

CS 6474/CS 4803

Social Computing: Sociological Foundations II

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Social structures, creativity, and innovation

Structural Holes and Good Ideas

THINK TANK; *Where to Get a Good Idea: Steal It Outside Your Group*

By MICHAEL ERARD MAY 22, 2004



Got a good idea? Now think for a moment where you got it. A sudden spark of inspiration? A memory? A dream?

Most likely, says Ronald S. Burt, a sociologist at the University of Chicago, it came from someone else who hadn't realized how to use it.

"The usual image of creativity is that it's some sort of genetic gift, some heroic act," Mr. Burt said. "But creativity is an import-export game. It's not a creation game."

Mr. Burt has spent most of his career studying how creative, competitive people relate to the rest of the world, and how ideas move from place to place. Often the value of a good idea, he has found, is not in its origin but in its delivery. His observation will undoubtedly resonate with overlooked novelists, garage inventors and forgotten geniuses who pride themselves on their new ideas but aren't successful in getting them noticed. "Tracing the origin of an idea is an interesting academic exercise, but it's largely irrelevant," Mr. Burt said. "The trick is, can you get an idea which is mundane and well known in one place to another place where people would get value out of it."

Mr. Burt, whose latest findings will appear in the American Journal of Sociology this fall, studied managers in the supply chain of Raytheon, the large electronics company and military contractor based in Waltham, Mass., where he worked until last year. Mr. Burt asked managers to write down their best ideas about how to improve business operations and then had two executives at the company rate their quality. It turned out that the highest-ranked ideas came from managers who had contacts outside their immediate work group. The reason, Mr. Burt said, is that their contacts span what he calls "structural holes," the gaps between discrete groups of people.

Summary

- Role of social network structure on social capital
- Burt's observations:
 - Opinions and thoughts within groups are homogenous
 - People who extend themselves across the 'structural holes' between groups are exposed to diverse ways of thinking
- Brokerage across structural holes between groups can lead to greater accumulation of social capital – quantitatively defining the *network constraint* measure, that uses the size, density, and hierarchy measures of an individual's egonetwork
 - Hypothesis is tested with a case study of the network structure of managers in a supply chain company

Social Capital

- "...the ability of actors to secure benefits by virtue of membership in social networks or other social structures"
- "During recent years, the concept of social capital has become one of the most popular exports from sociological theory into everyday language."
- **"... the point is approaching at which social capital comes to be applied to so many events and in so many different contexts as to lose any distinct meaning."**

Pierre Bourdieu

- Considered one of the first to clearly articulate the concept
- Recognized two parts to social capital
- The relationships that provide access to resources
- The quality of those relationships
- Bourdieu P. 1979. Les trois états du capital culturel. Actes Rech. Sci. Soc. 30:3-6
- Bourdieu P. 1985. The forms of capital. In Handbook of Theory and Research for the Sociology of Education, ed. JG Richardson, pp. 241-58. New York: Greenwood

James Coleman

- Coleman is responsible for popularizing the concept in American sociology
- He saw dense networks as a precondition of social capital
- He introduced the concept of *closure* (cohesion) as a measure of norms which guide the exchange of social capital

Origins of concept

- Captures ideas of capital from sociology since Durkheim and Marx
- What makes it different?
- Focus on the positive effects of relations (although there are certainly negatives)
- By describing it as *capital* it opens the door for economic analysis
- It represents a non-monetary resource for policymakers

How does social capital differ from economic capital?

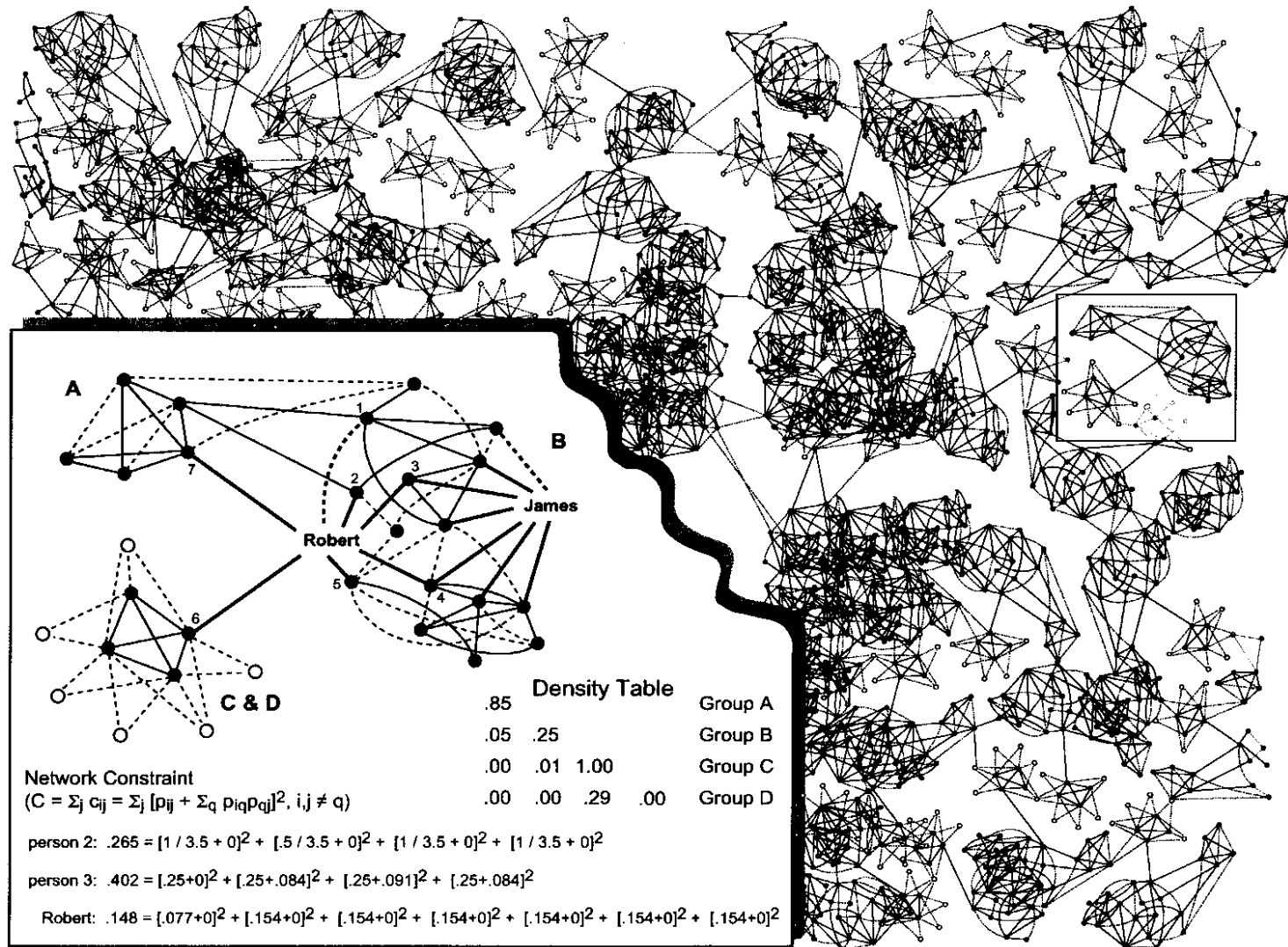
- Both are fungible (can be exchanged)
- Social capital exchange is less transparent
- Obligations and violations of reciprocity are more difficult to recognize and enforce

Summary (Burt 2004)

- Managers asked to come up with an idea to improve the supply chain
- Then asked:
 - whom did you discuss the idea with?
 - whom do you discuss supply-chain issues with in general
 - do those contacts discuss ideas with one another?
- 673 managers (455 (68%) completed the survey)
- ~ 4000 relationships (edges)

Structural Holes

(Figure 1 from Burt 2004)



Network Constraint

- Measure of the extent to which the people a respondent knows are tied to each other
- High constraint means the network is redundant and recycles information
- Low constraint = bridging between groups = good ideas

Four levels of brokerage

- Level 1
 - Make people on both sides aware of the interests and difficulties in the other
- Level 2
 - Transferring best practices from one group to another
- Level 3
 - Draw analogies between groups ostensibly irrelevant to one another (difficult for people who have spent a long time in a group because they use differences to justify continuing their behavior on the basis that the other group is a different context)
- Level 4
 - Synthesis
- A setting dependent on formal chains of command for communication is a setting rich in opportunities to coordinate directly across the formal chains

The results show a strong effect of network constraint on salary, evaluation and promotion, independent of the job/age characteristics related to human capital explanations.

TABLE 1
PREDICTING PERFORMANCE

	1 Salary		2 Salary		3 Evaluation		4 Promotion	
Manager 1	-31,099**	(2,882)	-35,707**	(3,498)	-.973	(.678)	.689	(.670)
Manager 2	-16,652**	(2,745)	-19,892**	(3,479)	-.863	(.631)	1.165	(.648)
Manager 3 (reference)	
Sr. manager	19,638**	(3,782)	15,484**	(4,143)	.116	(.843)	-.635	(.885)
Executive	65,394**	(4,522)	61,930**	(4,835)	.423	(1.01)	.221	(1.08)
Purchasing	754	(1,351)	1,811	(1,884)	.410	(.313)	.478	(.345)
Age	338**	(52)	300**	(71)	-.085**	(.013)	-.084**	(.013)
Bachelor	1,610	(1,003)	200	(1,401)	-.211	(.237)	.118	(.240)
Graduate	734	(864)	-451	(1,155)	-.208	(.203)	.182	(.204)
Hightech	3,516**	(880)	3,150*	(1,189)	.087	(.209)	.162	(.210)
Lowtech	-6,927**	(1,481)	-6,607*	(2,375)	-.351	(.342)	-.409	(.378)
Urban 1	3,613**	(1,046)	3,947**	(1,456)	.423	(.247)	-.152	(.252)
Urban 2	5,049**	(1,010)	5,585*	(1,427)	-.564	(.238)	-.052	(.243)
Network constraint	-7	(25)	-1	(38)	-.014**	(.004)	-.022**	(.006)
Mgr2 × constraint	-19	(35)	-47	(58)	.004	(.008)	-.008	(.009)
Mgr3 × constraint	-47	(38)	-159*	(59)	-.007	(.009)	.003	(.009)
SrMgr × constraint	-214*	(75)	-216*	(84)	-.005	(.017)	.010	(.019)
Executive × constraint	-681**	(124)	-697**	(132)	-.011	(.028)	.024	(.030)
N	673		398		673		638	

NOTE.—Coefficients in models 1 and 2 are change in salary dollars with a unit increase in row variable (respectively .80 and .83 squared multiple correlations; network effect plotted in fig. 4). Coefficients in model 3 predict three levels of evaluation for an ordinal logit model (114.8 χ^2 with 17 *df*; network effects are plotted in fig. 4 holding age constant). Coefficients in model 4 are for a logit model predicting whether the employee was promoted in the year after the network survey or received an above average raise (100.5 χ^2 with 17 *df*; network effect is plotted in fig. 4 holding age constant). SEs are given in parentheses.

* $P < .05$.

** $P < .001$.

Summary (Burt 2004)

- Main finding – interconnected groups give rise to “better ideas” compared to densely intraconnected groups
- Other findings – 1) organizations that collaborate with partner firms show greater financial growth; 2) higher ranked, high tech, and managers in urban settings came up with better ideas; 3) managers who brokered connections across structural holes were rewarded for brokerage in terms of compensation, performance evaluations, and promotions

A cosmic background image featuring a deep blue and black space filled with stars and nebulae. A bright, glowing yellow and orange nebula is prominent in the upper right, while a bright white star or galaxy core is visible in the lower left. The overall effect is a sense of vastness and celestial wonder.

50TH ANNIVERSARY EDITION

THE STRUCTURE OF SCIENTIFIC
REVOLUTIONS

THOMAS S. KUHN

WITH AN INTRODUCTORY ESSAY BY IAN HACKING

Class Exercise I

To what extent are the findings on the importance of brokerage and structural holes affected by the case studies considered?

To what extent are the findings on the importance of brokerage and structural holes affected by the case studies considered?

Traditional organizations,
Self-reported network structure,
Hierarchical role of managers and their teams,
“Good ideas” solicited from high ranked managers,
The study is from more than 10 years ago,
Unclear if the good ideas were implemented

What are some of the variables that should have been considered/controlled for in the study?

What are some of the variables that should have been considered/controlled for in the study?

Composition of the groups,
Group size,
Type of organization,
Company culture

Can a structure (and related structural holes) be too large or small to realize the benefit of brokerage?

Recruiters with larger personal rolodexes generate no more or less output

	Revenue \$	\$ for completed searches	Completed searches	Multitasking	Duration	Duration controlling for multitasking
Size of rolodex (Q50)	-10.2 (60.3)	-22.9 (32.6)	0.000 (0.001)	0.000 (0.001)	-0.013 (0.021)	-0.013 (0.016)

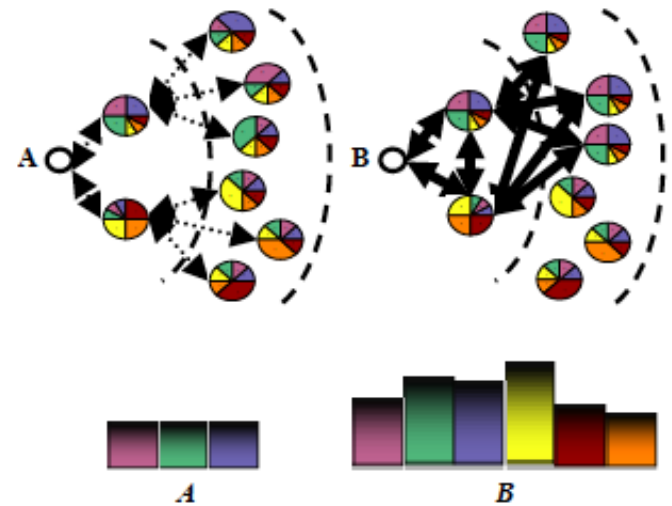
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$, Standard err in paren.

Instead, a larger private rolodex is associated with:

- Less information sharing
- Less DB proficiency
- Lower % of e-mail read
- Less learning from others
- Less perceived credit for ideas given to colleagues
- More dissembling on the phone

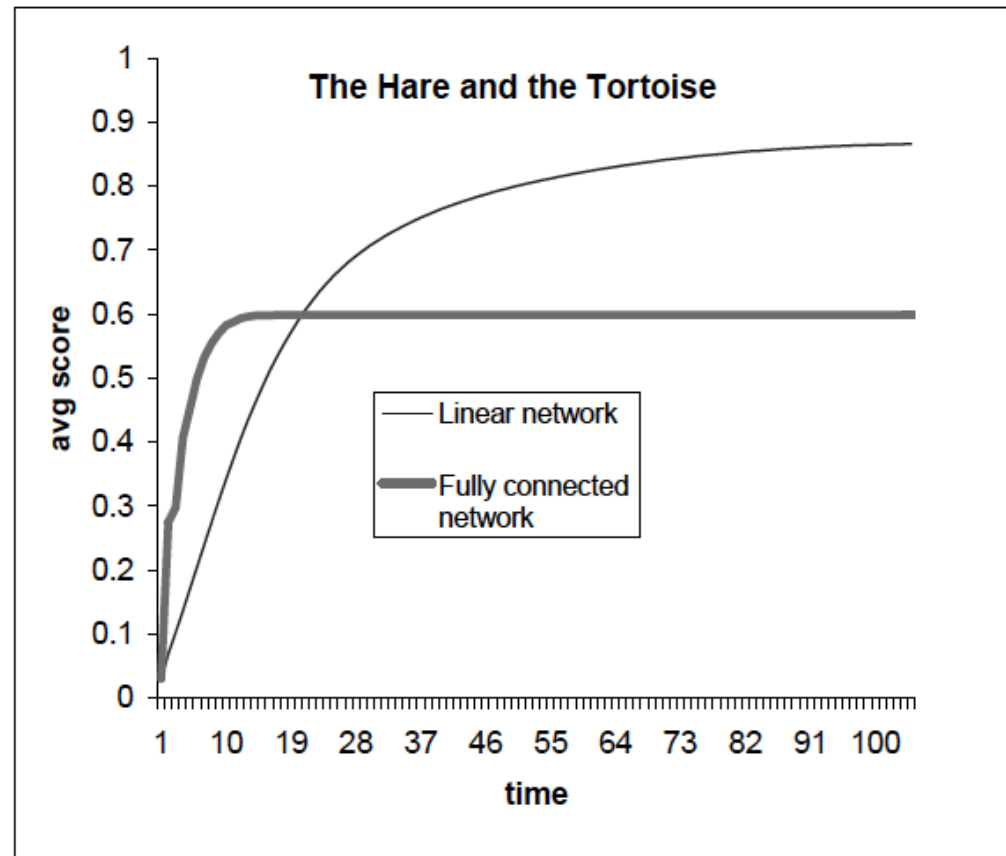
Networks of higher degrees drive performance by providing access to novel information

- network structure (having high degree) correlates with receiving novel information sooner (as deduced from hashed versions of their email)
- getting information sooner correlates with \$\$ brought in
 - controlling for # of years worked
 - job level
 -





Networks and innovation

- **fully connected network** converges more quickly on a solution, but if there are lots of local maxima in the solution space, it may get stuck without finding optimum.
- **linear network** (fewer edges) arrives at better solution eventually because individuals innovate longer



Email structure matters

New Contract Revenue					Contract Execution Revenue				
Coefficients ^a					Coefficients ^a				
Unstandardized Coefficients					Unstandardized Coefficients				
	B	Std. Error	Adj. R ²	Sig. F 		Std. Error	Adj. R ²	Sig. F 	
(Base Model)			0.40				0.19		
Best structural pred.	12604.0***	4454.0	0.52	.006	1544.0**	639.0	0.30	.021	
Ave. E-Mail Size	-10.7**	4.9	0.56	.042	-9.3*	4.7	0.34	.095	
Colleagues' Ave. Response Time	-198947.0	168968.0	0.56	.248	-368924.0**	157789.0	0.42	.026	
a. Dependent Variable: Bookings02					a. Dependent Variable: Billings02				
b. Base Model: YRS_EXP, PARTDUM, %_CEO_SRCH, SECTOR(dummies), %_SOLO.					b. N=39. *** p<.01, ** p<.05, * p<.1				

Sending *shorter* e-mail helps get contracts and finish them.

Faster response from colleagues helps finish them.

Class Exercise II

Cite a case example where the structural hole phenomenon can explain a specific characteristic of online social networks.