Lecture 3: More on the small world problem and some history

Sociology 204: Social Networks, Spring 2021

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1/3: Electronic small world experiment

POP QUIZ

POP QUIZ FOR CANDY

POP QUIZ FOR CANDY

What was the chain completion rate for Dodds, Muhamad, and Watts?

Let's think back to 1967 . . . .

http://upload.wikimedia.org/wikipedia/commons/f/f5/1967_Ford_Fairlane_Ranchero.jpg

http://commons.wikimedia.org/wiki/File:Ericsson_Dialog_in_green.JPG

http://commons.wikimedia.org/wiki/File:Computer_in_County_of_Orange_offices,_1967.jpg

Story $\rightarrow$ problem statement

Given two individuals selected randomly from the population, what is the probability that the minimum number of intermediaries required to link them is 0,1,2,...k?

Empirical approach
(Harvard approach)

vs.

Modeling approach
(MIT approach)

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Today

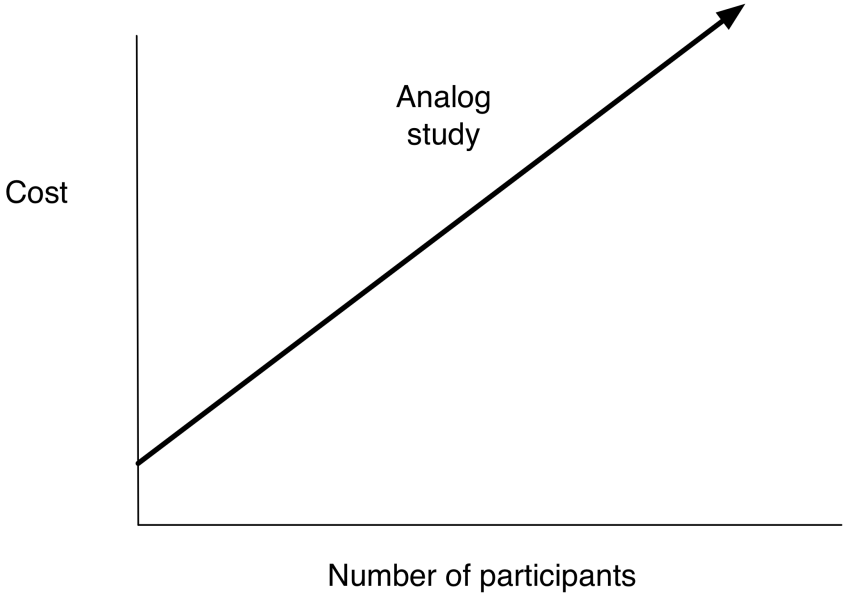
- see how Dodds, Muhamad, and Watts tried to improve the empirical approach
- learn some background so that we can understand a modeling approach

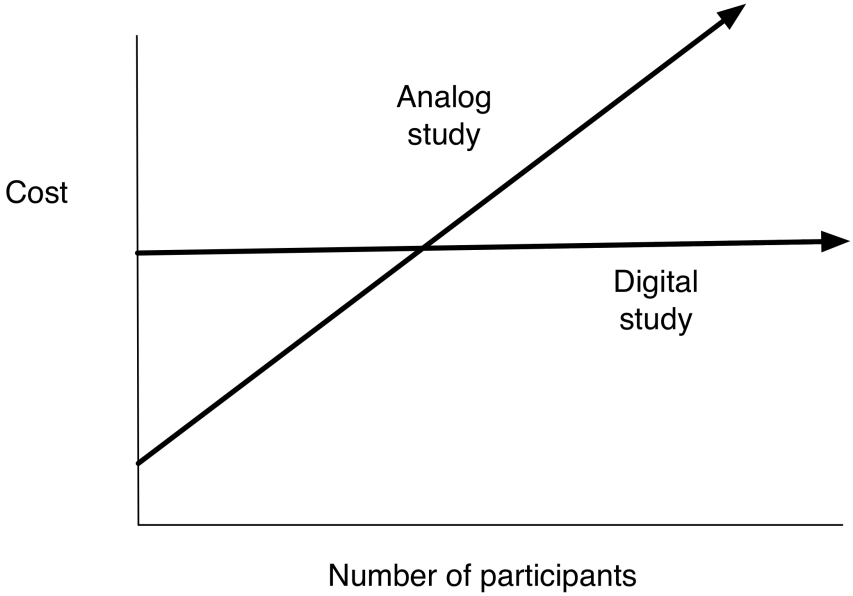
"I read somewhere that everybody on the planet is separated by only six other people. Six degrees of separation. Between us and everybody else on this planet. The president of the United States. A gondolier in Venice . . . It's not just the big names. It's anyone. A native in the rain forest. A Tierra del Fuegan. An Eskimo. I am bound to everyone on this planet by a trail of six people. It's a profound thought . . . "
Ouisa in *Six Degrees of Separation* by John Guare (1990)

Analog vs Digital

Digital enables:

- zero-marginal cost data


Analog
study
Cost
Number of participants


Analog
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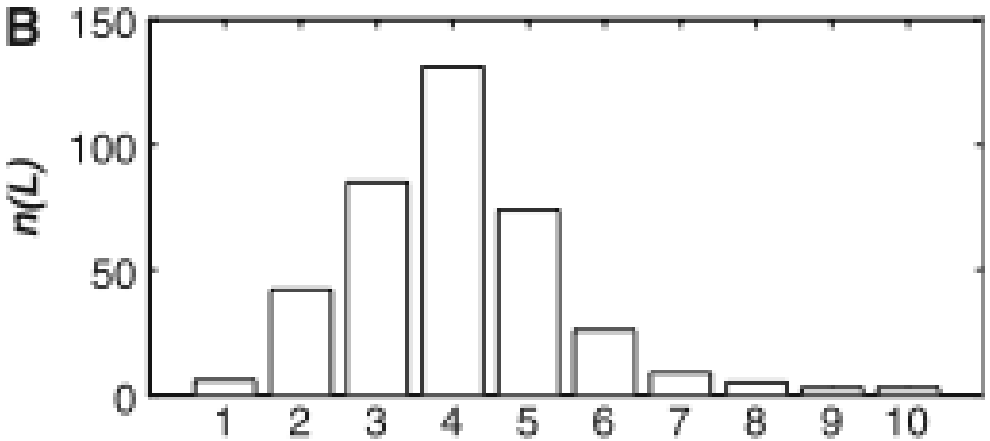
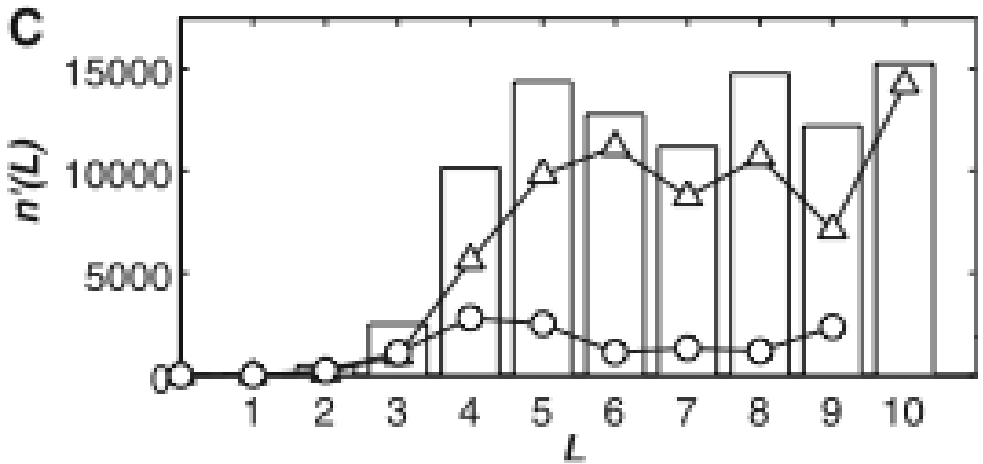
For more: Salganik (2018) *Bit by Bit: Social Research in the Digital Age*: `http://www.bitbybitbook.com`

- What was the limiting factor for Travers and Milgram?
- What was the limiting factor for Dodds, Muhamad, and Watts?

24,163 chains started toward 18 targets all over the world. The first time ever we have an experiment like this on a global scale. What did they find?



L = chain length (number of edges)



Median of 5 (same country) to 7 (different country) intermediaries

How did people decide who to pass the message to?
Location and occupation accounted for about half of all choices

What was the chain completion rate for Dodds, Muhamad, and Watts?

Although the average participation rate (about 37%) was high relative to those reported in most e-mail–based surveys (*26*), the compounding effects of attrition over multiple links resulted in exponential attenuation of chains as a function of their length and therefore an extremely low chain completion rate (384 of 24,163 chains reached their targets). Chains may have terminated (i)

$$\frac{384}{24{,}163} = 1.6\%$$

Target	*City*	*Country*	*Occupation*	*Gender*	*N*
1	Novosibirsk	Russia	PhD student	F	8234
2	New York	USA	Writer	F	6044
3	Bandung	Indonesia	Unemployed	M	8151
4	New York	USA	Journalist	F	5690
5	Ithaca	USA	Professor	M	5855
6	Melbourne	Australia	Travel Consultant	F	5597
7	Bardufoss	Norway	Army veterinarian	M	4343
8	Perth	Australia	Police Officer	M	4485
9	Omaha	USA	Life Insurance Agent	F	4562
10	Welwyn Garden City	UK	Retired	M	6593
11	Paris	France	Librarian	F	4198
12	Tallinn	Estonia	Archival Inspector	M	4530
13	Munich	Germany	Journalist	M	4350
14	Split	Croatia	Student	M	6629
15	Gurgaon	India	Technology Consultant	M	4510
16	Managua	Nicaragua	Computer analyst	M	6547
17	Katikati	New Zealand	Potter	M	4091
18	Elderton	USA	Lutheran Pastor	M	4438
Totals					98,847

Target	*City*	*Country*	*Occupation*	*Gender*	*N*	N_c (%)
1	Novosibirsk	Russia	PhD student	F	8234	20(0.24)
2	New York	USA	Writer	F	6044	31 (0.51)
3	Bandung	Indonesia	Unemployed	M	8151	0
4	New York	USA	Journalist	F	5690	44 (0.77)
5	Ithaca	USA	Professor	M	5855	168 (2.87)
6	Melbourne	Australia	Travel Consultant	F	5597	20 (0.36)
7	Bardufoss	Norway	Army veterinarian	M	4343	16 (0.37)
8	Perth	Australia	Police Officer	M	4485	4 (0.09)
9	Omaha	USA	Life Insurance Agent	F	4562	2 (0.04)
10	Welwyn Garden City	UK	Retired	M	6593	1 (0.02)
11	Paris	France	Librarian	F	4198	3 (0.07)
12	Tallinn	Estonia	Archival Inspector	M	4530	8 (0.18)
13	Munich	Germany	Journalist	M	4350	32 (0.74)
14	Split	Croatia	Student	M	6629	0
15	Gurgaon	India	Technology Consultant	M	4510	12 (0.27)
16	Managua	Nicaragua	Computer analyst	M	6547	2 (0.03)
17	Katikati	New Zealand	Potter	M	4091	12 (0.3)
18	Elderton	USA	Lutheran Pastor	M	4438	9 (0.21)
Totals					98,847	384 (0.4)

The largest empirical study of all time is mostly about connections to Steve Strogatz! (About 40% of completed chains)

What's next?

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