

Lecture 24: Social networks and finding a job

Matthew J. Salganik

Sociology 204: Social Networks
Princeton University



1. Gee et al. (2017) “Social Networks and Labor Markets: How Strong Ties Relate to Job Finding on Facebook’s Social Network.” *Journal of Labor Economics*.
2. Greenberg and Fernandez (2016) “The Strength of Weak Ties in MBA Job Search: A Within-Person Test.” *Sociological Science*.

Community Minute

These papers represent two distinct styles of social data, each with strengths and weaknesses.

Big data















Readymades



Custommades

Social Networks and Labor Markets: How Strong Ties Relate to Job Finding on Facebook's Social Network

Laura K. Gee, *Tufts University*

Jason Jones, *Stony Brook University*

Moira Burke, *Facebook*

Builds on Granovetter (1973)

1. Descriptive Weak Tie Hypothesis: roughly, more jobs come through weak ties than strong ties (similar to data from Granovetter (1973))

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1. Descriptive Weak Tie Hypothesis: roughly, more jobs come through weak ties than strong ties (similar to data from Granovetter (1973))
2. Conditional Weak Tie Hypothesis: roughly, a single weak tie is more likely than a single strong tie to lead to a new job (often what people think is in Granovetter (1973))

Data comes from Facebook. This data was not designed to study networks and jobs, but it can be repurposed for that.

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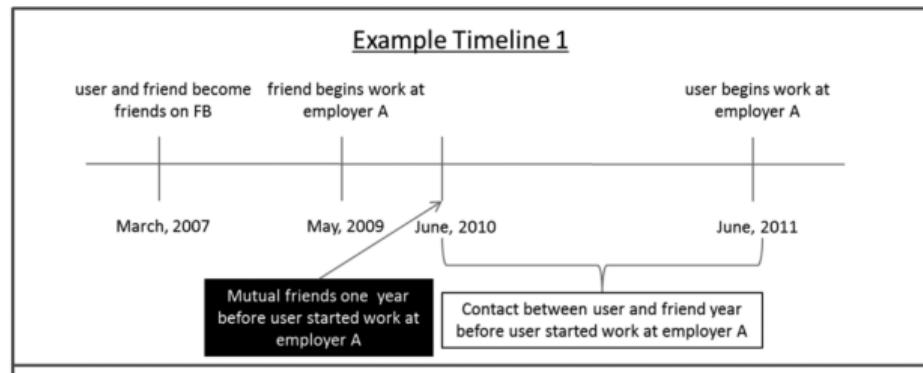


has not updated his/her employer information recently. So, we concentrate on job help and define a “sequential job” as occurring when the following criteria are met:

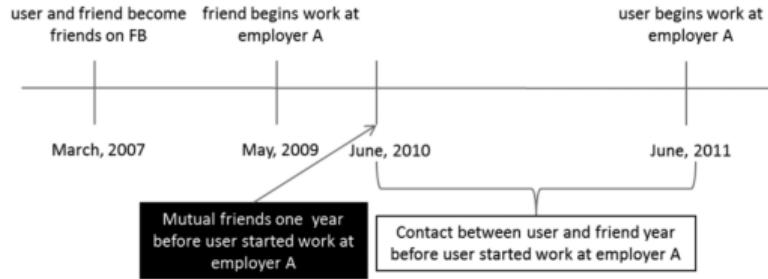
1. The user and this friend currently work or previously worked at the same employer.
2. The user began working at the employer at least 1 year after his/her friend started at that employer.
3. The user and the friend were Facebook friends at least 1 year before the user started working at that employer.

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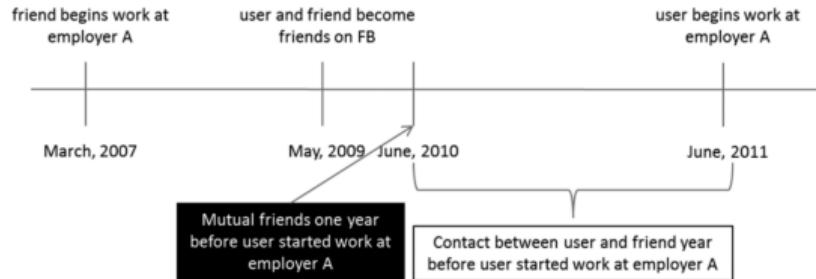
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Example Timeline 1



Example Timeline 2

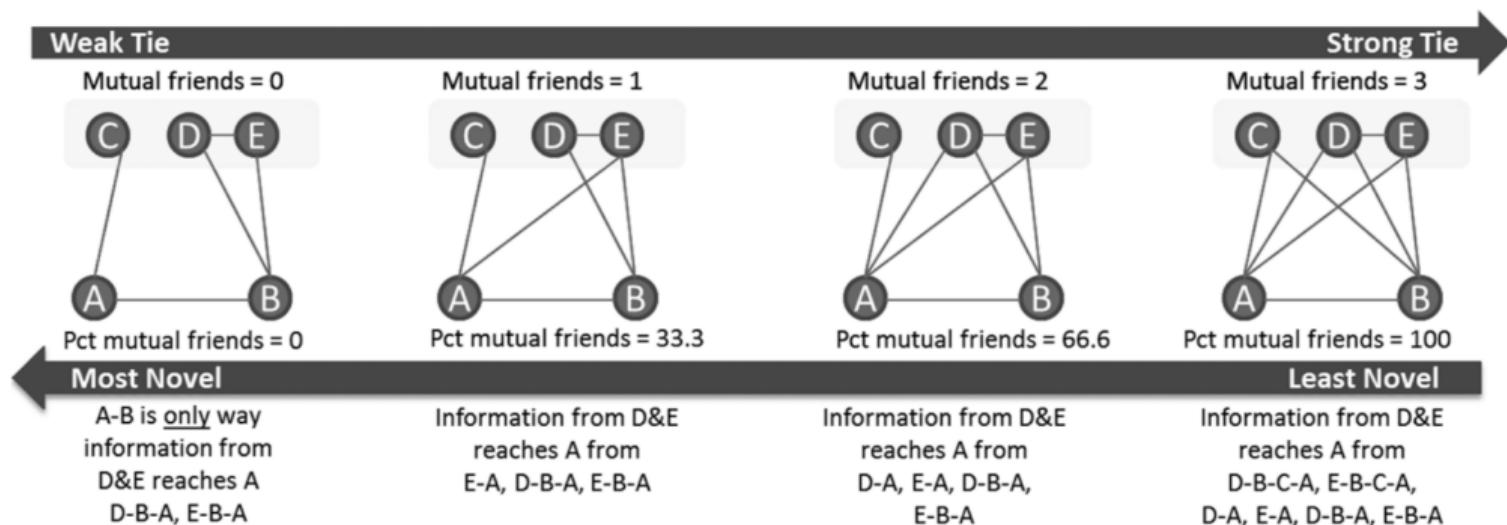


Tie strength:

- ▶ contact-based definitions (photo tags, wall posts)
- ▶ structural definition based on friendship overlap

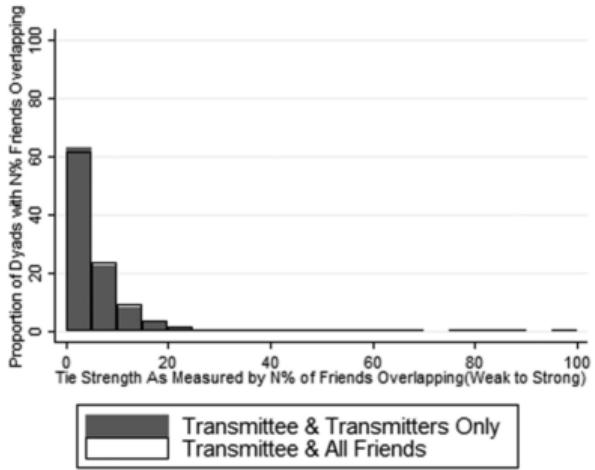
Tie strength:

- ▶ contact-based definitions (photo tags, wall posts)
- ▶ structural definition based on friendship overlap



Think-pair-share: Which of these measurement approaches concerns you more?

1. job help
2. tie strength



similarity. Most sequential jobs come from a weak tie, but most ties in the population are weak. This means that the weak ties are collectively important because people have many weak ties.²⁷

This supports Descriptive Weak Tie Hypothesis.

To test Conditional Weak Tie Hypothesis, they fit this model

$$J_{ik} = \beta T_{ik} + \alpha X_{ik} + E_i + \epsilon_{ik}. \quad (2)$$

Very roughly, this allows them to estimate how tie strength impacts the probability of “sequential job” accounting for other factors.

Table 5
Dependent Variable Is Probability of a Sequential Job

	Simple Specification 1			Improved Specification 2			Placebo Test		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Tag	.126*** (.009)			.094*** (.008)			.021*** (.001)		
Post		.203*** (.012)			.124*** (.002)			.036*** (.001)	
Friend overlap			.001 (.011)			.093*** (.003)			.036*** (.002)
R^2	.002	.004	.000	.055	.056	.054	.006	.006	.006
N	1,438,699	1,438,699	1,438,699	1,438,699	1,438,699	1,438,699	2,241,023	2,241,023	2,241,023
Outcome mean \bar{f}_w	2.038	2.038	2.038	2.038	2.038	2.038	.839	.839	.839
Proportional \uparrow if 10 unit \uparrow (%)	62	100	.5	46	60	46	25	43	43
Original – Placebo							.073	.088	.057
Proportional \uparrow if 10 unit \uparrow Original – Placebo (%)							21	17	3

NOTE: All coefficients are multiplied by 100 for ease of readability. Standard errors (in parentheses) are clustered at the user level and are weighted so that each user's weights sum to 1. Columns 4–9 include a user fixed effect and control variables: friend x years older, both male/female, friend more/less educated, both married, same state, same city, friend's tenure at firm (years), and same high school/college/graduate school. Full results for cols. 4–9 are in appendix table 2. The coefficients in cols. 4–6 are different from those in col. 9 ($\chi^2(1) = 64.79$, Prob. > χ^2 = .0000). The coefficients in col. 5 are different from those in col. 8 ($\chi^2(1) = 27.29$, Prob. > χ^2 = .0000). The coefficients in col. 6 are different from those in col. 9 ($\chi^2(1) = 10.10$, Prob. > χ^2 = .0020). "Proportional \uparrow if 10 unit \uparrow " shows the proportional increase in the probability of a sequential job associated with a 10 unit increase in tie strength. "Proportional \uparrow if 10 unit \uparrow Original – Placebo" shows the difference between the proportional increase using Improved Specification 2 on the original data versus using the Improved Specification 2 on the placebo data.

* $p < .05$.

** $p < .01$.

*** $p < .001$.

equation (1) or our improved specification from equation (2). Table 5 shows the coefficients for the simple model in columns 1–3 and for the improved model in columns 4–6. The coefficients are all positive and statistically significant. This refutes the Conditional Weak Ties Hypothesis. These coefficients show that a single weak tie is actually less helpful than a single strong tie. In columns 1–6 of table 5, the coefficient β is the average percentage

This study, like all studies, involved lots of choices. So Gee et al. try to see how robust their findings are to these choices.

- ▶ Functional form
- ▶ Mismeasurement of sequential jobs
- ▶ Definition of tie existence and tie strength

Results hold up under a number of checks

Social Networks and Labor Markets: How Strong Ties Relate to Job Finding on Facebook's Social Network

Laura K. Gee, *Tufts University*

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Journal of Economic Behavior & Organization

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The paradox of weak ties in 55 countries



Laura K. Gee^{a,*}, Jason J. Jones^b, Christopher J. Fariss^c, Moira Burke^d,
James H. Fowler^{e,f}

^a Department of Economics, Tufts University, United States

^b Department of Sociology, SUNY Stony Brook, United States

^c Department of Political Science, Pennsylvania State University, United States

^d Facebook, United States

^e Global Public Health Division, University of California, San Diego, United States

^f Department of Political Science, University of California, San Diego, United States

- ▶ Descriptive Weak Tie Hypothesis finding: “In all 55 countries we find support for the statement: most sequential jobs collectively come from weak rather than strong ties, and this is because most ties are indeed weak.”

- ▶ Descriptive Weak Tie Hypothesis finding: “In all 55 countries we find support for the statement: most sequential jobs collectively come from weak rather than strong ties, and this is because most ties are indeed weak.”
- ▶ Conditional Weak Tie Hypothesis finding: “Across all three measures [of tie strength], there is a positive association between tie strength and the probability of a sequential job in all 55 countries (with just one exception, a negative and statistically insignificant association between posting and a sequential job in Nigeria)”



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This is only possible because of readymade data. It is financially prohibitive to collect data in 55 different countries for a single study.



The Strength of Weak Ties in MBA Job Search: A Within-Person Test

Jason Greenberg,^a Roberto M. Fernandez^b

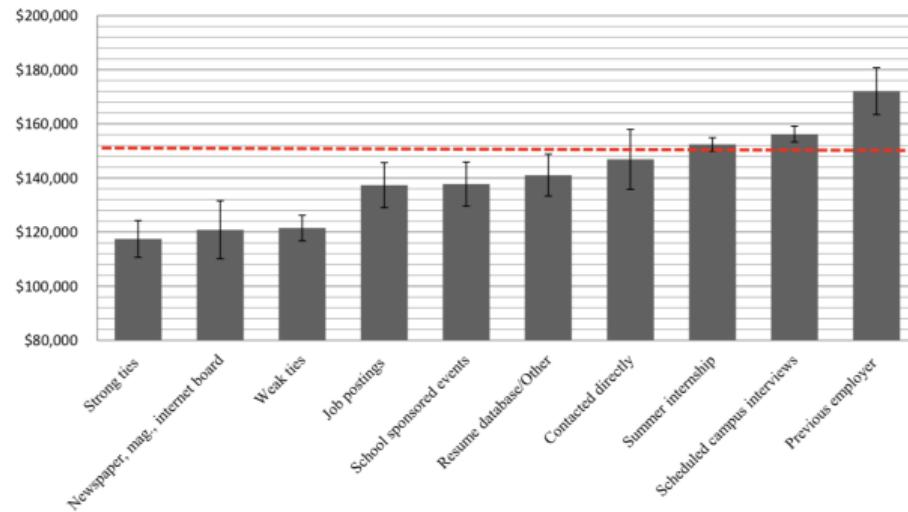
a) New York University; b) Massachusetts Institute of Technology

- ▶ Motivated by Granovetter (1973)

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- ▶ Setting two cohorts of students in an elite MBA program

Hypothesis 1: Job offers derived via social ties should offer higher total compensation than offers originating from other channels. (Note how this goes beyond comparing strong and weak ties; it compares social ties to other forms of search)

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Overall, offers from strong and weak ties have lower mean total compensation. But, different kind of students might be getting offers through different channels.

$\ln(\text{Total compensation})_{ij}$

$$= \beta_0 + \sum_{p=1}^P \beta_1 (\text{Search channel})_{ij} + \beta_2 \Theta_{ij} + \beta_3 \omega_{ij} + \varepsilon_{ij} \quad (1)$$

As noted, this is a (within-student) fixed effects model. Hence, all student-

Very roughly, this allows you to compare job offers for the exact same job searcher

Table 2: Regression Coefficients Predicting Ln(Total compensation)

	(1) OLS	(2) FE	(3) FE
Weak ties	-0.248 [†] (0.059)	-0.143 [*] (0.064)	-0.173 [*] (0.075)
Strong ties	-0.238 [†] (0.068)	-0.217 [†] (0.052)	-0.192 [*] (0.077)
Contacted directly	-0.049 (0.087)	-0.186 [*] (0.082)	-0.245 [*] (0.103)
Job posting	-0.145 (0.094)	-0.121 (0.100)	-0.186 (0.110)
School sponsored event	-0.154 (0.089)	-0.103 (0.078)	-0.106 (0.086)
Resume database/Other	-0.04 (0.109)	0.08 (0.093)	0.095 (0.130)
Newspaper; magazine; internet	-0.245 [*] (0.114)	-0.239 (0.205)	-0.308 (0.216)
Previous employer	0.124 (0.065)	0.111 (0.076)	0.13 (0.075)
Summer internship	-0.01 (0.038)	-0.066 (0.042)	-0.051 (0.053)
Constant	11.549 [†] (0.377)	11.903 [†] (0.024)	11.938 [†] (0.046)
Job seeker FE	No	Yes	Yes
Industry FE	Yes	No	Yes
Function FE	Yes	No	Yes
Controls	Yes	No	No
N(clusters)	564	497(219)	476 (218)
F(df)	7.66 (52) [†]	3.12 (9) [†]	2.68 (33) [†]
R ² (within for FE)	0.28	0.068	0.19

Note: Source: Proprietary data from a perennial top US business school. Model 1 clusters standard errors around job seeker and employer. It also includes the following controls: Gender, international citizen, undergraduate GPA, graduate GPA, GMAT verbal/quant. score, Ivy league undergraduate degree, undergraduate major, age, years of work experience, prior industry of employment, and year of graduation. Models 2 and 3 are job seeker fixed effects models.

[†] = $p < .01$, * = $p < .05$ (two-tailed).

If you want to learn how to interpret tables like this, take a statistics class (or a few).

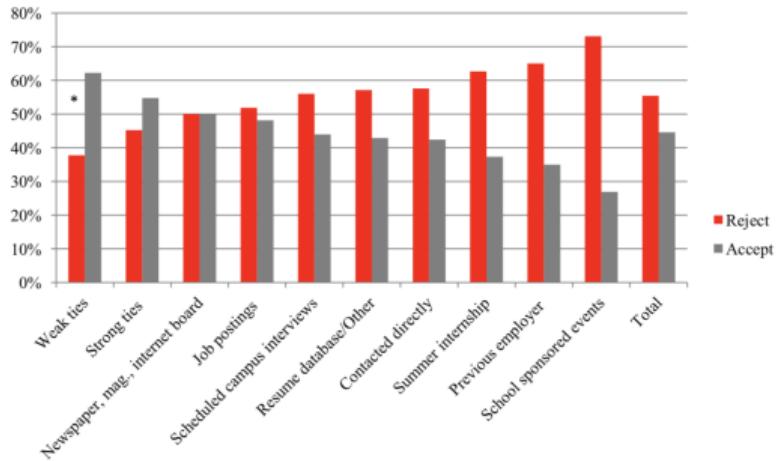
Hypothesis 1: Job offers derived via social ties should offer higher total compensation than offers originating from other channels.

When they estimate a within-student model they don't find support for hypothesis 1.

"Job offers received by students through family, friends and other strong ties offer initial compensation 17 percent *less* than job offers derived via on-campus recruiting."

Hypothesis 2: Job seekers are more likely to accept offers derived via weak ties than formal search channels.

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Overall, acceptance rate is highest from weak ties. But, different kind of students might be getting offers through different channels and these are different kinds of offers.

$$\begin{aligned} Pr(Choice)_{ij} = & \beta_0 + \sum_{p=1}^P \beta_1 (\textit{Search channel})_{ij} + \beta_2 (\ln(TC))_{ij} \\ & + \beta_3 (\textit{Reason})_{ij} + \beta_4 \Theta_{ij} + \beta_5 \omega_{ij} + \varepsilon_{ij} \end{aligned} \quad (2)$$

Very roughly, this allows you to compare decisions for the exact same job searcher

Table 3: Regression Coefficients Predicting Job Choice

	(4) Logit	(5) FE	(6) FE	(7) FE
Ln(Total comp.)	1.992 [†] (0.692)	2.306 [†] (0.514)	2.903 [†] (0.585)	3.360 [†] (0.824)
Weak ties	1.248 [*] (0.552)	1.464 [†] (0.534)	1.537 [*] (0.631)	
Strong ties	0.178 (0.441)	0.838 (0.633)	0.631 (0.718)	
Contacted directly	0.434 (0.508)	0.002 (0.661)	-0.117 (0.734)	
Job posting	0.381 (0.734)	1.325 (0.759)	1.217 (0.940)	
School event	-0.444 (0.591)	-1.640 [*] (0.791)	-1.863 [*] (0.807)	
Resume database/Other	0.826 (1.099)	-0.792 (1.091)	-2.445 (1.498)	
Newspaper, magazine, internet	0.989 (0.785)	-0.348 (0.741)	0.172 (0.818)	
Previous employer	0.879 (0.721)	-1.309 [*] (0.542)	-1.108 [*] (0.560)	
Summer internship	1.093 [*] (0.435)	-0.444 (0.332)	-0.297 (0.363)	
Job seeker FE	No	Yes	Yes	Yes
Industry FE	Yes	No	No	Yes
Function FE	Yes	No	No	Yes
Controls	Yes	No	No	No
N	564	424	424	424
Wald- χ^2 (df)	187.36 (54) [†]	20.13 (1) [†]	39.57 (10) [†]	71.98 (33) [†]
Log likelihood	-286.584	-134.418	-121.315	-110.379
Pseudo R^2	0.225	0.103	0.191	0.264

Note: Source: Proprietary data from a perennial top US business school. Model 4 clusters standard errors around job seeker and employer. Models 5 - 7 are conditional fixed effects models.

[†] = $p < .01$, * = $p < .05$ (two-tailed).

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Hypothesis 2: Job seekers are more likely to accept offers derived via weak ties than formal search channels.

When they estimate a within-student model they find support for hypothesis 2. “Taken together, these results suggest that controlling for the total compensation offered, students are more likely to accept offers derived primarily through weak ties rather than on-campus recruiting.”

Why are students more likely to accept job offers from weak ties? What is the mechanism?

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“weak ties are the primary search channel cites as results in offers with perceived growth potential”



The Strength of Weak Ties in MBA Job Search: A Within-Person Test

Jason Greenberg,^a Roberto M. Fernandez^b

a) New York University; b) Massachusetts Institute of Technology

Think-pair-share: Which did you like better?

Social Networks and Labor Markets:
How Strong Ties Relate to Job
Finding on Facebook's
Social Network

Laura K. Gee, *Tufts University*

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Moira Burke, *Facebook*

Readymades

VS



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A Within-Person Test

Jason Greenberg,^a Roberto M. Fernandez^b

^a NYU Stern School of Business; ^b Massachusetts Institute of Technology

Custommades

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+

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Custommades



R. Mutt
1917

Stepping back:

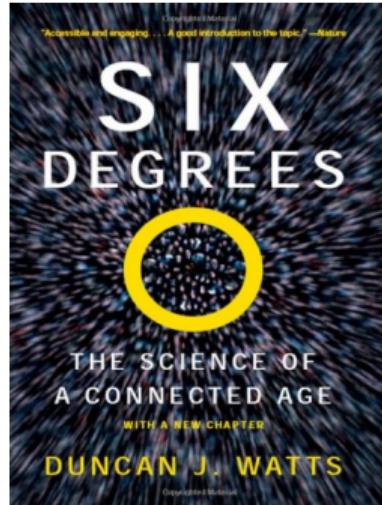
- ▶ we can study job search through readymade and custommade data, each approach has strengths and weaknesses

Stepping back:

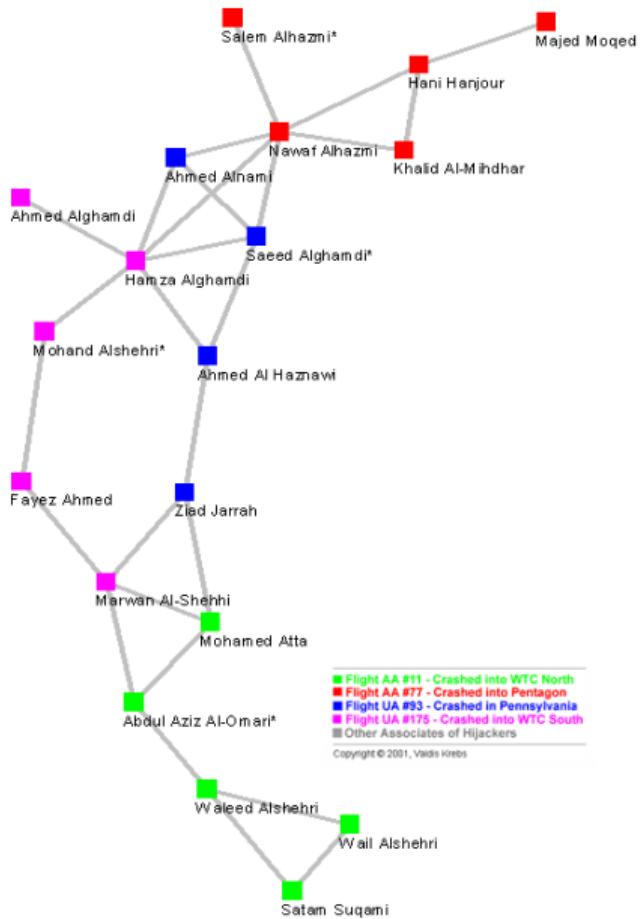
- ▶ we can study job search through readymade and custommade data, each approach has strengths and weaknesses
- ▶ people are more likely to find jobs through weak ties, but this is because they have more weak ties. Each individual strong tie is more valuable than each individual weak ties.

Stepping back:

- ▶ we can study job search through readymade and custommade data, each approach has strengths and weaknesses
- ▶ people are more likely to find jobs through weak ties, but this is because they have more weak ties. Each individual strong tie is more valuable than each individual weak ties.
- ▶ relative to other search methods, search through networks can lead to jobs with lower compensation but higher growth potential.

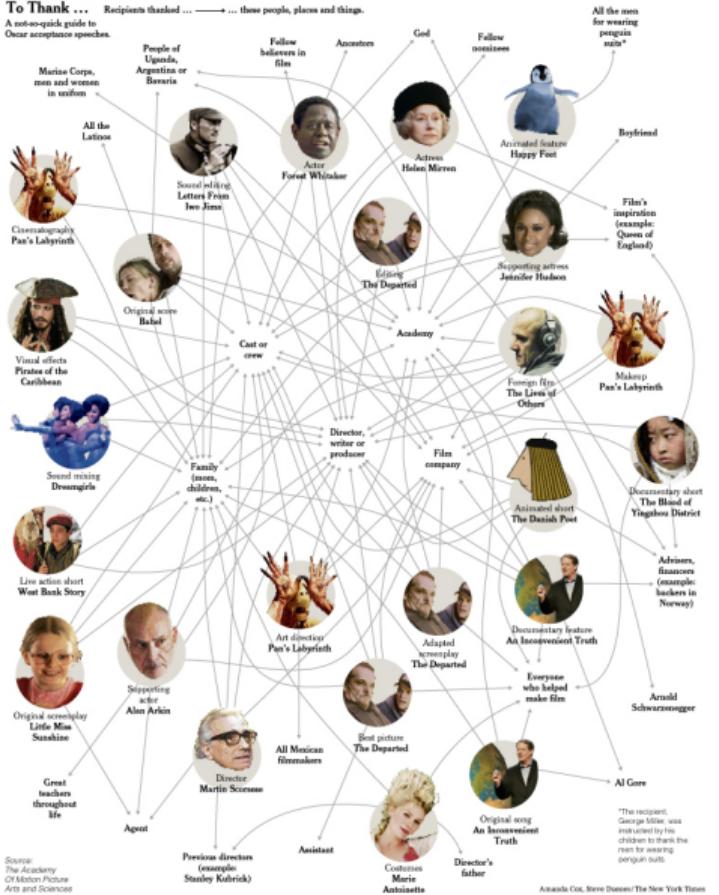


We live in the connected age.



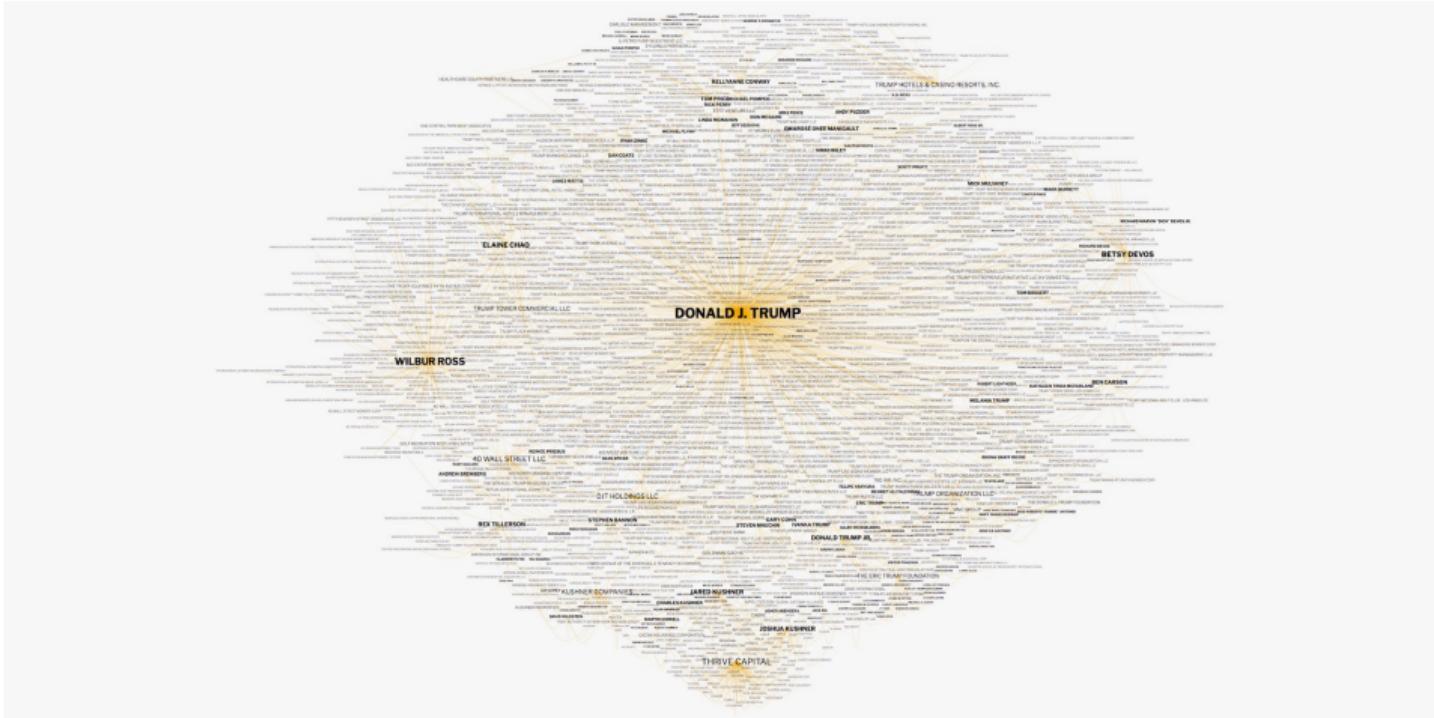
I Would Like To Thank ...

A not-so-quick guide to Oscar acceptance speeches.



Source:
The Academy
of Motion Picture
Arts and Sciences

Amanda Cox, Steve Boudreau/The New York Times



<https://kimalbrecht.com/vis/#trump-connections>

General pattern:

- ▶ nodes
- ▶ edges

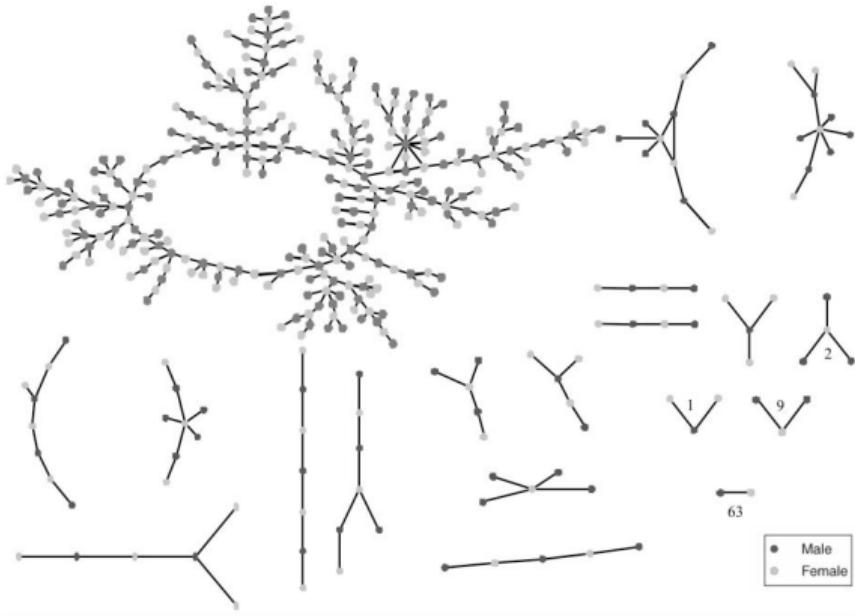


FIG. 2.—The direct relationship structure at Jefferson High

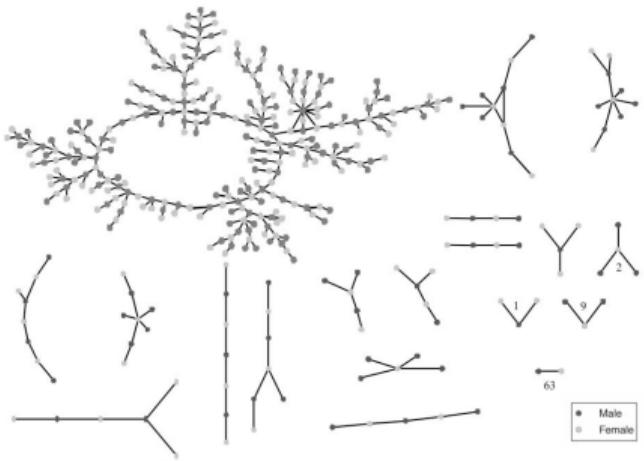
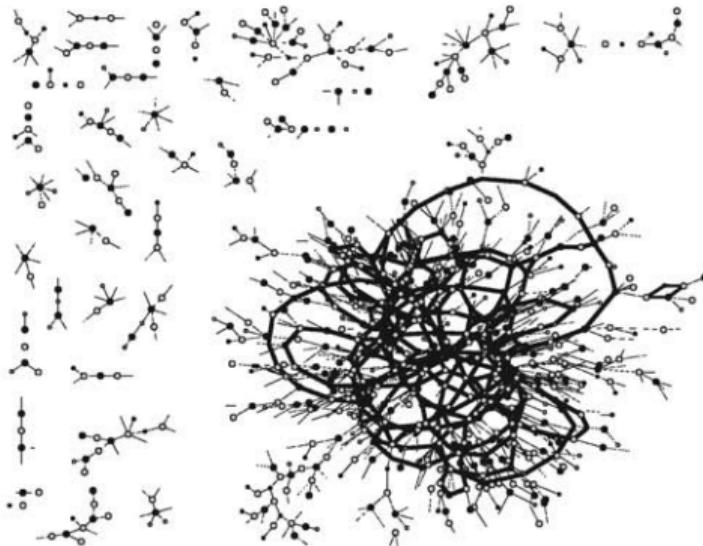
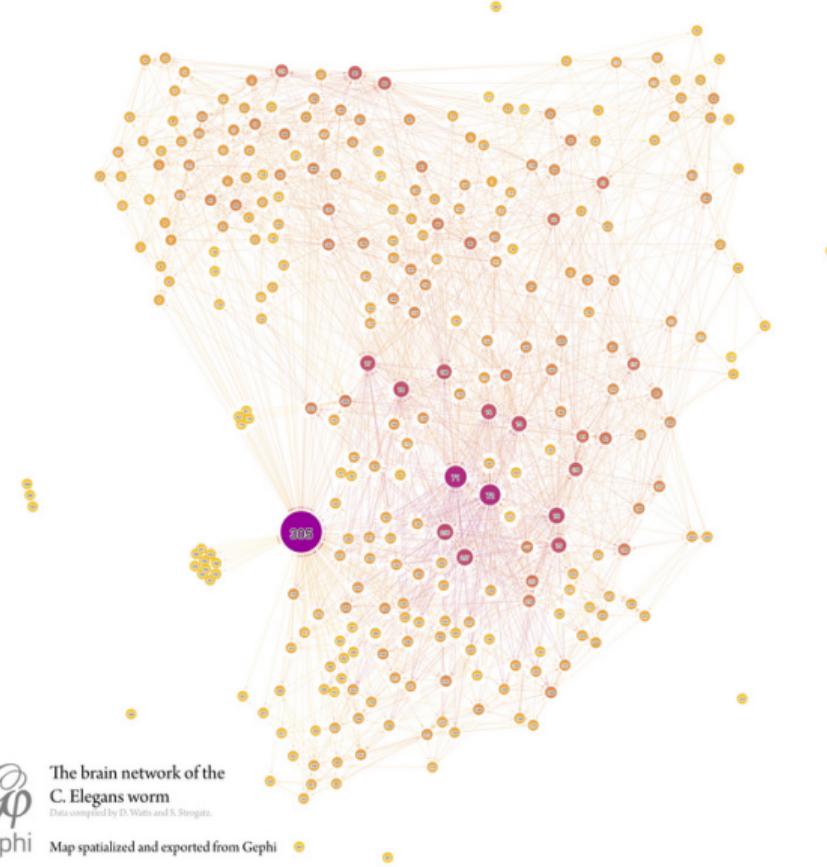


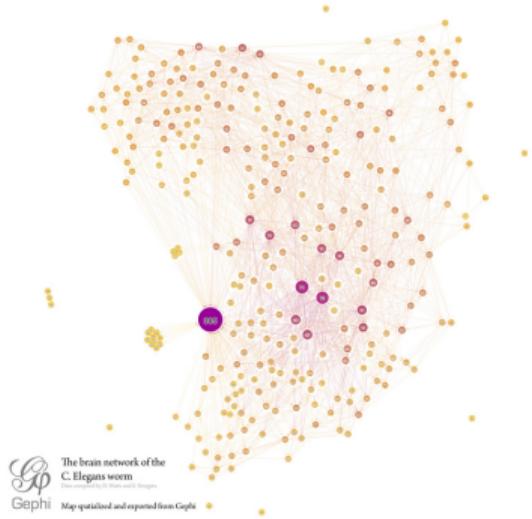
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(a) American High School

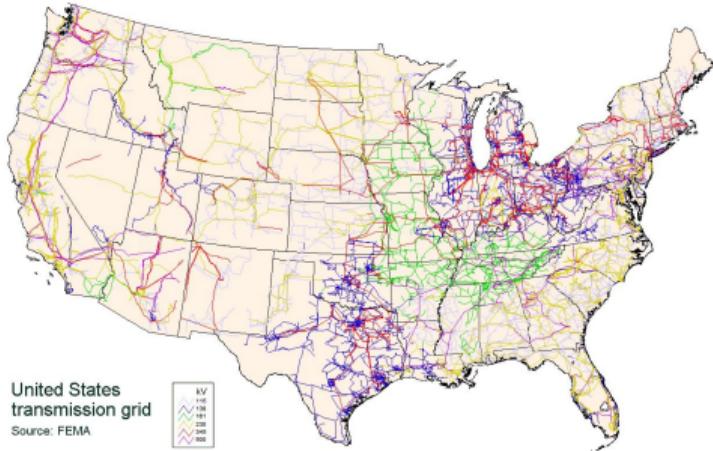


(b) Likoma Island, Malawi





(a) Worm Brain



(b) Power Grid

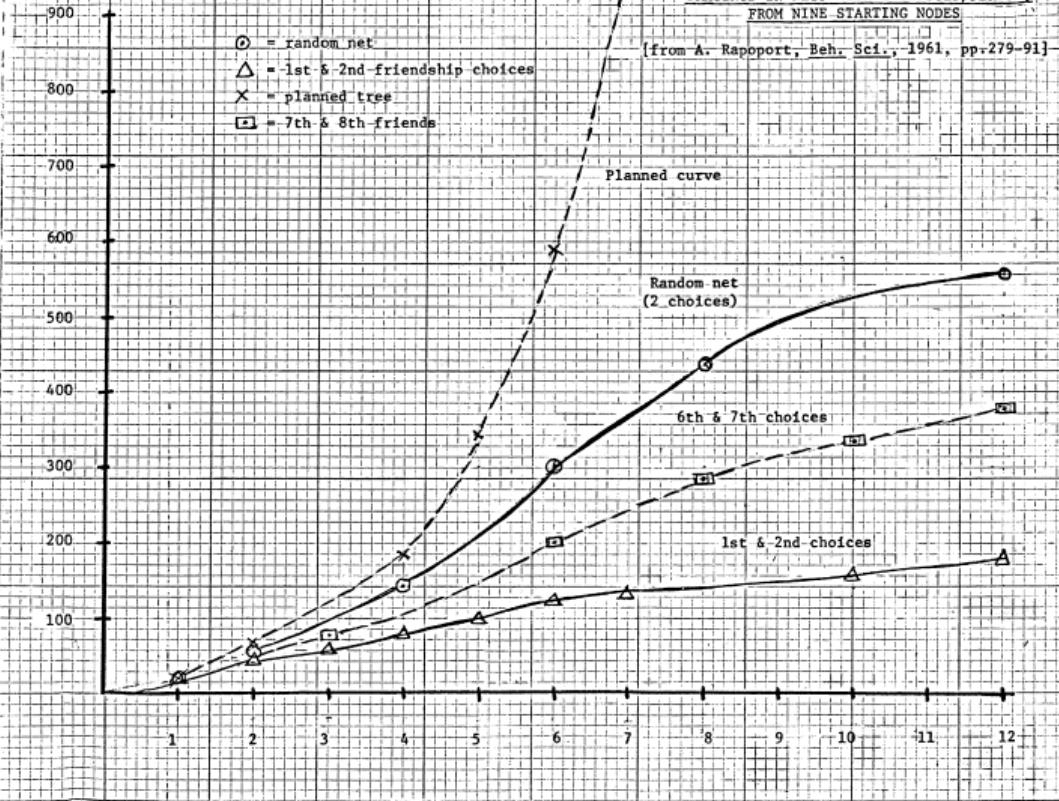
<https://commons.wikimedia.org/wiki/File:C.elegans-brain-network.jpg> & <https://commons.wikimedia.org/wiki/File:UnitedStatesPowerGrid.jpg>

- SR 10, Lecture Notes
February 28, 1966

TRACINGS IN NETS WITH 2 CHOICES/PERSON
FROM NINE STARTING NODES

[from A. Rapoport, Beh. Sci., 1961, pp.279-91]

CROSS SECTION - 10 SQUARES TO INCH
THE CHAMPION LINE NO. 810



Learning objectives

- ▶ Students will be able to **describe** the major concepts used in the study of networks.

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- ▶ Students will be able to **describe** the interconnections between the major concepts used in the study of networks.

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- ▶ Students will be able to **describe** the interconnections between the major concepts used in the study of networks.
- ▶ Students will be able to **use** the major concepts in the study of networks to gain insight into real-world phenomena.
- ▶ Students will be able to **evaluate** real, modern research that connects the concepts of networks to real-world phenomena.

Thank you for a wonderful semester!