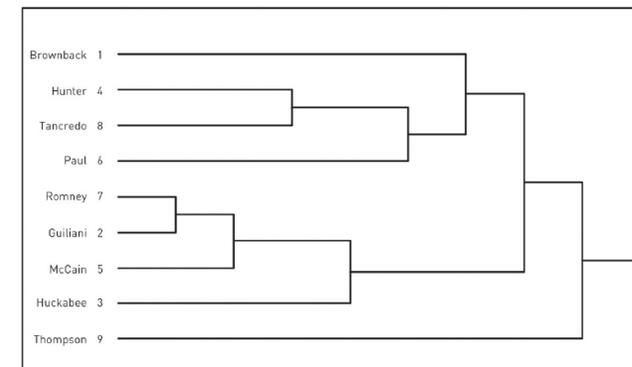
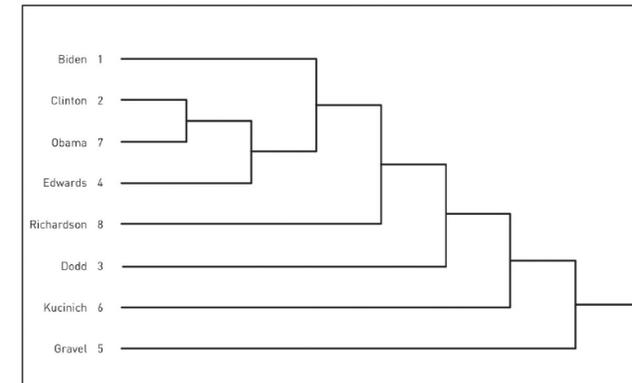


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# Yang et al. – Political Networks

- ▶ “The Republican camp, therefore, had a potentially troublesome cleavage between the two groups of candidates, whose respective supporters might not be easily convinced to join the other camp.”
- ▶ It is, thus, easy to imagine that donors to some of the more peripheral Democratic candidates would have little difficulty supporting the party nominee during the general election. In contrast, the Republican structure suggests a much more divisive financial campaign. It is plausible that those donating to the losing “cluster” around Tancredo, Hunter, and Paul would not be willing to switch their allegiance to the party nominee, John McCain.

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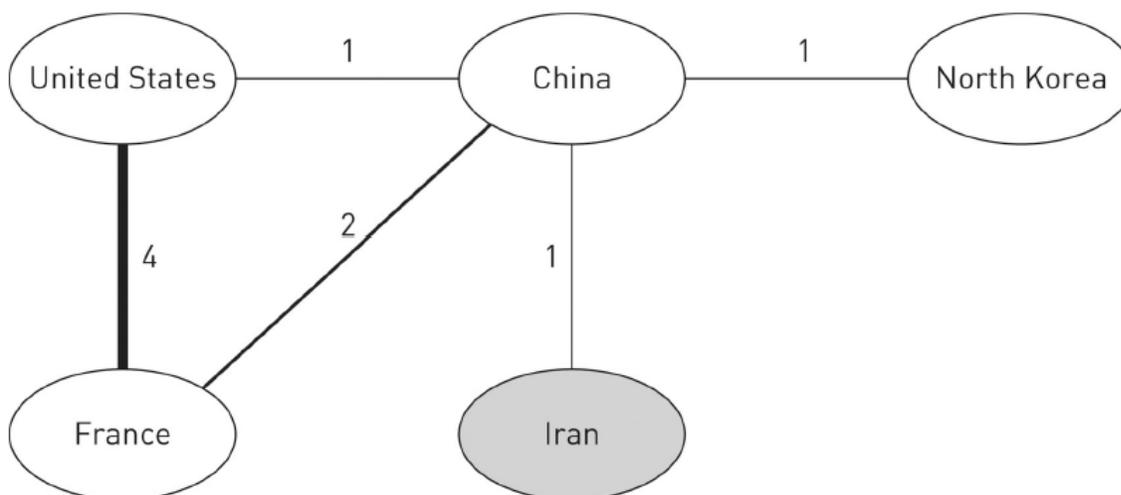


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# Yang et al. – Political Networks

- ▶ International Relations - Power and Hierarchy:
- ▶ “**Networks as a governance structure** represent a different kind of practice and reflect a different underlying logic than that of the market or the formal hierarchy (Podolny & Page, 1998; Powell, 1990).”
- ▶ “Actors in a given network pursue repeated, enduring exchange relations with one another, unlike the one-off meetings under the market logic.”

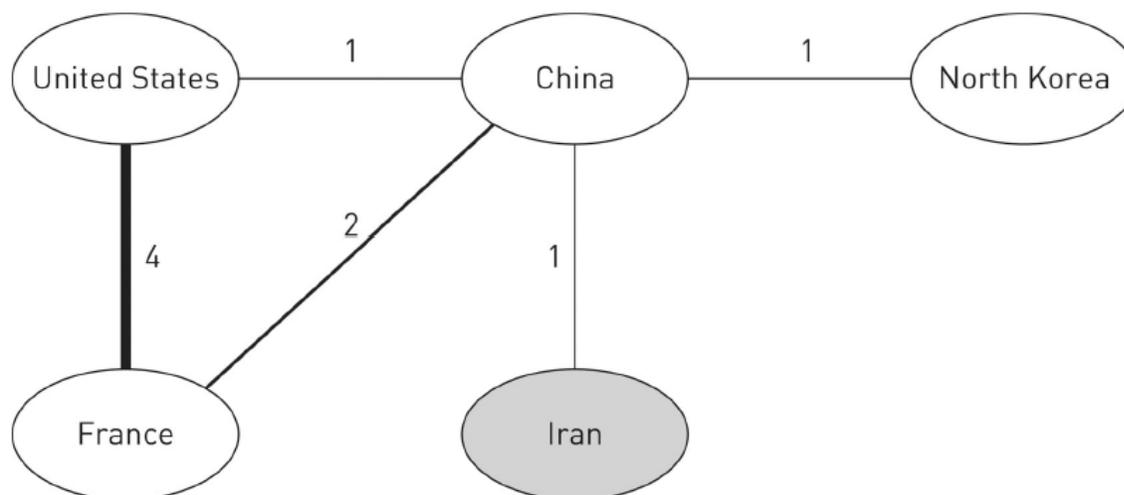
Figure 8.8 Network of Five Nations in Co-Affiliation in IGOs



# Yang et al. – Political Networks

- ▶ International Relations - Power and Hierarchy:
- ▶ “They also lack a legitimate organizational authority of the formal hierarchy to arbitrate and resolve disputes that may arise.”
- ▶ “Concerns for reputation and the fear of being excluded from the network of beneficial transactions in the future induce network members to follow the norms adopted in the network (Granovetter, 1985).”

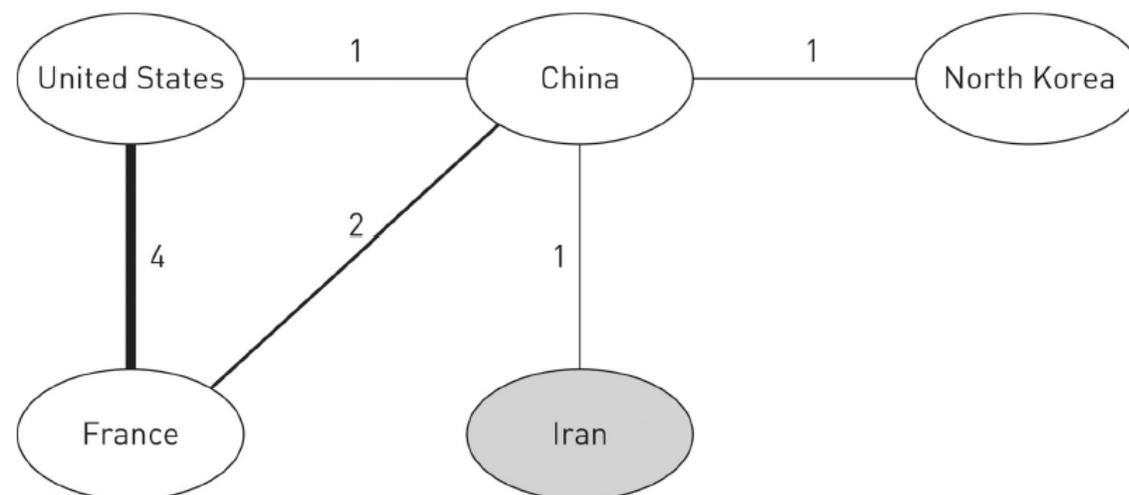
Figure 8.8 Network of Five Nations in Co-Affiliation in IGOs



# Yang et al. – Political Networks

- ▶ International Relations - Diffusion
- ▶ “Magnus Thor Torfason and Paul Ingram (2010) showed that the interstate network through joint memberships in IGOs is a fundamental power grid behind the **diffusion of democracy.**”

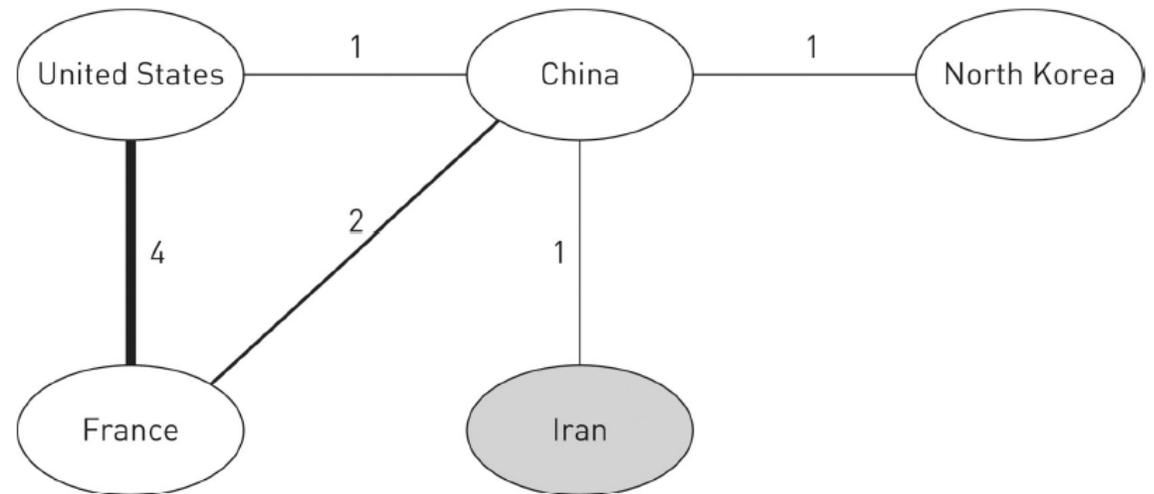
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# Yang et al. – Political Networks

- ▶ International Relations - Diffusion
- ▶ “States that come in contact with more democratic states in this IGO network are more likely to democratize themselves. The authors argued that this is mainly the result of what they call **normative isomorphism**—the message that democracy is the only legitimate form of government spreads through interactions within those IGOs until the participating authoritarian countries accept this view.”

Figure 8.8 Network of Five Nations in Co-Affiliation in IGOs



# Yang et al. – Political Networks

- ▶ International Relations - Diffusion
- ▶ “But the authors also found some evidence for a potentially more **coercive isomorphism**, as interaction with powerful or richer democracies in the IGO network makes democratization even more likely. In other words, the democratizing countries might be bowing to the economic or military might of the countries they encounter.”

Figure 8.8 Network of Five Nations in Co-Affiliation in IGOs

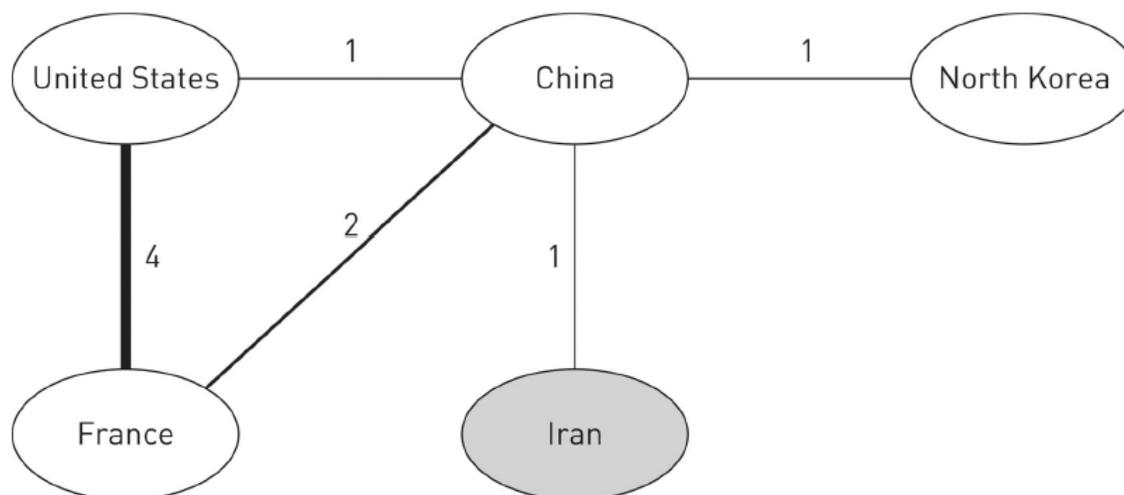
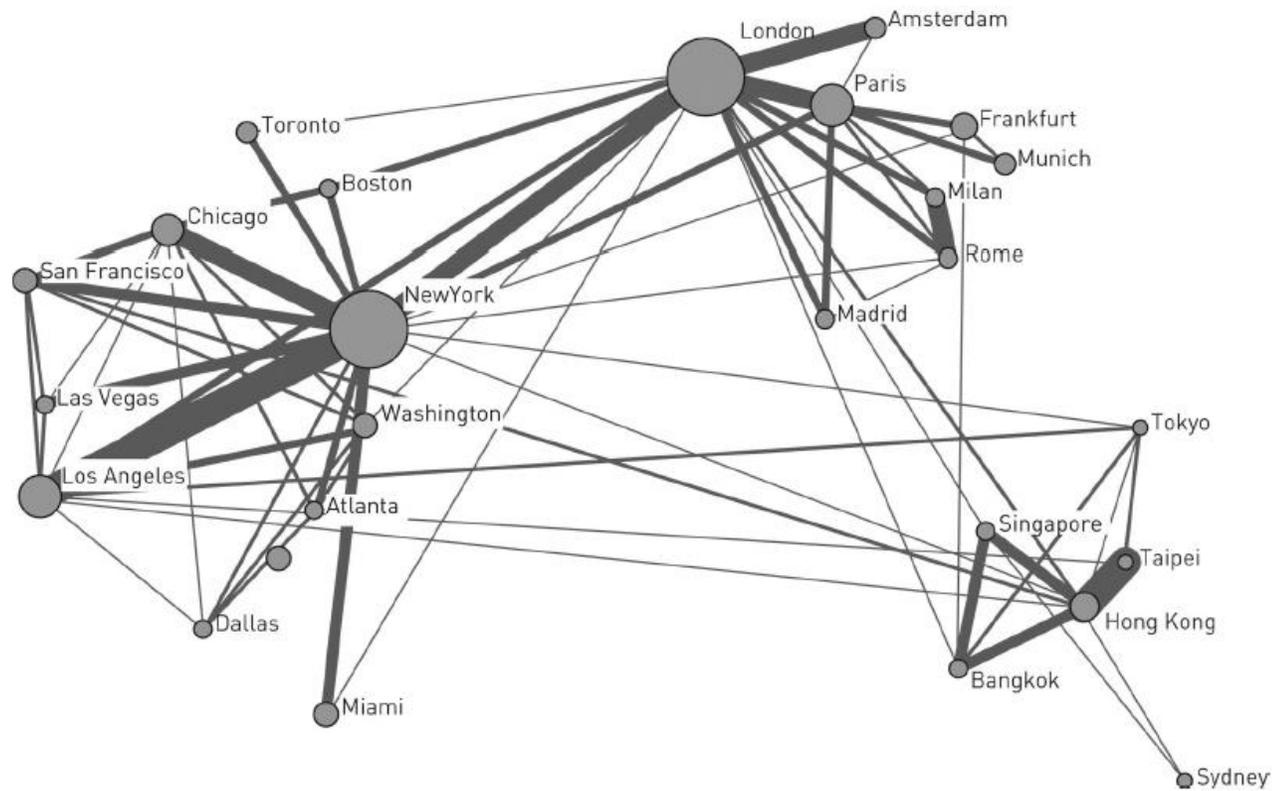


Figure 8.11 Inter-City Passenger Flow



# Yang et al. – Political Networks

# Adamic and Glance - The Political Blogosphere and the 2004 Election

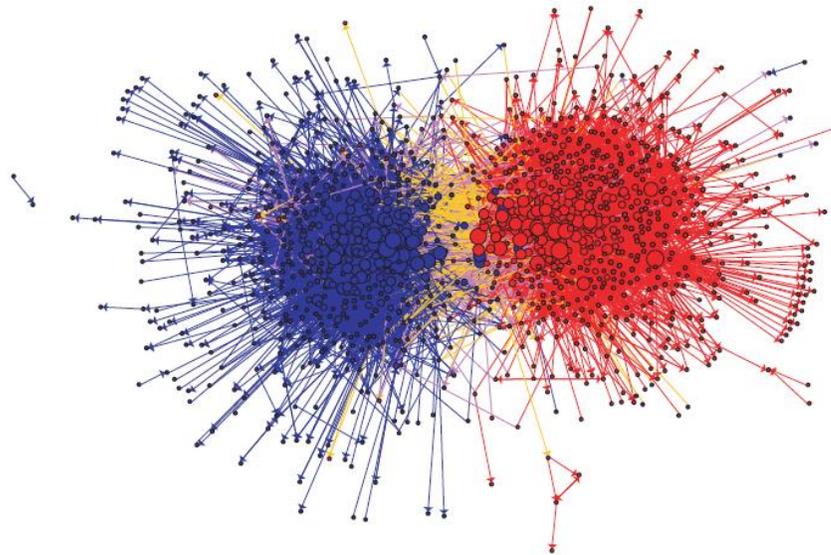


Figure 1: Community structure of political blogs (expanded set), shown using utilizing the GUESS visualization and analysis tool[2]. The colors reflect political orientation, red for conservative, and blue for liberal. Orange links go from liberal to conservative, and purple ones from conservative to liberal. The size of each blog reflects the number of other blogs that link to it.

- ▶ “[W]e analyze the posts of 40 “A-list” blogs over the period of two months preceding the U.S. Presidential Election of 2004, to study how often they referred to one another and to quantify the overlap in the topics they discussed.”
- ▶ “Weblogs may be read by only a minority of Americans, but their influence extends beyond their readership through their interaction with national mainstream media.”

# Adamic and Glance - The Political Blogosphere and the 2004 Election

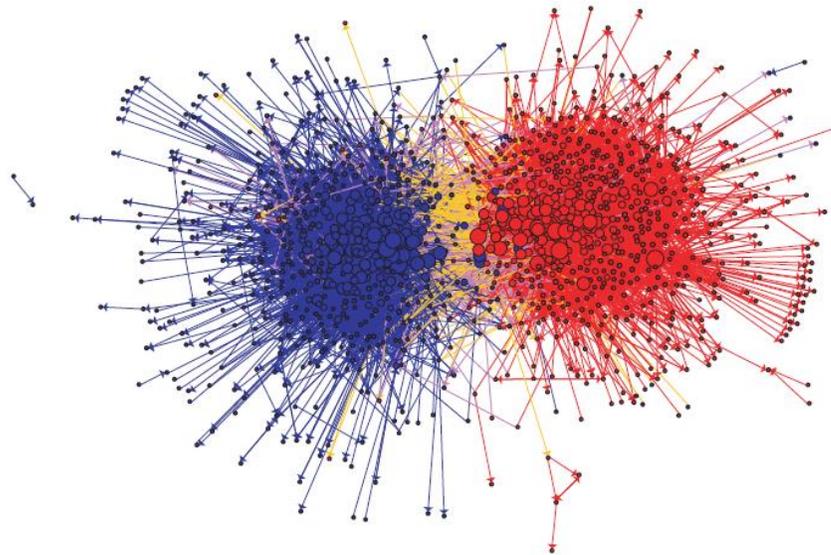


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- ▶ “the most popular political blogs also get a **disproportionate** number of links from other blogs...with a few blogs of either persuasion having over a hundred incoming links, while hundreds of blogs have just one or two.”
  - ▶ Preferential attachment?
- ▶ “From both samples we find that liberal and conservative blogs did indeed have **different lists** of favorite news sources...people, and topics to discuss, although they occasionally overlapped in their discussion of news articles and events.”

# Adamic and Glance - The Political Blogosphere and the 2004 Election

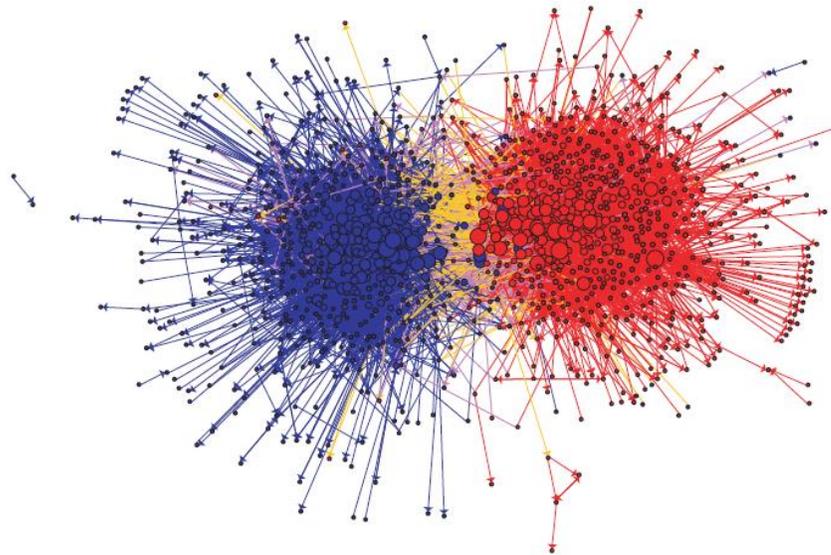


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- ▶ “The division between liberals and conservatives was further reflected in the **linking pattern** between the blogs, with a great majority of the links remaining **internal** to either liberal or conservative communities. Even more interestingly, we found differences in the behavior of the two communities, with conservative blogs linking to a greater number of blogs and with greater frequency.”

# Adamic and Glance - The Political Blogosphere and the 2004 Election

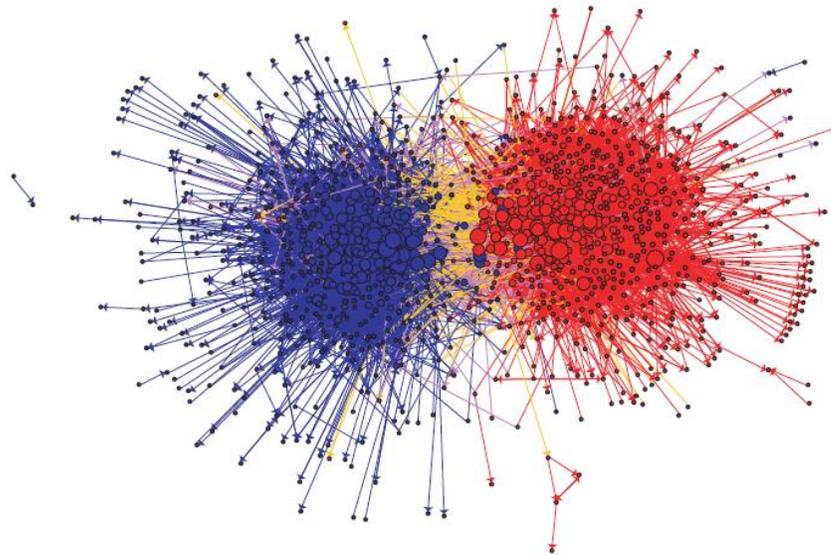
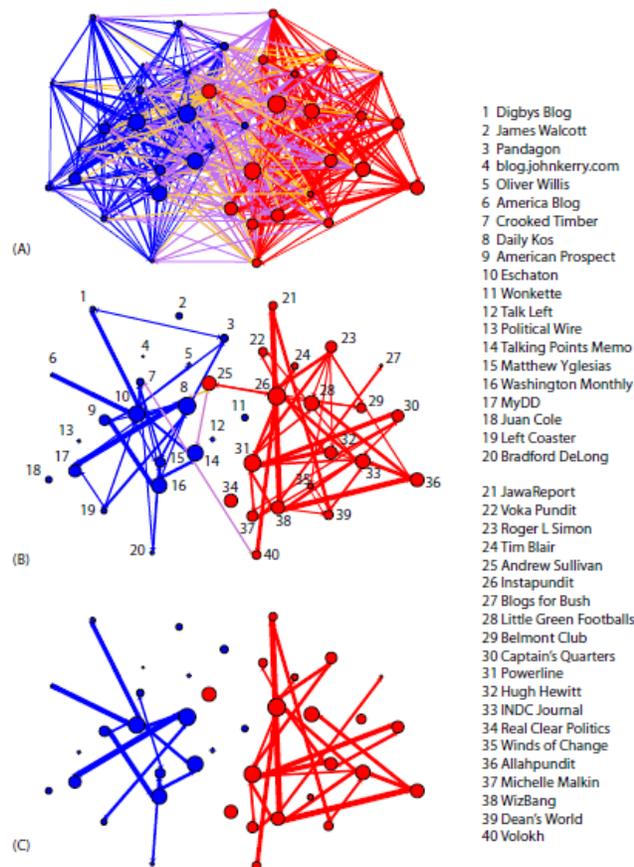


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- ▶ “Cross citing accounted for only 15% of the links, with liberals citing conservatives 247 times, and conservatives citing liberals 312 times. The interesting result is that even though the conservatives had 16% fewer posts, they posted 40% more links to one another, linking at a rate of 0.20 links per post, compared to just 0.12 for liberal blogs.”
- ▶ “We further found that the citations were concentrated among a smaller subset of the top 20 liberal blogs, but were relatively more distributed among the conservative blogs.”

# Adamic and Glance - The Political Blogosphere and the 2004 Election



- ▶ “Through these visualizations, we see that right-leaning blogs have a denser structure of strong connections than the left, although liberal blogs do have a few exceptionally strong reciprocated connections.”
- ▶ “we see both communities acting as mild **echo chambers** by frequently discussing separate sets of web pages and news items.”

**Figure 3: Aggregate blog citation behavior prior to the 2004 election. Color corresponds to political orientation, size reflects the number of citations received from the top 40 blogs, and line thickness reflects the number of citations between two blogs. (A) All directed edges are shown. (B) Edges having fewer than 5 citations in either or both directions are removed. (C) Edges having fewer than 25 combined citations are removed.**

# Adamic and Glance - The Political Blogosphere and the 2004 Election

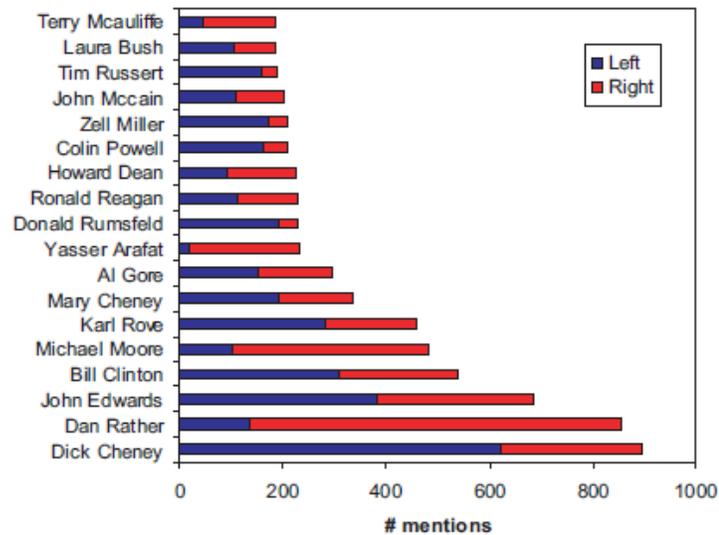


Figure 6: Mentions of political figures in liberal vs. conservative weblogs (excludes George W. Bush and John Kerry)

- ▶ “[T]he right leaning bloggers account for 59% of mentions of John Kerry, while the left account for 53% of mentions of George Bush.”
- ▶ “The chart shows that some political figures are the focus of attention of primarily one side of the political spectrum. For example, the following figures are cited by name predominantly by the right: Dan Rather, Michael Moore, Yasser Arafat and Terry McAuliffe.”

# Adamic and Glance - The Political Blogosphere and the 2004 Election

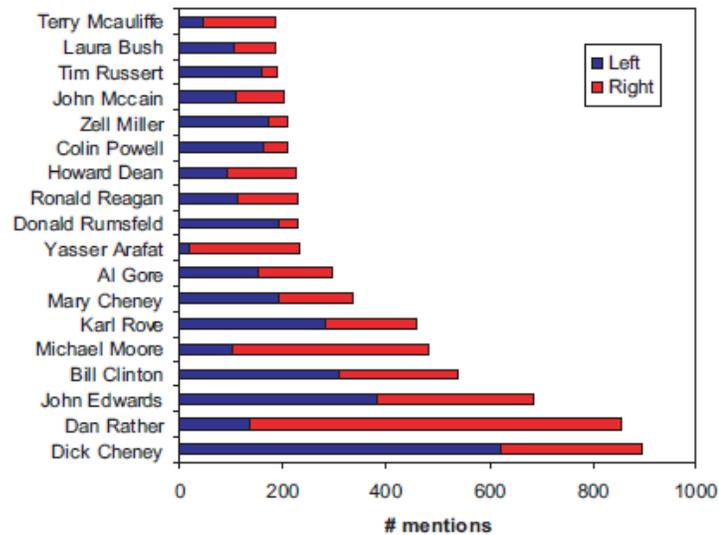


Figure 6: Mentions of political figures in liberal vs. conservative weblogs (excludes George W. Bush and John Kerry)

▶ “On the other hand, the left leaning bloggers account for most mentions of: Donald Rumsfeld, Colin Powell, Zell Miller and Tim Russert. Notice the overall pattern: Democrats are the ones more often cited by right-leaning bloggers, while Republicans are more often mentioned by left-leaning bloggers.”

# Bond et al. - A 61-million- person experiment in social influence and political mobilization

- ▶ In this Facebook experiment, “the messages directly influenced political self-expression, information seeking and real-world voting behavior of millions of people. Furthermore, the messages not only influenced the users who received them but also the users’ friends, and friends of friends.”

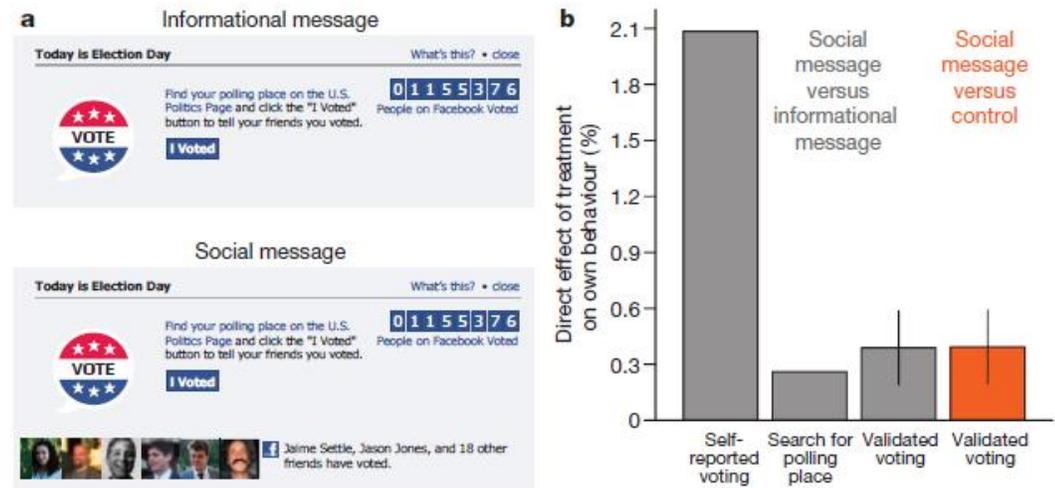


Figure 1 | The experiment and direct effects. a, b, Examples of the informational message and social message Facebook treatments (a) and their direct effect on voting behaviour (b). Vertical lines indicate s.e.m. (they are too small to be seen for the first two bars).

# Bond et al. - A 61-million- person experiment in social influence and political mobilization

- ▶ “The effect of social transmission on real-world voting was greater than the direct effect of the messages themselves, and nearly all the transmission occurred between ‘close friends’ who were more likely to have a face-to-face relationship. These results suggest that strong ties are instrumental for spreading both online and real-world behavior in human social networks.”

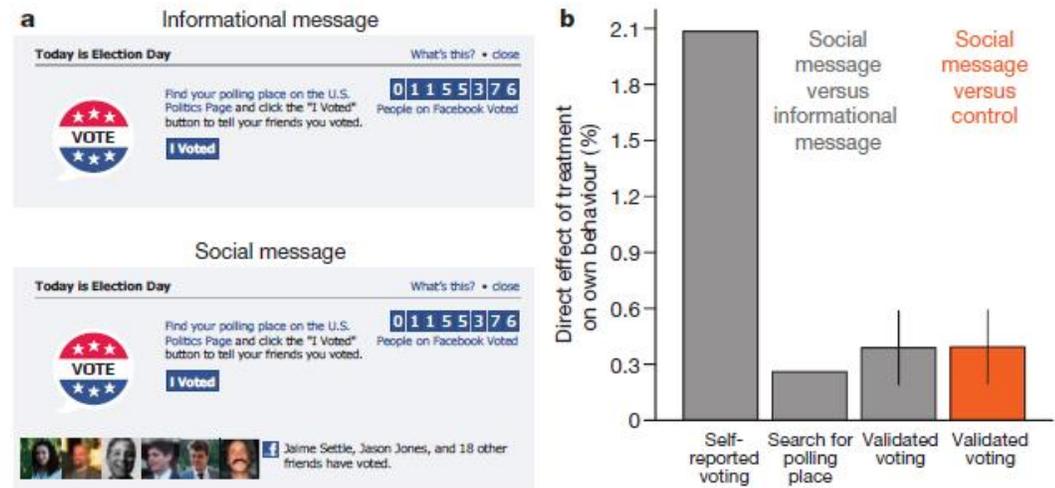
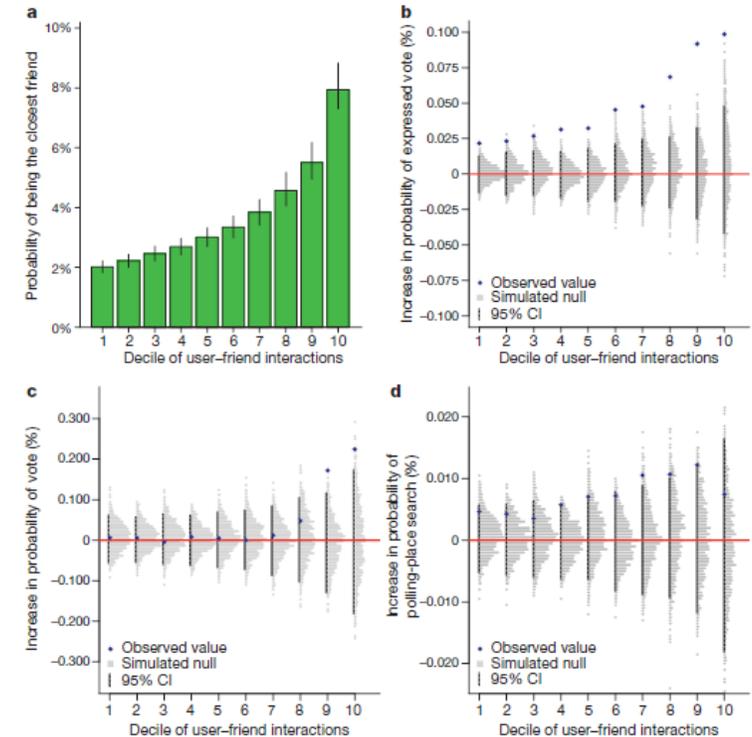


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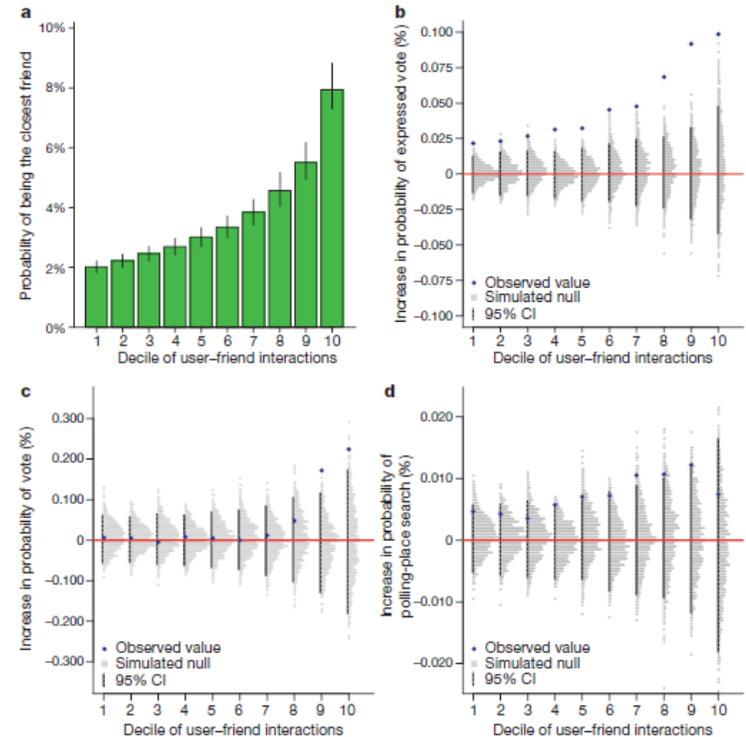
# Bond et al. - A 61-million-person experiment in social influence and political mobilization

- ▶ “Users in our sample had on average 149 Facebook friends...”
  - ▶ Recall Dunbar’s number
- ▶ [But] “close friendships accounted for all of the significant contagion of these behaviors, in spite of the fact that they make up only 7% of all friendships on Facebook.”
- ▶ “Our results suggest that the Facebook social message increased turnout **directly** by about 60,000 voters and **indirectly** through social contagion by another 280,000 voters, for a total of 340,000 additional votes. That represents about 0.14% of the voting”

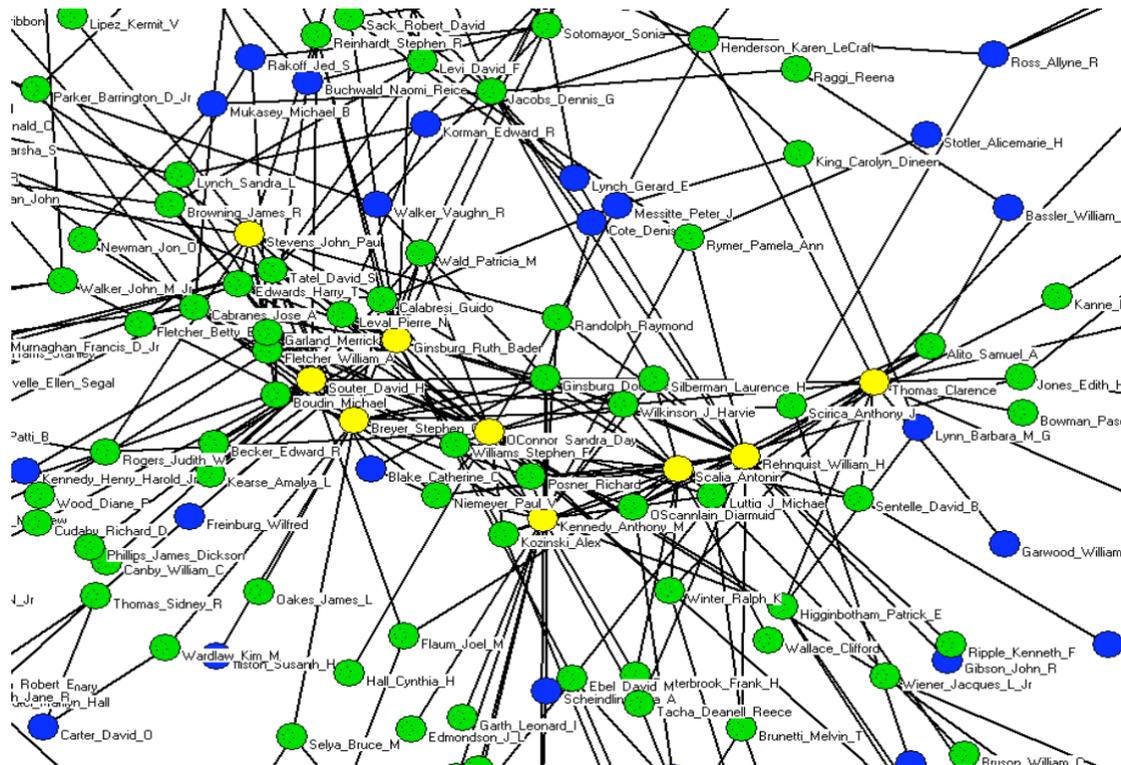


# Bond et al. - A 61-million-person experiment in social influence and political mobilization

- ▶ [In fact], “close friends exerted about four times more influence on the total number of validated voters mobilized than the message itself.”
- ▶ “Thus, efforts to influence behavior should pay close attention not only to the effect a message will have on those who receive it but also to the likelihood that the message and the behavior it spurs will spread from person to person through the social network.”
- ▶ “Online mobilization works **because it primarily spreads through strong-tie networks** that probably exist offline but have an online representation...it is plausible that unobserved face-to-face interactions account for at least some of the social influence that we observed in this experiment.”

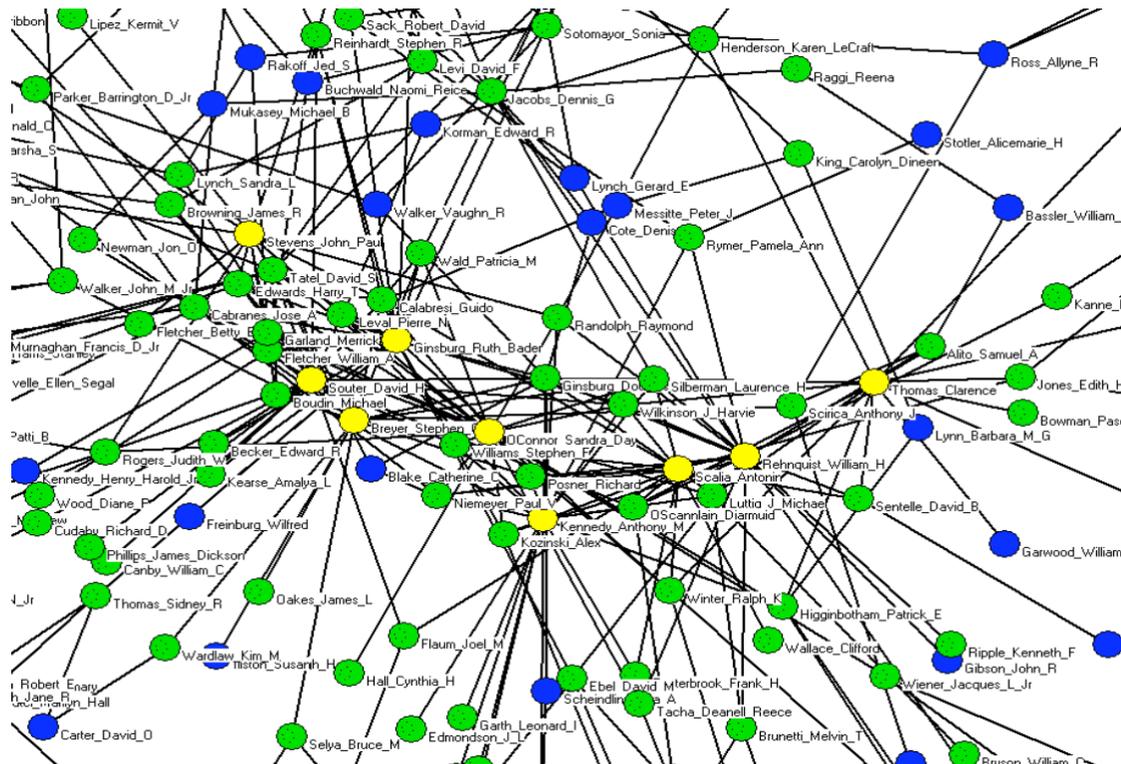


# Katz and Stafford - A Social Network Analysis of the Federal Judiciary



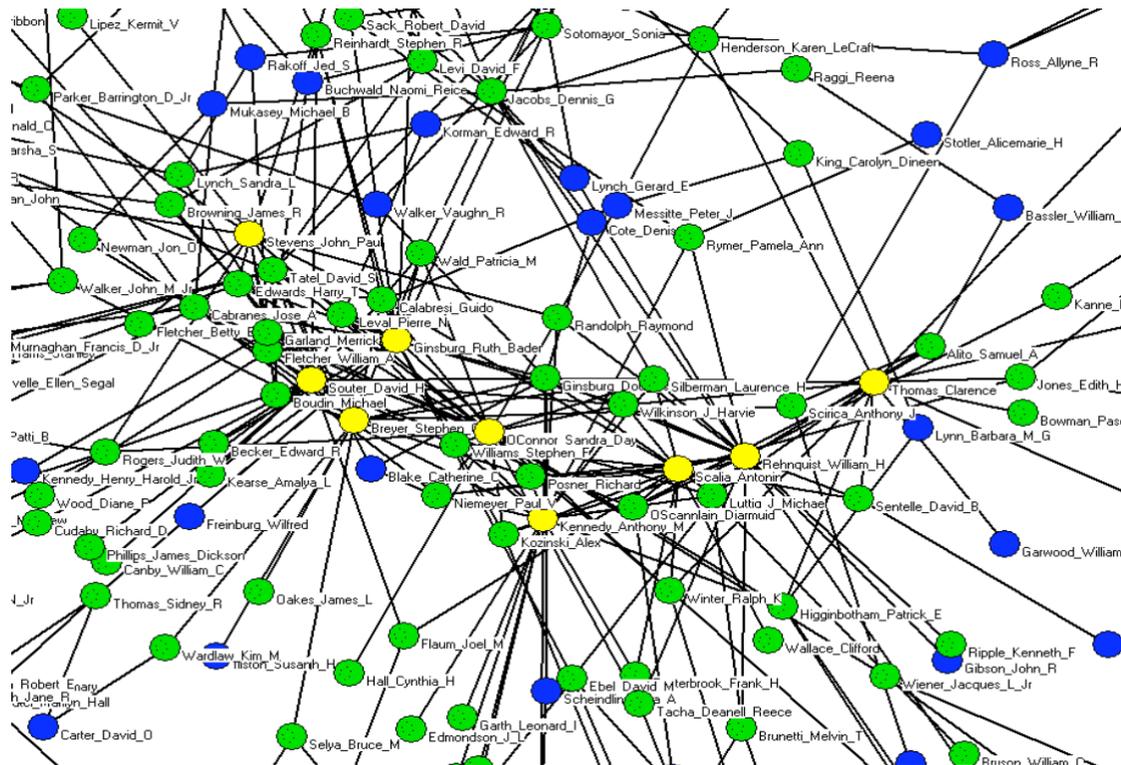
- ▶ “judicial social structure—**operationalized** as the professional and social connections between judicial actors—partially directs outcomes in the hierarchical federal judiciary.”
- ▶ “the flow of law clerks reflects a reasonable proxy for social and professional linkages between jurists.”
- ▶ “[W]e find the **distribution of “degrees”** is highly skewed, implying the social structure is dictated by a small number of socially-prominent actors.”

# Katz and Stafford - A Social Network Analysis of the Federal Judiciary



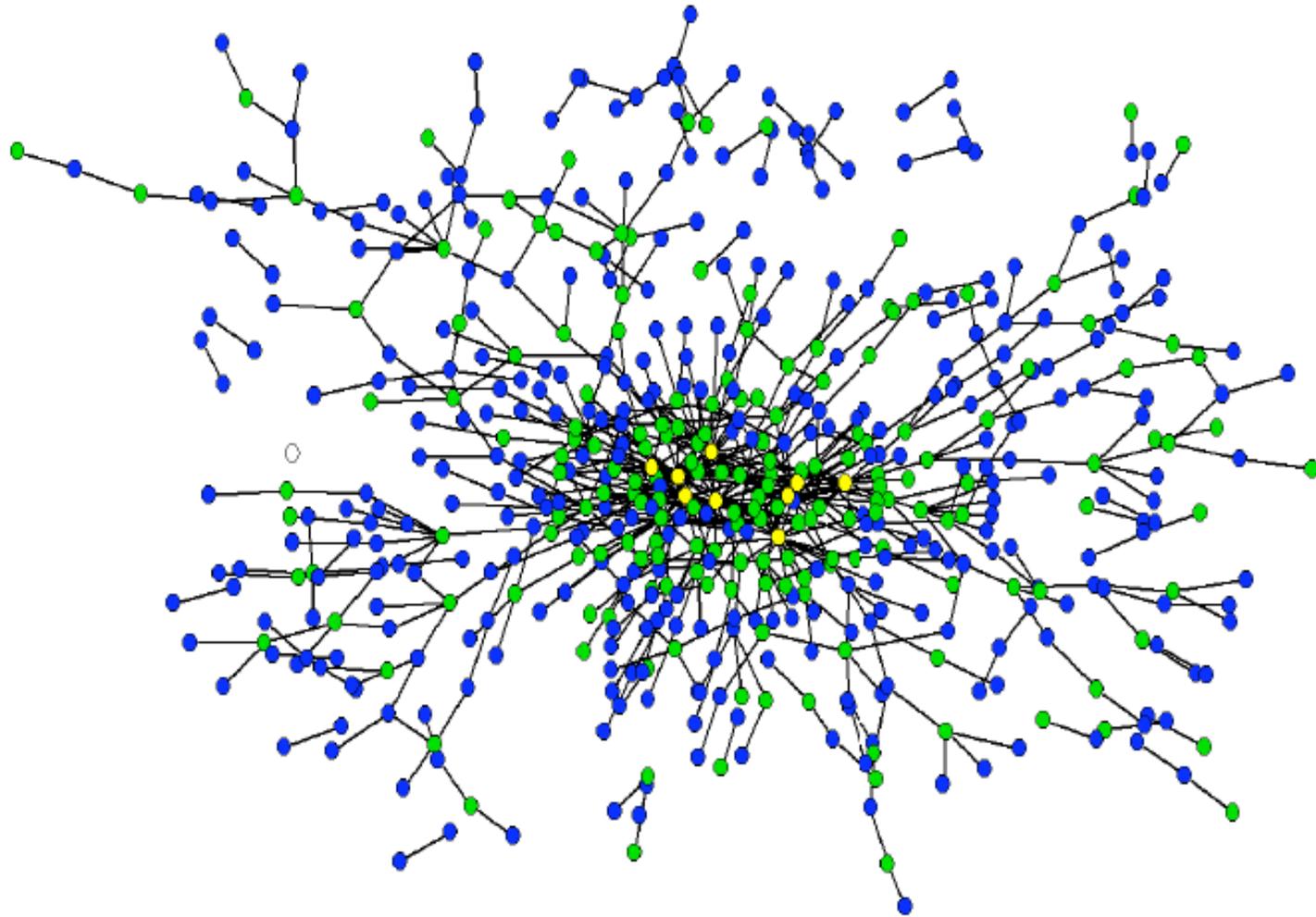
- ▶ “[W]hile the notion of a “feeder judge” is commonly invoked...visualization displays a host of secondary movers who “feed” the feeders thereby increasing their centrality within the network.”
- ▶ “Despite the presence of clear cliques or communities, the center of the network is dense and clustered enough to keep interconnected most of the members of the federal judiciary.”

# Katz and Stafford - A Social Network Analysis of the Federal Judiciary

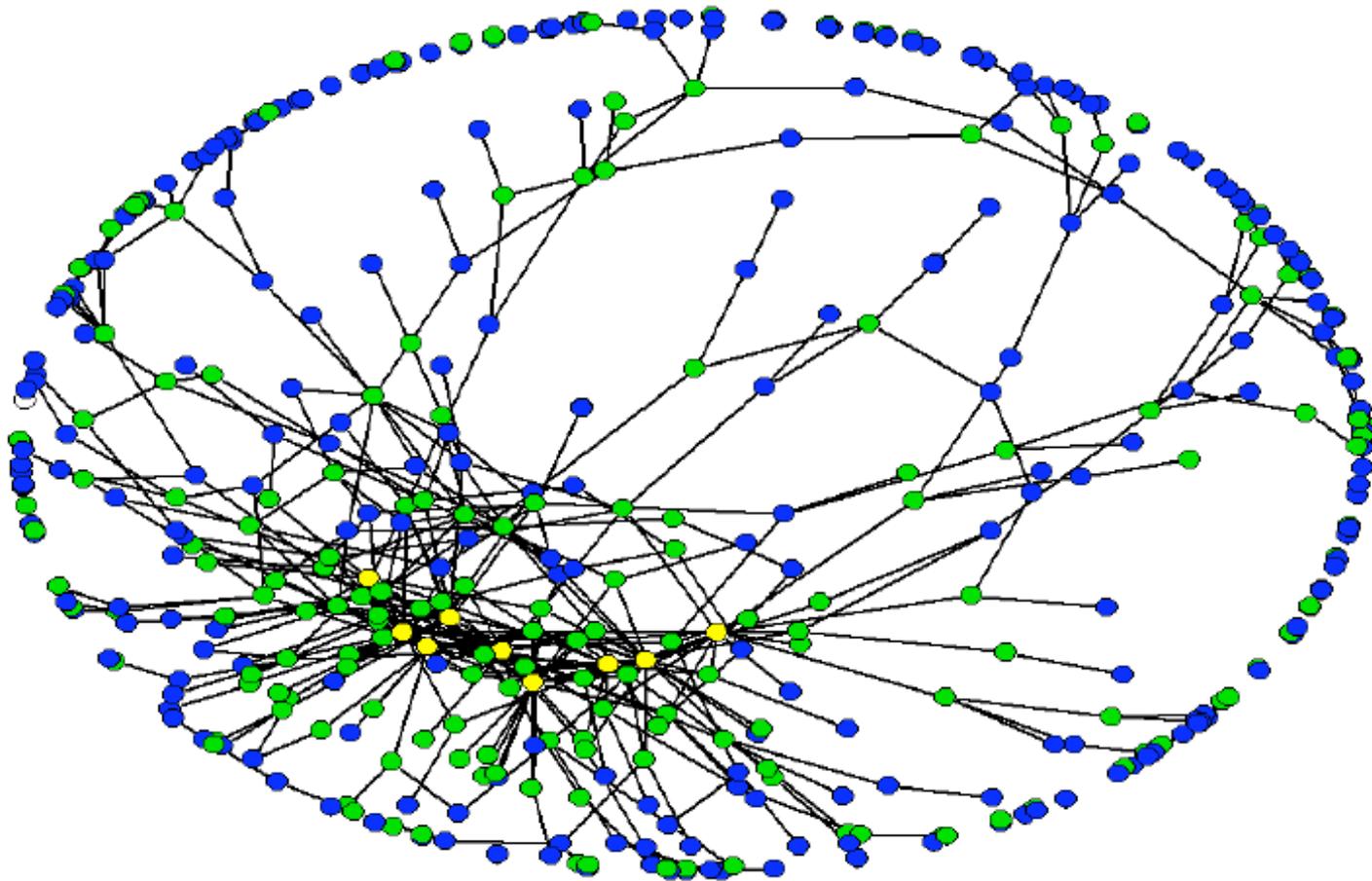


▶ “The nodes are the individual judges and, as operationalized, the edges reflect a weighted measure of shared clerks between the jurists. Although the traffic is directed, we explicitly choose to model the network as undirected because we believe the influence is bidirectional.”

▶ See footnote 125. They never explain why.

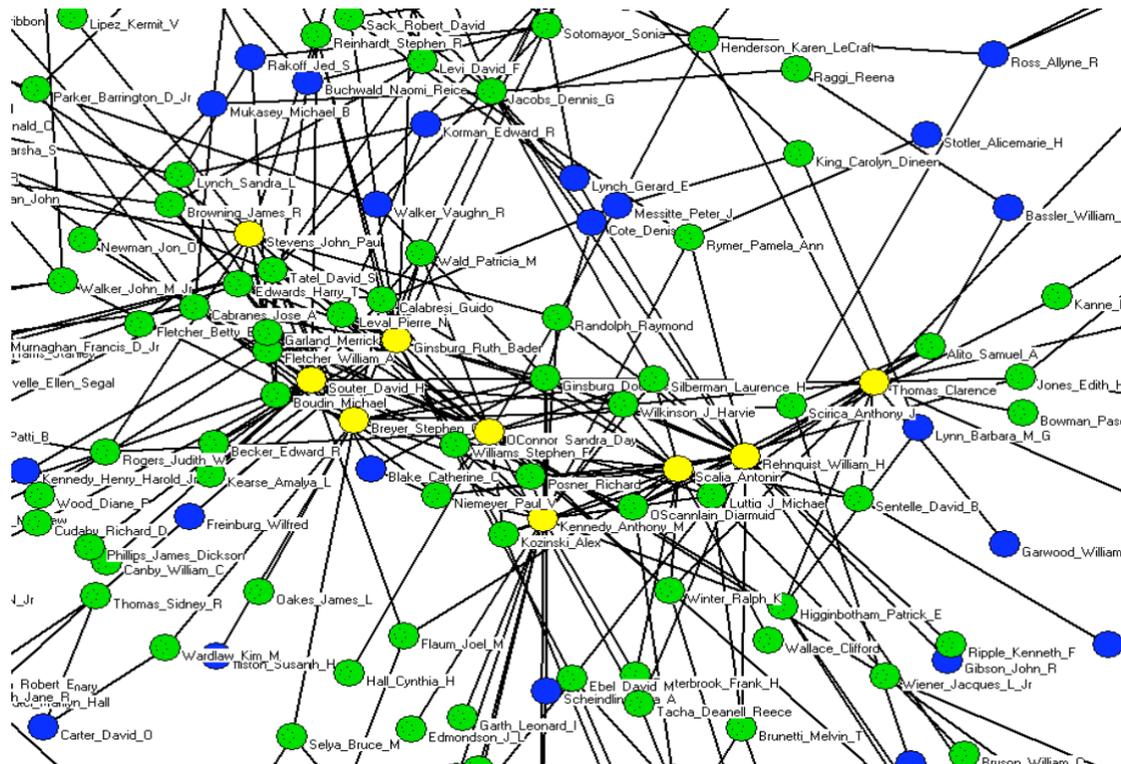


# Katz and Stafford - A Social Network Analysis of the Federal Judiciary



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- ▶ “In the context of the federal judiciary network, [closeness centrality] will be highest when a judge is on average nearer to the rest of the jurists than any other judge.”
- ▶ “Jurists that exhibit high betweenness [centrality] scores may act as gatekeepers that connect communities in a bowtie-like fashion. These jurists are...important in maintaining the connectivity of the network.”

Table 1: Ranking Jurists Using Various Measures of Centrality

Rank	Authority	Closeness	Betweenness
1	Luttig, J. Michael	Ginsburg, Douglas H.	Sotomayor, Sonia
2	Wilkinson, J. Harvie	Wilkinson, J. Harvie	Brunetti, Melvin T.
3	Kozinski, Alex	Silberman, Laurence H.	Gillmor, Helen W.
4	Silberman, Laurence H.	Randolph, A. Raymond	Straub, Chester J.
5	O'Scannlain, Diarmuid	Tatel, David S.	Henderson, Karen LeCraft
6	Calabresi, Guido	Jacobs, Dennis G.	Gilman, Ronald Lee
7	Tatel, David S.	Luttig, J. Michael	Tjoflat, Gerald B.
8	Posner, Richard	Calabresi, Guido	Gibbons, Julia Smith
9	Ginsburg, Douglas H.	Williams, Stephen F.	Randolph, A. Raymond
10	Sentelle, David B.	Kozinski, Alex	Tatel, David S.
11	Boudin, Michael	Winter, Ralph K.	Gleeson, John
12	Edwards, Harry T.	Gleeson, John	Black, Susan Harrell
13	Williams, Stephen F.	Cabranes, José A.	Arnold, Morris S.
14	Garland, Merrick B.	O'Scannlain, Diarmuid	Walker Jr., John M.
15	Jones, Edith Hollan	Garland, Merrick B.	Sentelle, David B.

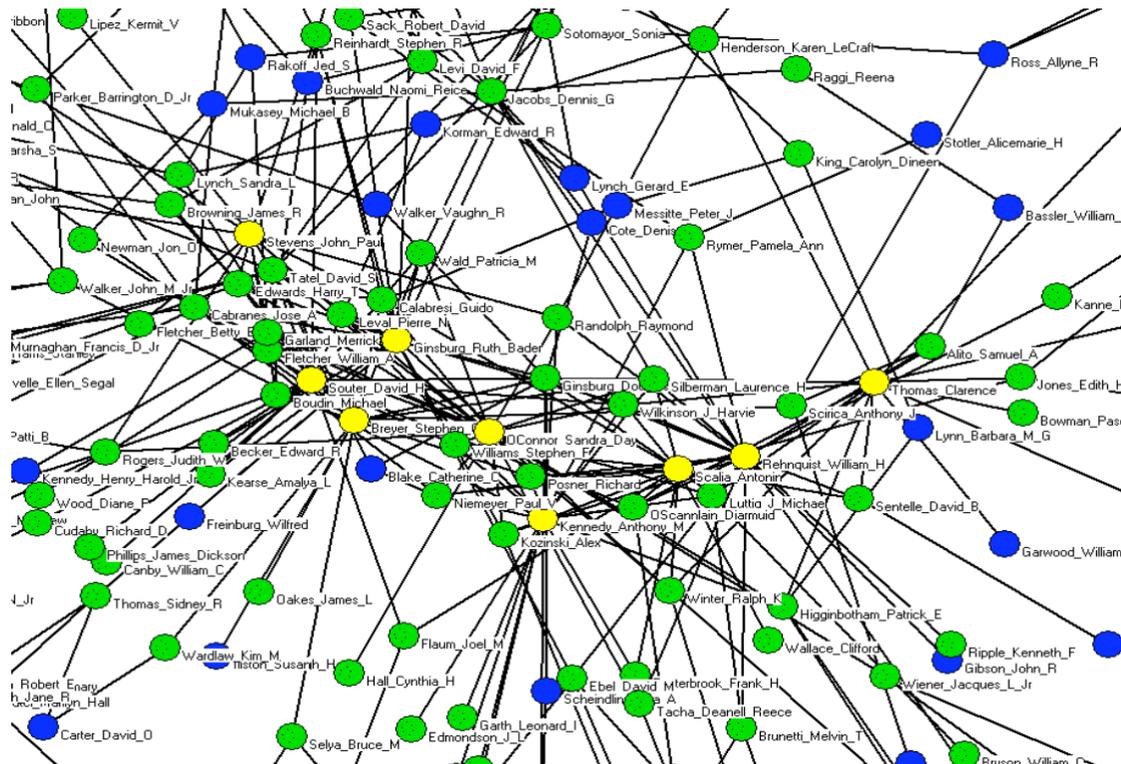
# Katz and Stafford - A Social Network Analysis of the Federal Judiciary

Table 2: Degree Distribution

<b>% of Judges</b>	<b>District Judges</b>	<b>Circuit Judges</b>	<b>Aggregate</b>
with Degree 0	57.43%	23.20%	<b>50.04%</b>
	(522)	(58)	<b>(580)</b>
with Degree 1	25.85%	21.60%	<b>24.16%</b>
	(235)	(54)	<b>(280)</b>
with Degree 2	9.90%	18.40%	<b>11.73%</b>
	(90)	(46)	<b>(136)</b>
with Degree 3	3.96%	11.60%	<b>5.61%</b>
	(36)	(29)	<b>(65)</b>
with Degree 4	1.87%	8.40%	<b>3.28%</b>
	(17)	(21)	<b>(38)</b>
with Degree 5	0.33%	6.00%	<b>1.56%</b>
	(3)	(15)	<b>(18)</b>
with Degree 6– 10 inclusively	0.55%	6.80%	<b>1.90%</b>
	(5)	(17)	<b>(22)</b>
with Degree greater than 10	0.11%	7.6%	<b>1.73%</b>
	(1)	(19)	<b>(20)</b>
<b>Total</b>	<b>909</b>	<b>250</b>	<b>1159</b>

# Katz and Stafford - A Social Network Analysis of the Federal Judiciary

# Katz and Stafford - A Social Network Analysis of the Federal Judiciary



- ▶ “Using the MLE approach, the alpha for the judicial social network is  $\{-2.38\}$ , placing it in the traditional  $2 < \alpha < 3$  interval for a power law...
- ▶ “[T]he empirical evidence presented herein is consistent with prior scholarship describing and documenting the fractal nature of the American common law and its constitutive institutions.”

# James Fowler - Connecting the Congress

- ▶ “[W]hat exactly does it mean to be connected?”
- ▶ “How do we observe the network of social connections between legislators?”
- ▶ “I study a network that provides substantial information about how legislators are connected to one another: the network of legislative cosponsorships.”
  - ▶ “rules in both the House and the Senate dictate that only one legislator can claim sponsorship.”

# James Fowler - Connecting the Congress

- ▶ “Using large-scale network analysis, I map the cosponsorship networks of all 280,000 pieces of legislation proposed in the U.S. House and Senate from 1973 to 2004. In these networks, a directional link can be drawn from each cosponsor of a piece of legislation to its sponsor since it represents support for the sponsor’s legislative efforts.
  - ▶ “To ensure that the networks analyzed are relatively static, I partition the data by chamber and Congress to create 32 separate cosponsorship networks.”

# James Fowler - Connecting the Congress

- ▶ “Several scholars have studied individual motivations for cosponsorship...there have also been a number of studies that seek to understand aggregate cosponsorship behavior.”
- ▶ “I posit that cosponsorship contains important information about the social support network between legislators. For purposes of illustration, consider two different kinds of cosponsorship, active and passive.”
  - ▶ Active: An active cosponsor actually helps write or promote legislation
  - ▶ Passive: a passive cosponsor will merely sign on to legislation she supports.

# James Fowler - Connecting the Congress

- ▶ “Table 1 shows that the mean average distances for each chamber and Congress are quite short, suggesting that legislative networks are very densely connected.”
- ▶ “In the Senate the **mean average distance** ranges from 1.17 to 1.51, whereas in the House it ranges from 1.58 to 1.95. In other words, in the Senate the average member is directly connected to nearly all the other Senators, whereas in the House the average member tends to be indirectly connected through at most a single intermediary to all the other Representatives.

Table 1 Characteristics of cosponsorship networks, 1973–2004

Congress	Years	Total sponsors	Total "bills"	Mean "bills"		Mean cosponsors per "bill"	Cosponsors per legislator	Mean distance
				sponsored by each legislator	cosponsored by each legislator			
House								
93rd	1973–1974	442	20,994	48	129	3	70	1.95
94th	1975–1976	439	19,275	44	151	3	79	1.89
95th	1977–1978	437	18,578	42	170	4	93	1.83
96th	1979–1980	436	10,478	24	187	8	111	1.76
97th	1981–1982	435	10,062	23	223	10	132	1.72
98th	1983–1984	435	9095	21	297	14	157	1.65
99th	1985–1986	432	8606	20	329	17	171	1.61
100th	1987–1988	436	8093	18	341	18	174	1.60
101st	1989–1990	438	8423	19	370	19	184	1.58
102nd	1991–1992	436	8551	19	339	17	172	1.61
103rd	1993–1994	437	7464	17	259	15	144	1.67
104th	1995–1996	433	6558	15	168	11	105	1.77
105th	1997–1998	439	6780	15	219	14	127	1.73
106th	1999–2000	437	7894	18	278	15	151	1.67
107th	2001–2002	441	7541	17	273	16	143	1.68
108th	2003–2004	438	7636	17	276	16	147	1.67
Senate								
93rd	1973–1974	101	5123	51	153	3	54	1.46
94th	1975–1976	100	4913	49	137	3	52	1.48
95th	1977–1978	102	4722	45	121	3	49	1.51
96th	1979–1980	99	4188	41	135	3	54	1.46
97th	1981–1982	101	9674	96	219	2	68	1.31
98th	1983–1984	101	11,228	111	294	3	77	1.24
99th	1985–1986	101	7596	75	324	4	75	1.24
100th	1987–1988	101	7782	77	361	5	83	1.17
101st	1989–1990	100	7370	74	376	5	82	1.17
102nd	1991–1992	101	7686	75	335	4	79	1.21
103rd	1993–1994	101	5824	58	232	4	70	1.30
104th	1995–1996	102	8101	79	176	2	59	1.41
105th	1997–1998	100	7001	70	212	3	67	1.33
106th	1999–2000	102	8265	81	290	4	76	1.24
107th	2001–2002	101	8745	87	261	3	71	1.30
108th	2003–2004	100	7804	78	285	4	72	1.27

Note. "Bills" include any bill, resolution, or amendment offered in the House or Senate. Complete data for amendments starts in the 97th Congress.

# James Fowler - Connecting the Congress

- ▶ “Figure 1 shows two examples of these distance calculations for the 108th House. Interestingly, the representative who received the most unique cosponsorships was Representative Randy “Duke” Cunningham, who was forced to resign when it was discovered that he had been taking payments to influence other legislators in order to get defense contracts approved.”

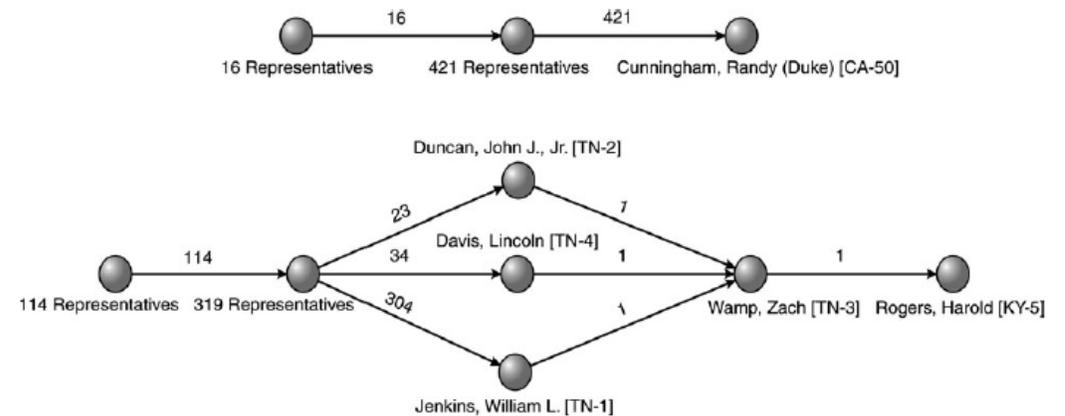


Fig. 1 Example of cosponsorship distance between legislators.

# James Fowler - Connecting the Congress

- ▶ “Cunningham received cosponsorships from 421 legislators and thus had a distance of 1 to each of them. The remaining 16 legislators to whom he had no direct connection were cosponsors on bills sponsored by one of the 421 legislators to whom he did have a direct connection. These legislators had a distance of 2. Thus, the average distance between Cunningham and the other legislators in the network was 1.04.”

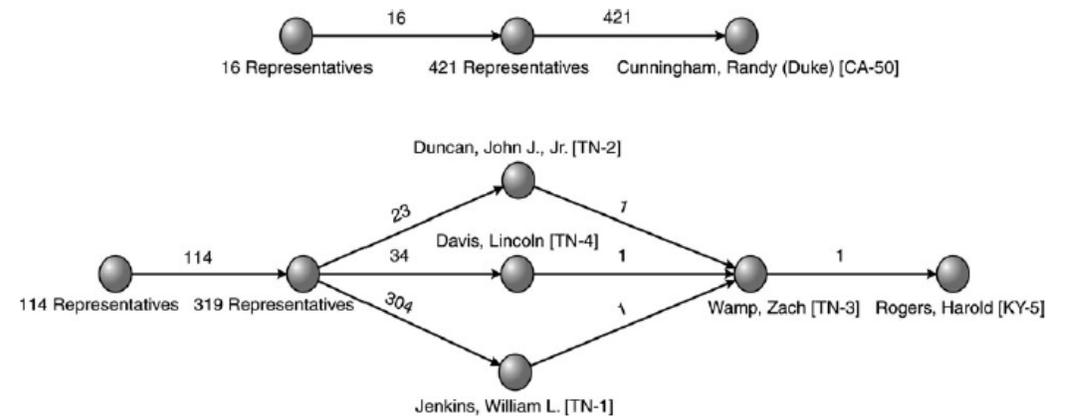


Fig. 1 Example of cosponsorship distance between legislators.

# James Fowler - Connecting the Congress

- ▶ “At the other extreme, Harold Rogers received a direct cosponsorship by a single individual—Representative Zach Wamp. Wamp received support from three other individuals, who in turn received support from 319 representatives. The remaining 114 individuals cosponsored at least one bill by someone in the group of 319. Thus, Rogers had a distance of 1 to 1 legislator, 2 to 3 legislators, 3 to 319 legislators, and 4 to 114, for an average distance of 3.25.”

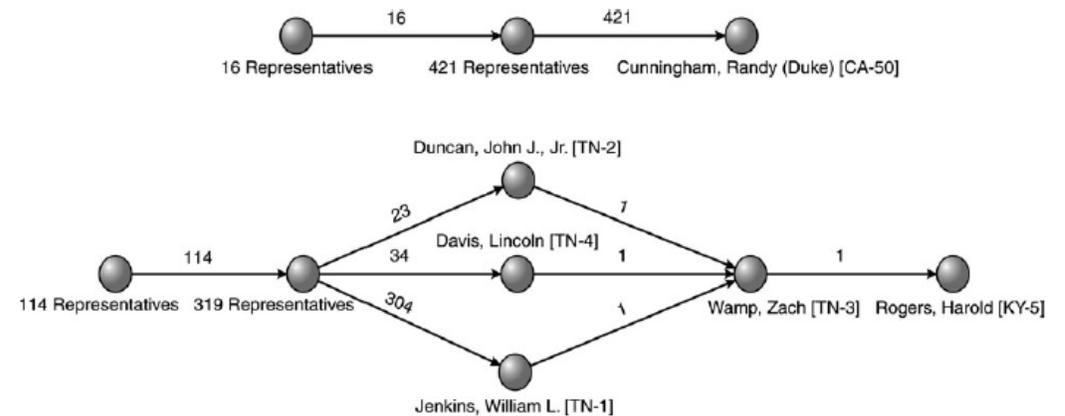


Fig. 1 Example of cosponsorship distance between legislators.

# James Fowler - Connecting the Congress

- ▶ **Centrality:** “Who is the most central legislator? Table 3 presents the scores and names of the top performers on each of these traditional measures of importance by chamber and Congress.”
- ▶ “The first two columns show the total number of bills sponsored and the total number of unique cosponsors (degree centrality), respectively. These values should have a strong relationship with other measures of centrality since they reflect the total number of opportunities for cosponsorship and the breadth of direct support an individual receives from other legislators. Column two also presents closeness centrality scores.”

**Table 3** Highest scoring legislator in each chamber and Congress

Congress	Most bills sponsored	Most unique cosponsors/ highest closeness centrality	Highest betweenness centrality	Highest eigenvector centrality
<b>House</b>				
93rd	286 Roe, Robert A. [D-NJ-8]	354/0.84 O'Neill Thomas [D-MA-8]	3349 Wolff, Lester [D-NY-6]	0.157 O'Neill Thomas [D-MA-8]
94th	309 Pepper, Claude [D-FL-14]	434/0.99 O'Neill Thomas [D-MA-8]	2975 Murphy, John [D-NY-17]	0.168 O'Neill Thomas [D-MA-8]
95th	325 Roe, Robert A. [D-NJ-8]	396/0.91 Burton, John L. [D-CA-5]	2917 Nolan, Richard [D-MN-6]	0.141 Burton, John L. [D-CA-5]
96th	122 Roe, Robert A. [D-NJ-8]	386/0.89 Anderson, Glenn [D-CA-32]	2660 Whitehurst, Goerge [R-VA-2]	0.126 Anderson, Glenn [D-CA-32]
97th	150 Michel, Robert [R-IL-18]	408/0.93 Conte, Silvio [R-MA-3]	1949 Whitehurst, Goerge [R-VA-2]	0.115 Conte, Silvio [R-MA-3]
98th	122 Biaggi, Mario [D-NY-19]	406/0.93 Downey, Thomas [D-NY-2]	1457 Simon, Paul [D-IL-22]	0.096 Simon, Paul [D-IL-22]
99th	112 Biaggi, Mario [D-NY-19]	391/0.90 Pepper, Claude [D-FL-14]	1432 Kaptur, Marcia [D-OH-9]	0.091 Pepper, Claude [D-FL-14]
100th	104 Michel, Robert [R-IL-18]	400/0.92 Hughes, William [D-NJ-2]	1378 Kolter, Joseph [D-PA-4]	0.089 Panetta, Leon [D-CA-16]
101st	106 Solomon, Gerald [R-NY-24]	414/0.95 Bilirakis, Michael [R-FL-9]	1192 Roe, Robert A. [D-NJ-8]	0.088 Oakar, Mary Rose [D-OH-20]
102nd	107 Fawell, Harris W. [R-IL-13]	415/0.95 Kennelly, Barbara B. [D-CT-1]	2077 Towns, Edolphus [D-NY-11]	0.092 Kennelly, Barbara B. [D-CT-1]
103rd	102 Traficant, James [D-OH-17]	406/0.93 Moran, James P. [D-VA-8]	1934 Jacobs, Andrew [D-IN-10]	0.105 Moran, James P. [D-VA-8]
104th	144 Solomon, Gerald [R-NY-22]	405/0.93 Johnson, Nancy L. [R-CT-6]	2687 Traficant, James [D-OH-17]	0.135 Bliley, Tom [R-VA-7]
105th	158 Solomon, Gerald [R-NY-22]	387/0.89 Thomas, William [R-CA-21]	2282 Evans, Lane [D-IL-17]	0.115 Thomas, William [R-CA-21]
106th	115 Andrews, Robert E. [D-NJ-1]	416/0.96 Johnson, Nancy L. [R-CT-6]	2075 Shows, Ronnie [D-MS-4]	0.109 Johnson, Nancy L. [R-CT-6]
107th	110 Andrews, Robert E. [D-NJ-1]	432/0.98 Bilirakis, Michael [R-FL-9]	2507 English, Phil [R-PA-21]	0.115 Bilirakis, Michael [R-FL-9]
108th	120 Andrews, Robert E. [D-NJ-1]	421/0.96 Cunningham, Randy [R-CA-50]	1688 English, Phil [R-PA-3]	0.110 Cunningham, Randy [R-CA-50]
<b>Senate</b>				
93rd	161 Inouye, Daniel [D-HI]	99/0.99 Allen, James [D-AL]	181 Humphrey, Hubert [D-MN]	0.157 Allen, James [D-AL]
94th	207 Jackson, Henry [D-WA]	98/0.99 Byrd, Robert C. [D-WV]	175 Dole, Robert J. [R-KS]	0.161 Byrd, Robert C. [D-WV]
95th	138 Inouye, Daniel [D-HI]	103/1.00 Dole, Robert J. [R-KS]	272 Dole, Robert J. [R-KS]	0.175 Dole, Robert J. [R-KS]
96th	126 Inouye, Daniel [D-HI]	100/1.00 Byrd, Robert C. [D-WV]	133 Cohen, William [R-ME]	0.164 Byrd, Robert C. [D-WV]

None of the traditional measures of centrality takes advantage of two other pieces of information that might be helpful for determining the *strength* of social relationships that exist in the network. First, we have information about the total number of cosponsors  $c_\ell$  on each bill  $\ell$ . The binary indicator  $a_{ij}$  assigns a connection from legislator  $i$  to  $j$ , regardless of whether a bill has 1 cosponsor or 100. However, legislators probably recruit first those legislators to whom they are most closely connected. Moreover, as the total number of cosponsors increases, it becomes more likely that the cosponsor is recruited by an intermediary other than the sponsor, increasing the possibility that there is no direct connection at all. Thus, bills with fewer total cosponsors probably provide more reliable information about the real social connections between two legislators than bills with many cosponsors (Burkett 1997). This relationship might take several different functional forms, but I assume a simple one: the strength of the connection between  $i$  and  $j$  on a given bill  $\ell$  is posited to be  $1/c_\ell$ .

Second, we have information about the total number of bills sponsored by  $j$  that are cosponsored by  $i$ . Legislators who frequently cosponsor bills by the same sponsor are more likely to have a real social relationship with that sponsor than those who cosponsor only a few times. We have already seen that the quantity of bills cosponsored  $q_{ij}$  is a better predictor of mutual cosponsorship than the simple binary indicator  $a_{ij}$ . This suggests that we might use information about the quantity of bills to denote the strength of the tie between  $i$  and  $j$ . To incorporate this information with the assumption about the effect of the number of cosponsors into a measure of connectedness, let  $a_{ij}^\ell$  be a binary indicator that is 1 if legislator  $i$  cosponsors a given bill  $\ell$  that is sponsored by legislator  $j$  and 0 otherwise. Then the *weighted* quantity of bills cosponsored  $w_{ij}$  will be the sum  $w_{ij} = \sum_\ell a_{ij}^\ell / c_\ell$ .

# James Fowler - Connecting the Congress

# James Fowler - Connecting the Congress

- ▶ **Connectedness:** “We can now use these weights to create a measure of legislative connectedness. Suppose the direct distance from legislator j to legislator i is the simple inverse of the cosponsorship weights...We can use these distances to calculate the shortest distance between any two legislators.”
  - ▶ “...we can expect a legislator ranked at the 95th percentile for connectedness to pass 3.13 times more amendments than a legislator ranked at the fifth percentile.”

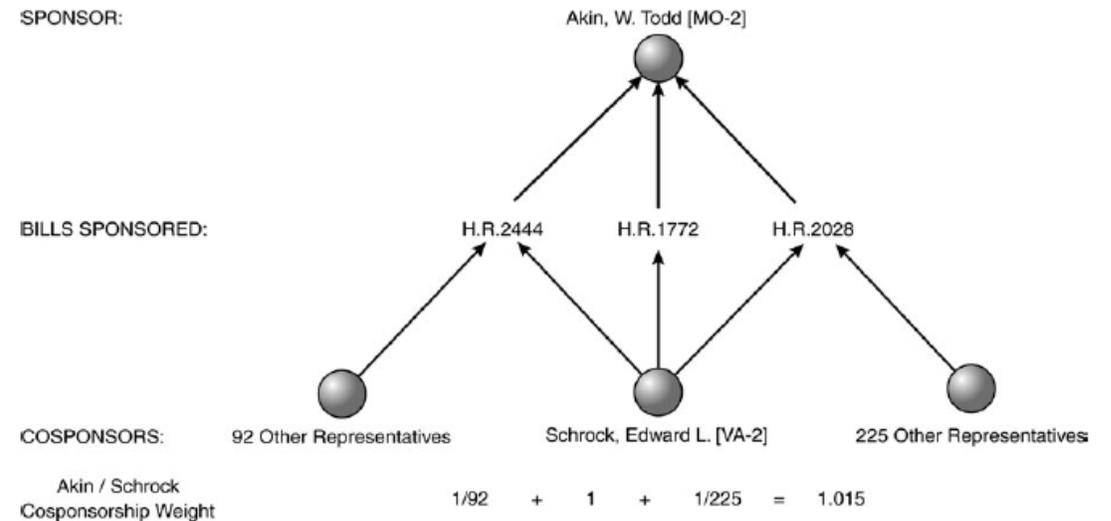
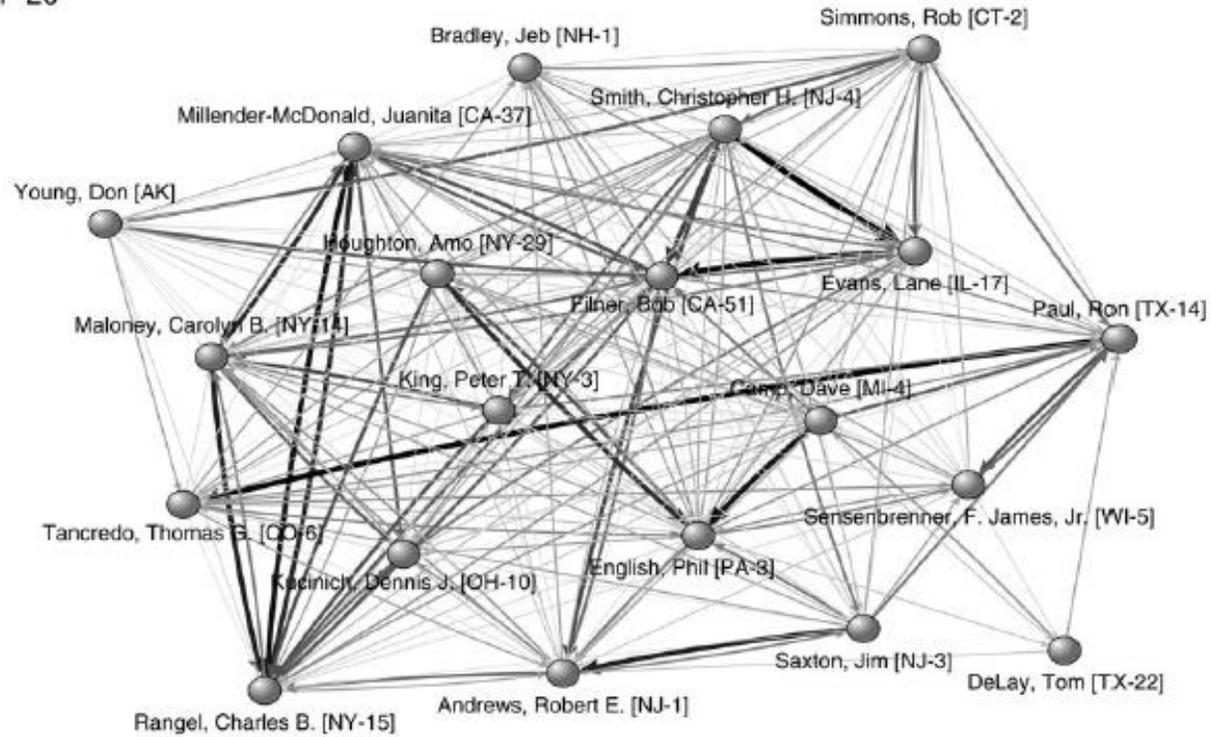


Fig. 2 Weighted cosponsorship distance calculation example.

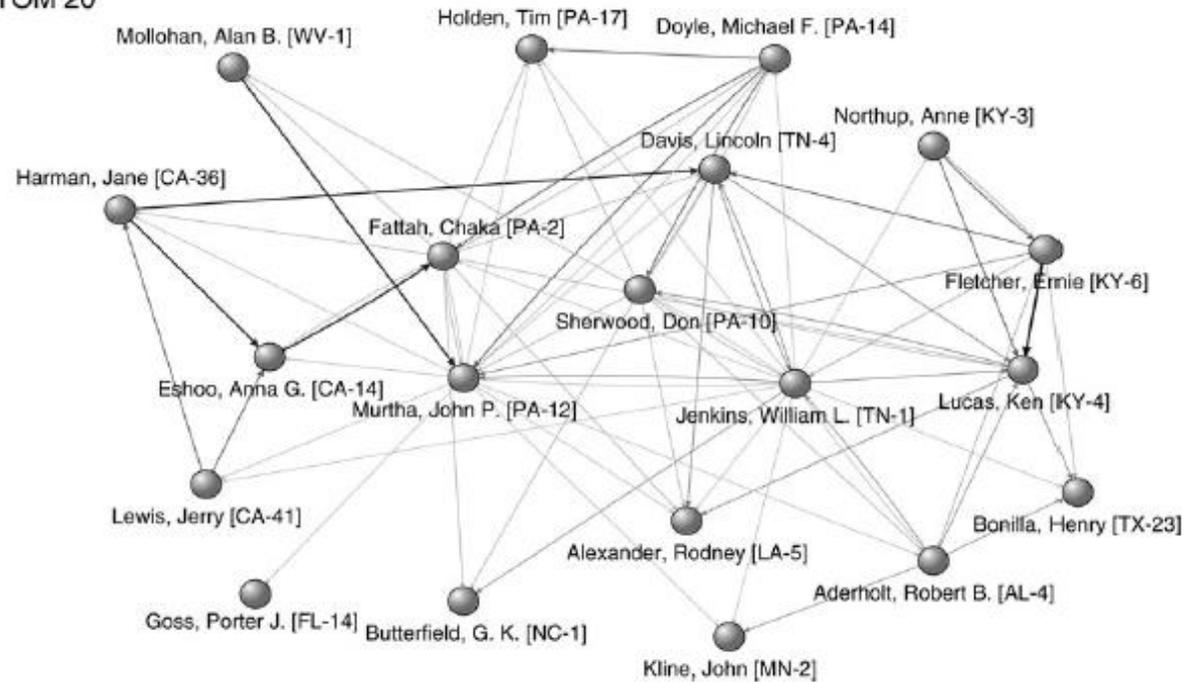
TOP 20



# James Fowler - Connecting the Congress

# James Fowler - Connecting the Congress

BOTTOM 20



**Fig. 3** Most and least connected legislators in the 108th House. These graphs only show connections among the 20 most connected (top 20) and among the 20 least connected (bottom 20). Connections between these two groups and to the other legislators in the 108th House are not shown. Graphs are drawn using Pajek (de Nooy, Mrvar, and Batagelj 2005).

# James Fowler and Sangick Jeon - The Authority of Supreme Court Precedent

- ▶ Background: “Legal historians suggest that justices in the 19th Century responded to the crisis of legitimacy by strengthening the norm of stare decisis, a legal norm inherited from English common law that encourages judges to follow precedent by letting the past decision stand.”
- ▶ “Recognizing that legitimacy is essential to achieve their policy objectives, the members of the Court justify their substantive rulings through court opinions, which allow the justices to demonstrate how their decisions are consistent with existing legal rules and principles established in prior cases.”

# James Fowler and Sangick Jeon - The Authority of Supreme Court Precedent

- ▶ “[T]he literature has ignored a rich source of accessible information about the role of precedent—the assessments of the justices themselves.”
- ▶ “Each judicial citation contained in an opinion is essentially a latent judgment about the case cited. When justices write opinions, they spend time researching the law and selecting precedents to support their arguments. Thus, the citation behavior of the Court’s provides information about which precedents serve important roles in the development of American law.”

# James Fowler and Sangick Jeon - The Authority of Supreme Court Precedent

- ▶ “[W]e describe a network analysis procedure...that aggregates the latent judgments in the citation network into authority scores and hub scores.”
- ▶ “The **authority score** of a case depends on the number of times it is cited and the quality of the cases that cite it. Symmetrically, the hub score of a case depends on the number of cases it cites and the quality of the cases cited.”
- ▶ “Thus, authority scores indicate the degree to which a case is thought to be important for resolving other important issues that come before the Court, while hub scores indicate the degree to which a case is well-grounded in previous important rulings.”

# James Fowler and Sangick Jeon - The Authority of Supreme Court Precedent

- ▶ “Of course, not all judicial citations represent a reliance on authority. It is possible that opinion writers sometimes cite a case just to mention it in passing or because they disagree. However, regardless of the content, each citation is a latent judgment by the justice who authors it about which cases are most important for resolving questions that face the Court.”
- ▶ “Since legal rules are cited to provide convincing legal justifications, the fact that the opinion writer choose to cite a case in an opinion rather than leave it out suggests that the citation, even if it is not a reliance on authority, provides applicable information about the role of various precedents in the legal network.”

# James Fowler and Sangick Jeon - The Authority of Supreme Court Precedent

- ▶ “We show that cases with high authority scores are much more likely than others to appear on lists of “**landmark**” cases chosen by legal experts and political scientists for their “importance” and “salience.”
- ▶ “Authority scores also predict which cases experts will identify as **important in the future**—all without incorporating any information about the content of these decisions.”
- ▶ “Another virtue of the network analysis approach is that we can determine which rulings were thought to be most important and which were most carefully grounded in prior precedent **at any point in time**. This allows us to test several hypotheses about the rise and fall of precedent.”

# James Fowler and Sangick Jeon - The Authority of Supreme Court Precedent

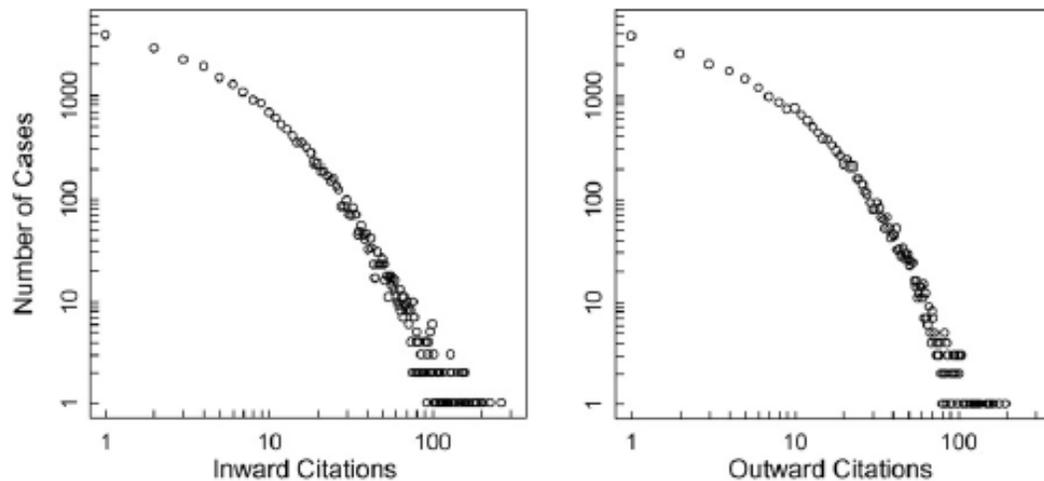


Fig. 2. Distribution of inward and outward citations in the precedent network.

- ▶ “Fig. 2 shows the distribution of inward citations (number of times each case was cited) and outward citations (the number of other cases each case cites) in the judicial precedent network on log-log plots. Notice that the vast majority of decisions are cited by only a few cases, but there are a few decisions that are widely cited. Similarly, most decisions contain only a few citations, but there are a few decisions that cite a large number of cases. This feature is common to large scale networks.”

# James Fowler and Sangick Jeon - The Authority of Supreme Court Precedent

- ▶ “Goodhart argues that by 1900, the doctrine of stare decisis was in full effect (1930, p. 180). However, Fig. 3 shows that the average number of inward and outward citations continued to rise in the 20th Century.”
- ▶ “As the norm of stare decisis becomes better established, there should also be an increasing number of cases which cite at least one precedent in order to justify the decision...starting in about 1800 there is a slow and steady increase in the practice. This increase levels off by 1900, when about 90% of the cases are citing precedent.”

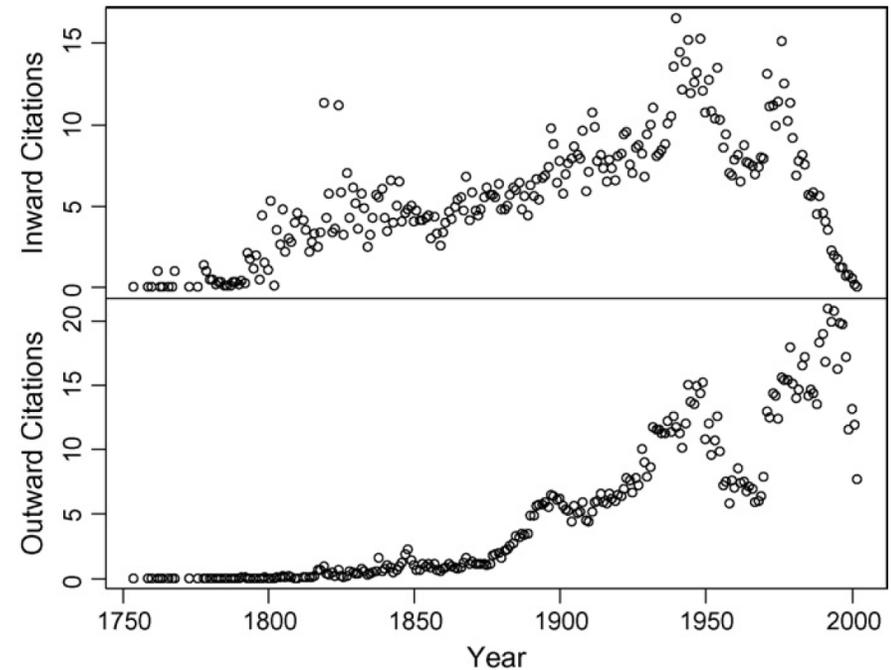


Fig. 3. Mean inward and outward citations by year.

# James Fowler and Sangick Jeon - The Authority of Supreme Court Precedent

- ▶ “Figs. 3 and 4 also show a sharp decrease in average number of outward citations and the portion of cases that do not cite any precedents during the Warren Court (1953–1969). These changes are consistent with our understanding of the Warren Court as an “activist” court that not only overruled more precedents than any other court...but revolutionized Constitutional law.”

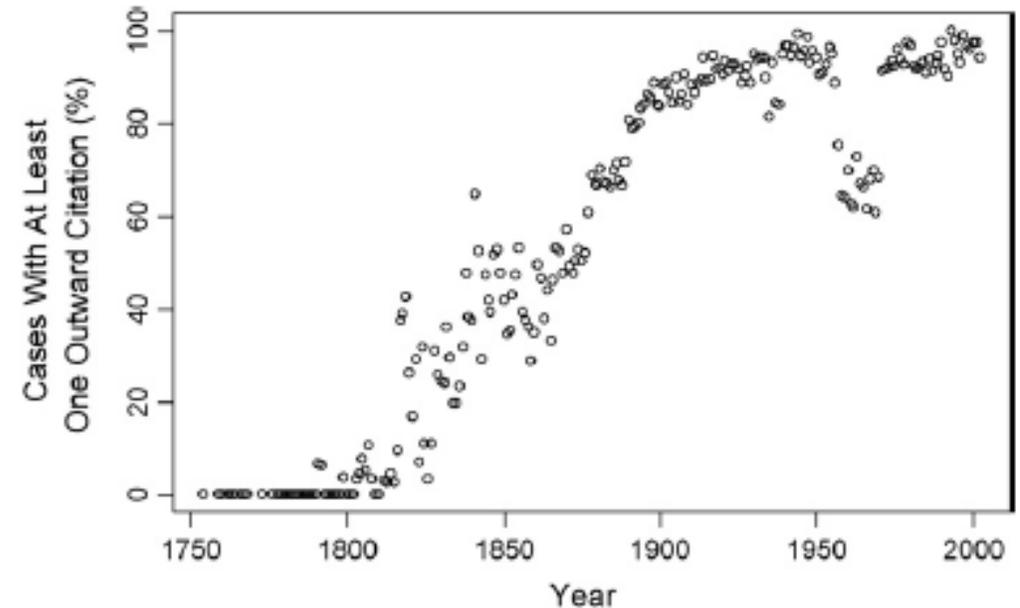


Fig. 4. Percentage of cases with at least one outward citation by year.

# James Fowler and Sangick Jeon - The Authority of Supreme Court Precedent

- ▶ “The only two courts that could have cited Warren Court precedents are the more conservative Burger (1969–1986) and Rehnquist (1986–2005) Courts. Although the opinions written by these Courts contained some of the highest average outward citations in the history of the Supreme Court, the Warren Court precedents nonetheless experience a sharp drop in inward citations. This suggests that there is something about precedents established during the period that is causing them to be neglected in subsequent cases.”

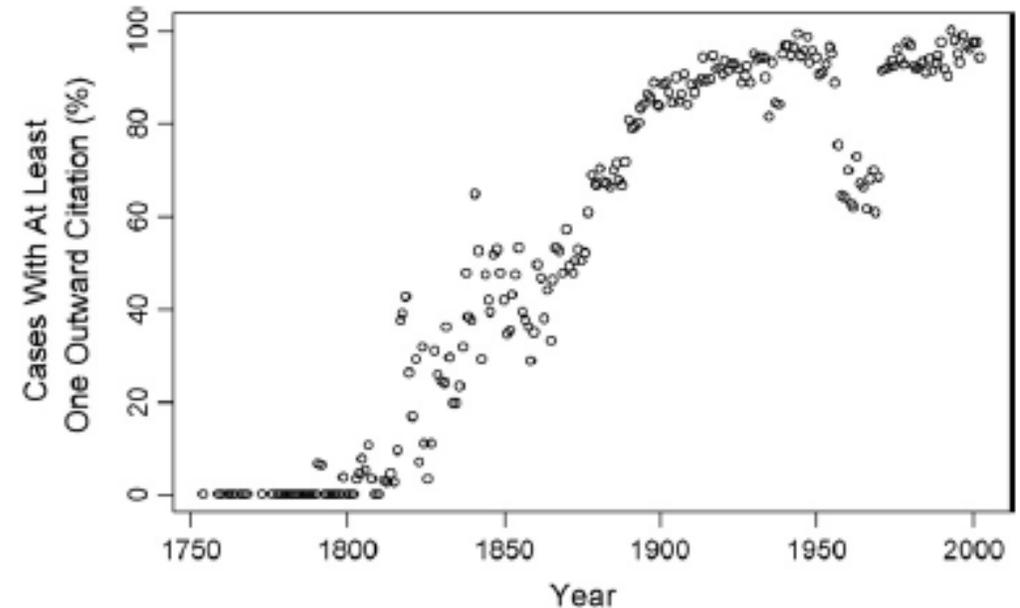


Fig. 4. Percentage of cases with at least one outward citation by year.

# James Fowler and Sangick Jeon - The Authority of Supreme Court Precedent

- ▶ “From a legal perspective, one possible explanation may be the weak legal basis of the Warren Court precedents resulting from the lack of outward citations. In the words of one scholar, “Warren Court decisions did not articulate specific doctrinal analyses, and therefore did not provide firm guidance for future Courts””

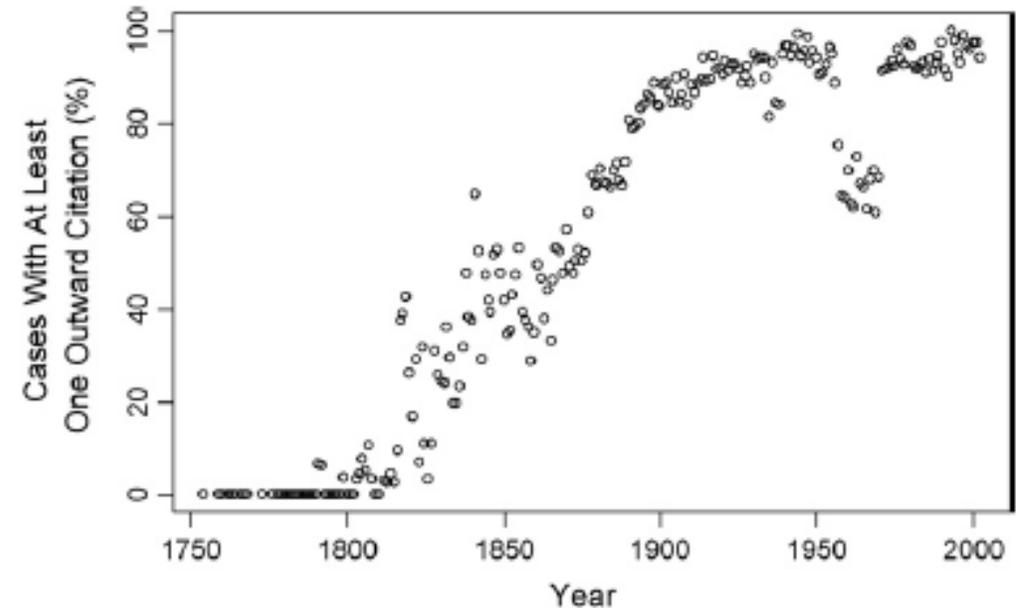


Fig. 4. Percentage of cases with at least one outward citation by year.

# James Fowler and Sangick Jeon - The Authority of Supreme Court Precedent

- ▶ “A recent advance in social network theory (Kleinberg, 1998) allows us to draw on both inward and outward citations for assessing importance. This procedure relies conceptually on two different kinds of important cases, hubs and authorities.”
- ▶ “A hub is a case that cites many other decisions, helping to define which legally relevant decisions are pertinent to a given precedent, while an authority is a case that is widely cited by other decisions.”

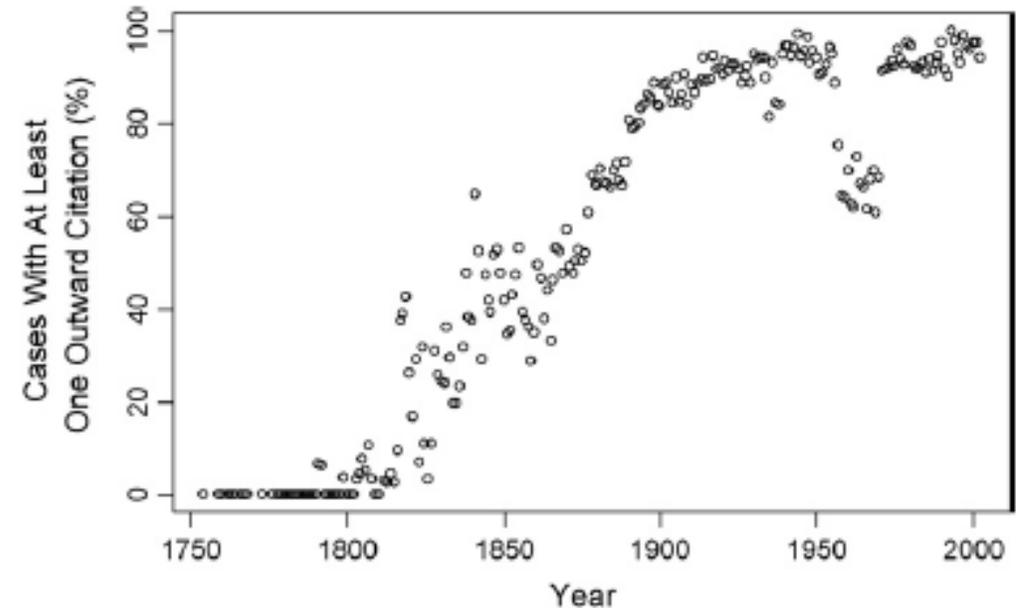


Fig. 4. Percentage of cases with at least one outward citation by year.

# James Fowler and Sangick Jeon - The Authority of Supreme Court Precedent

- ▶ “Most cases act as both hubs and authorities, and the degree to which cases fulfill these roles is mutually reinforcing within the precedent network. A case that is a good hub cites many good authorities, and a case that is a good authority is cited by many good hubs.”
- ▶ “The resulting hub and authority scores allow us to identify the key precedents in the network—precedents that are influential (authorities) and precedents that are well founded in law (hubs).”

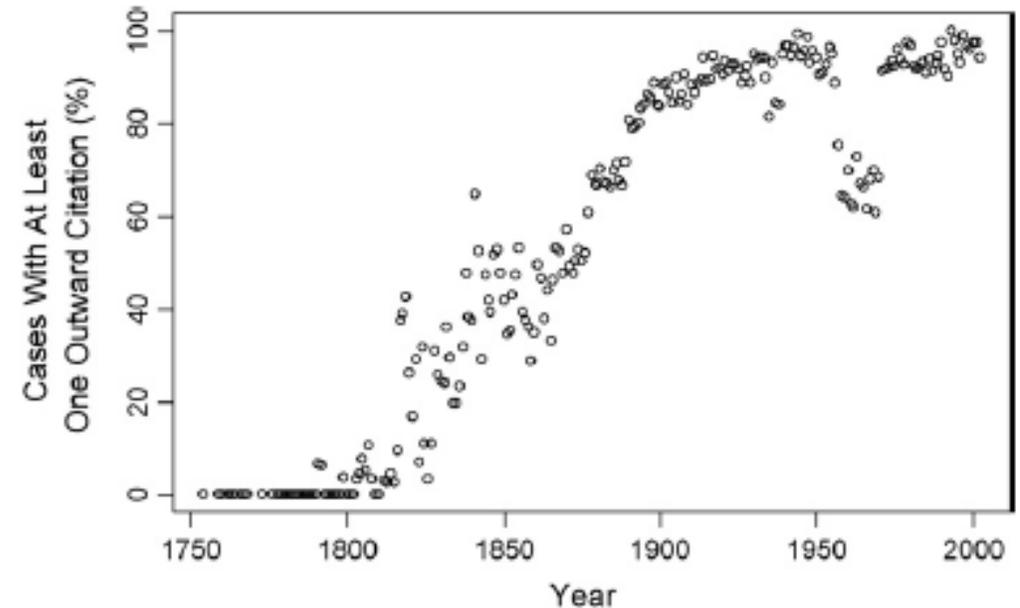


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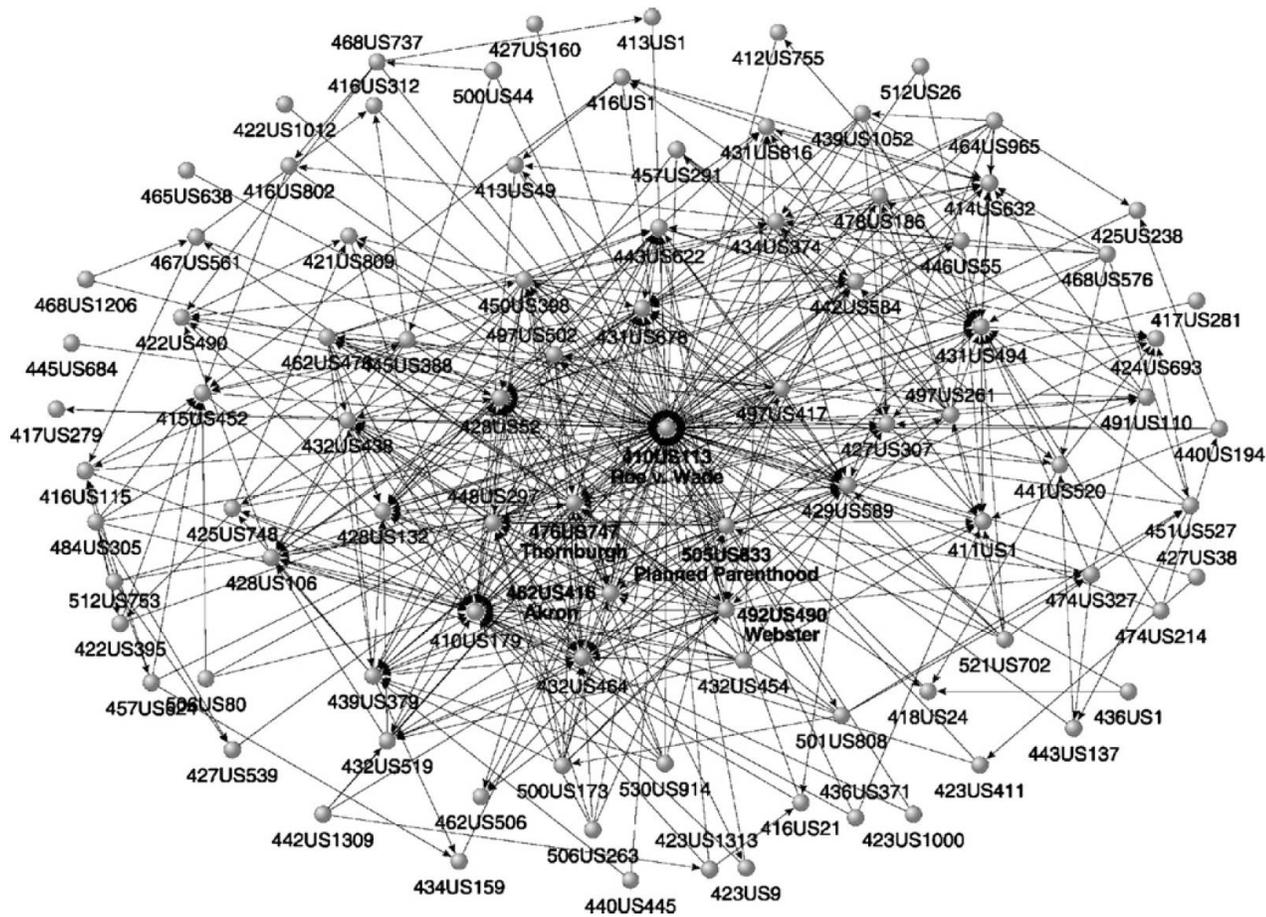
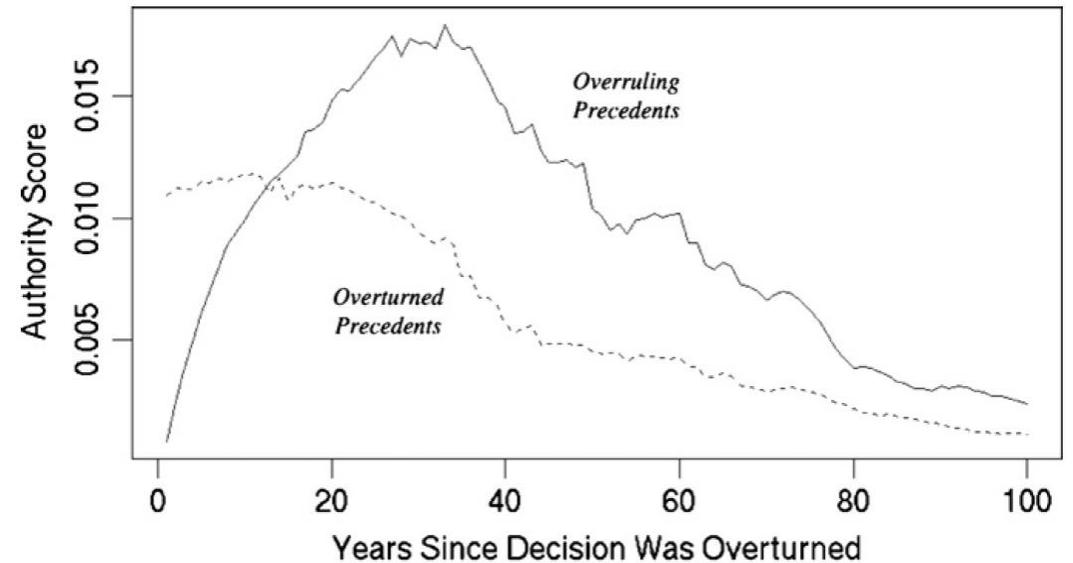


Fig. 5. Extended network of abortion decisions.

# James Fowler and Sangick Jeon - The Authority of Supreme Court Precedent

# James Fowler and Sangick Jeon - The Authority of Supreme Court Precedent

- ▶ “Although expert evaluations tell us which cases are presently considered most important, we do not have information about how these evaluations have changed over a long time period.”
- ▶ “One virtue of the authority score method is that we can use it to examine the rise and fall of a precedent’s importance with respect to the continuously evolving legal network.”



*Note:* Standard Error of the mean for both series is 0.002 or less.

Fig. 7. Authority scores of overturned and overruling precedents. *Note:* S.E. of the mean for both series is 0.002 or less.

# James Fowler and Sangick Jeon - The Authority of Supreme Court Precedent

- ▶ “Cases that have not received much attention in the network of precedent are less likely to have an influence over future decisions and less in need of revision. Thus, we hypothesize that when the Court overrules previous decisions, it tends to choose cases with high authority scores.”
- ▶ “A brief look at the data confirms this expectation—cases that were overturned had an average authority score of 0.016 (S.E. 0.002) at the time they were overturned compared to an average authority score of 0.004 (S.E. 0.000) for other cases.”

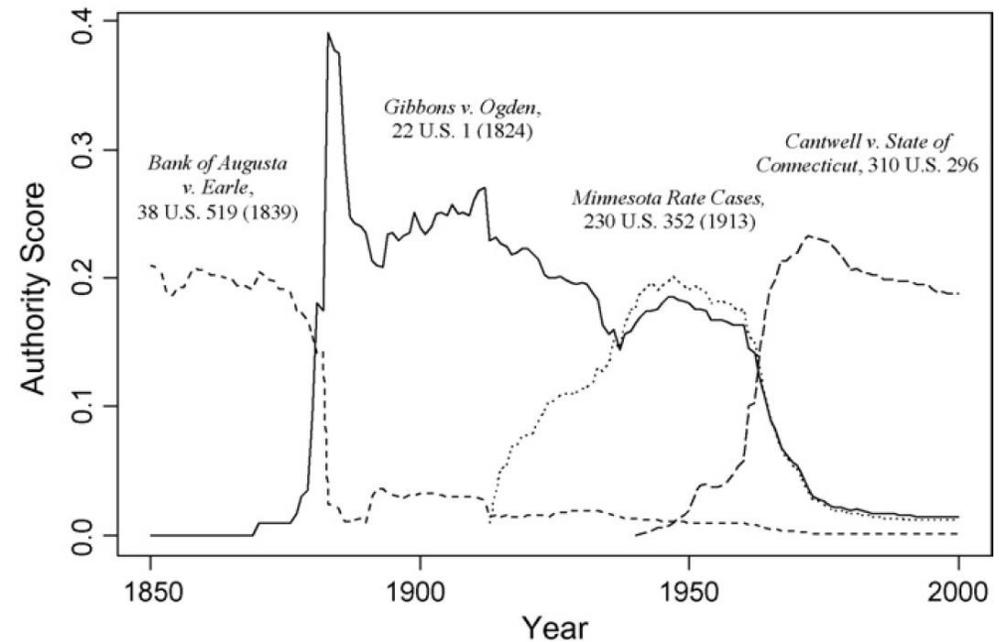


Fig. 8. Rise and fall of authorities.

# James Fowler and Sangick Jeon - The Authority of Supreme Court Precedent

- ▶ “The establishment of state and federal powers remained the focus of the Court’s efforts until shortly after the Great Depression and the New Deal. When Warren became Chief Justice of the Court in 1953, the due process cases still held important positions in the precedent network...”
- ▶ “However, as Fig. 9 illustrates, the civil rights revolution changes the Court’s focus once again as *Minnesota*, *Gibbons*, and *McCulloch* decline and First Amendment cases like *Cantwell* and *Thornhill* versus *Alabama* (1940) begin to rise.”

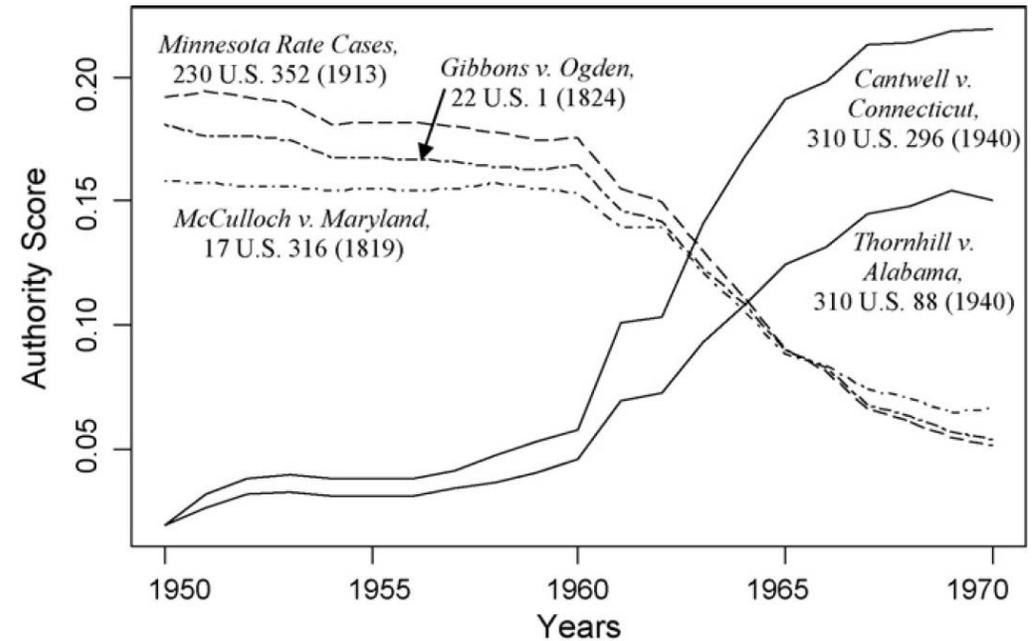


Fig. 9. Importance of commerce and civil rights issues.

# James Fowler and Sangick Jeon - The Authority of Supreme Court Precedent

- ▶ “What is striking in this figure is how sensitive the authority scores are to general changes in the issue focus of the Court. Notice how the authority of the commerce rules decline nearly in unison as the civil liberties rules become more influential.”

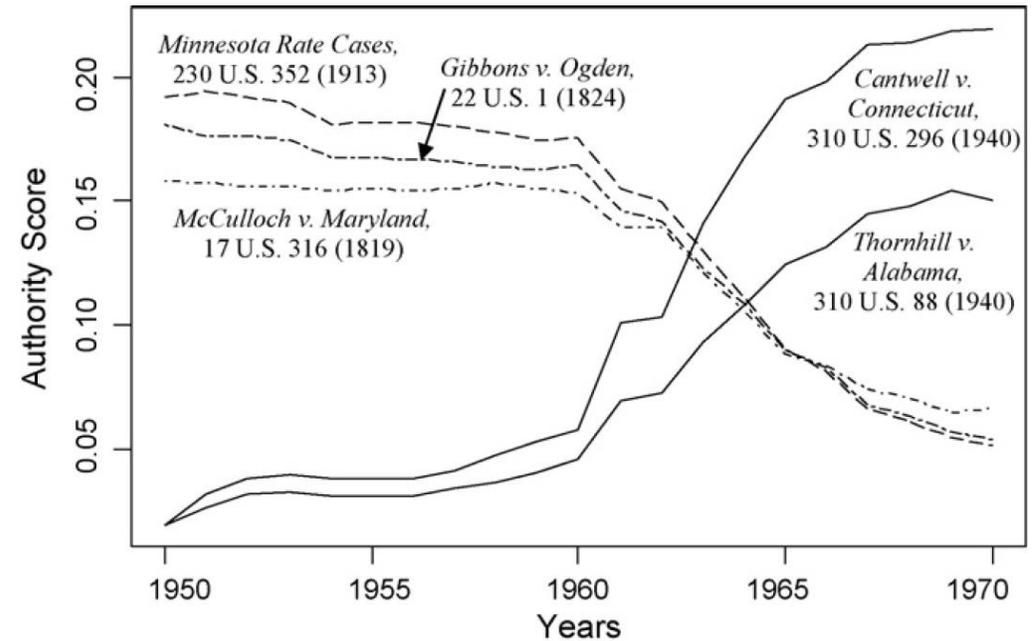
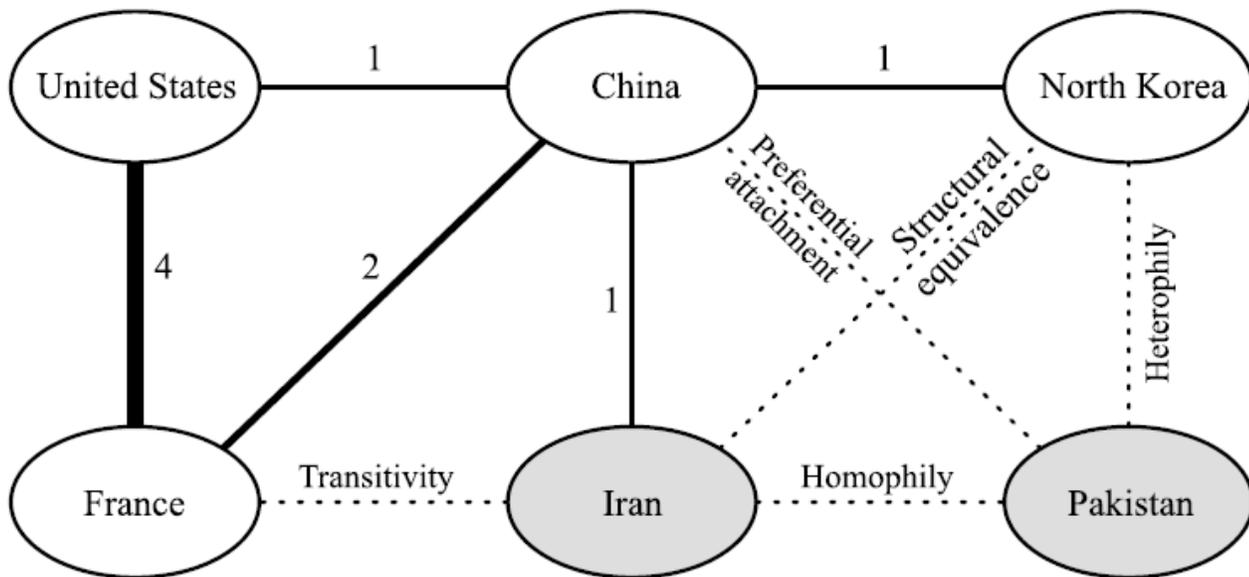


Fig. 9. Importance of commerce and civil rights issues.

# Hafner-Burton, Kahler and Montgomery - Network Analysis for International Relations

- ▶ “Networks in international relations have typically been treated as a mode of organization, one that displays neither the hierarchical character of states and conventional international organizations nor the ephemeral bargaining relationships of markets. The lens of network analysis offers a broader and contrasting view: networks are sets of relations that form structures, which in turn may constrain and enable agents.”
- ▶ “The neorealist concept of structure, based on the distribution of material capabilities across units, has typically dominated international relations.”
- ▶ “A network approach, by contrast, defines structures as emergent properties of persistent patterns of relations among agents that can define, enable, and constrain those agents.”



Note: Dotted lines indicate new ties.

**FIGURE 2.** Sample international network with an additional node (Pakistan), demonstrating potential mechanisms for new ties

## Hafner-Burton, Kahler and Montgomery - Network Analysis for International Relations

# Hafner-Burton, Kahler and Montgomery - Network Analysis for International Relations

- ▶ “Network analysis addresses the associations among nodes rather than the attributes of particular nodes. It is grounded in three principles: nodes and their behaviors are mutually dependent, not autonomous.”
- ▶ “...ties between nodes can be channels for transmission of both material (for example, weapons, money, or disease) and nonmaterial products (for example, information, beliefs, and norms); and persistent patterns of association among nodes create structures that can define, enable, or restrict the behavior of nodes...”
- ▶ “[N]o assumptions are made about the homogeneity or other characteristics of the nodes or ties.”

# Hafner-Burton, Kahler and Montgomery - Network Analysis for International Relations

- ▶ “Most networks face a tradeoff between efficiency and robustness: redundant links make a network more robust, but they may also make it operate less efficiently.”
- ▶ “The innovations of network analysis challenge conventional views of power in international relations.”
- ▶ “Pursuit of network power favors agent strategies that differ from those in conventional international politics.”

# Hafner-Burton, Kahler and Montgomery - Network Analysis for International Relations

- ▶ “If the proposition that social power is based on network centrality is correct, then strategies of membership in international institutions may reflect more than simple calculations of interest in a particular organization or its benefits+ The access that international institutions and agreements grant to larger networks may be as important as the content of the agreement itself.”
- ▶ “Unilateralism, which sacrifices the social power of networks, becomes less attractive as networks become denser.”
- ▶ “Network power may offset other forms of power in international politics, but network power may also be self-reinforcing and ultimately deepen other inequalities in the international system.”