



Multi-University Research Teams:
Shifting Impact, Geography, and
Stratification in Science



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About the report and authors

- ▶ Published on Science Magazine as a report on 21, Nov. 2008
- ▶ 3 Authors from
 - ▶ Kellogg School of management, Northwestern University, Evanston
 - ▶ National Bureau of Economic Research, Cambridge
 - ▶ Northwestern Institute on Complexity, Northwestern University, Evanston
 - ▶ Haas School of business, University of California at Berkeley, Berkeley



Introduction

- ▶ Demonstrate that teamwork in science increasingly spans:
 - ▶ university boundaries
 - ▶ a dramatic shift across virtually all fields of science, engineering, and social science
- ▶ Found that multi-university collaborations:
 - ▶ are the fastest growing type of authorship structure
 - ▶ produce the highest-impact papers when they include a top-tier university
 - ▶ are increasingly stratified by in-group university rank
- ▶ Suggests:
 - ▶ a concentration of the production of scientific knowledge in fewer rather than more centers of high-impact science



Introduction

▶ Authors Examined:

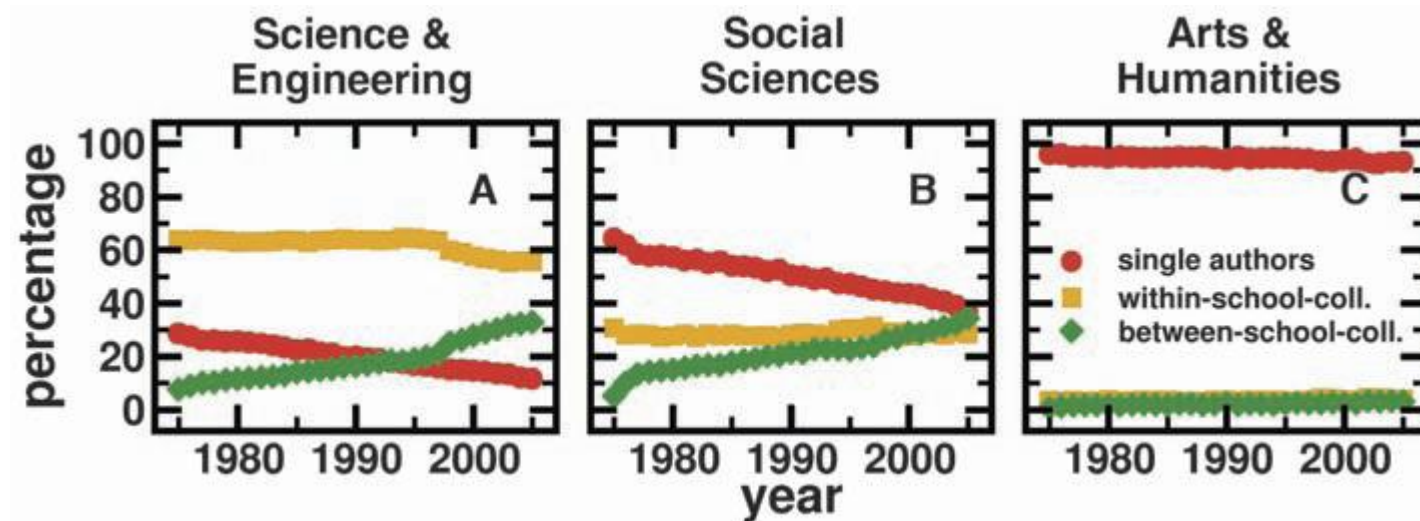
- ▶ 1) trends in multi-university collaborations across the full spectrum of academic fields
- ▶ 2) the association of these changes with research impact
- ▶ 3) the role of elite and nonelite universities in these trends

▶ Samples for examination

- ▶ 662 major U.S. universities
- ▶ 4.2 million research papers
- ▶ 172 fields of SE, 54 fields of SS, 27 fields of AH from 1975 ~ 2005



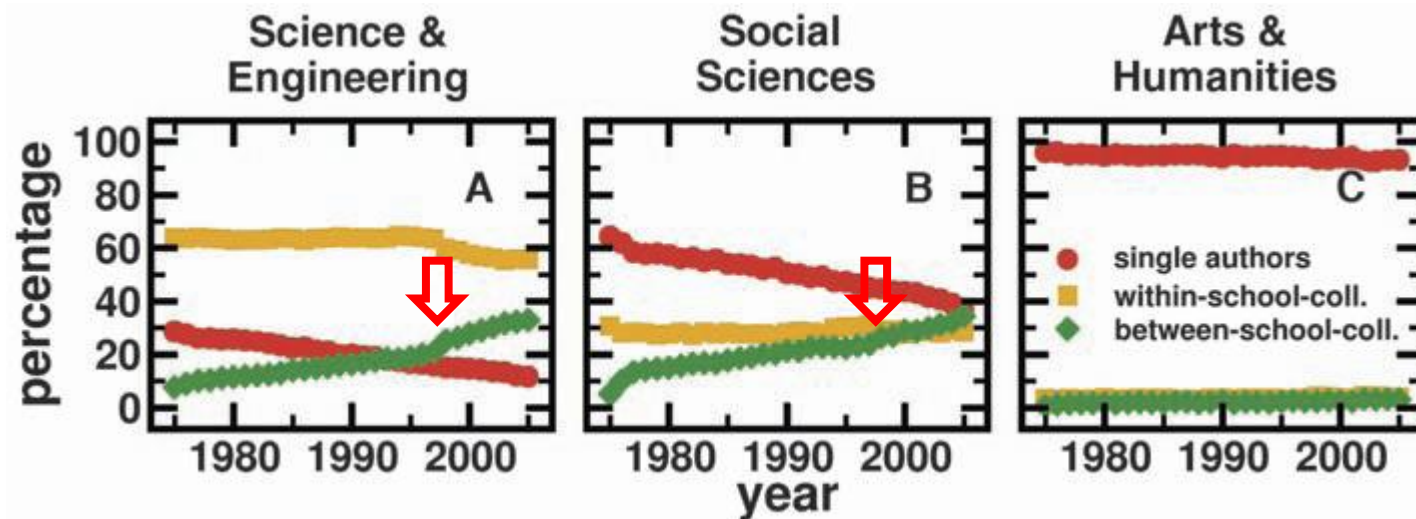
The Rise of Multi-university collaboration



- 1) growing segment in multi-university collaborations appear even stronger upon further including publications with collaborators outside the sample of major U.S. universities.



The Rise of Multi-university collaboration



- 1) growing segment in multi-university collaborations appear even stronger upon further including publications with collaborators outside the sample of major U.S. universities.
 - 2) ↓ shows unusual jump in 1998, a period when the Internet and other information and computing technologies were spreading widely
-



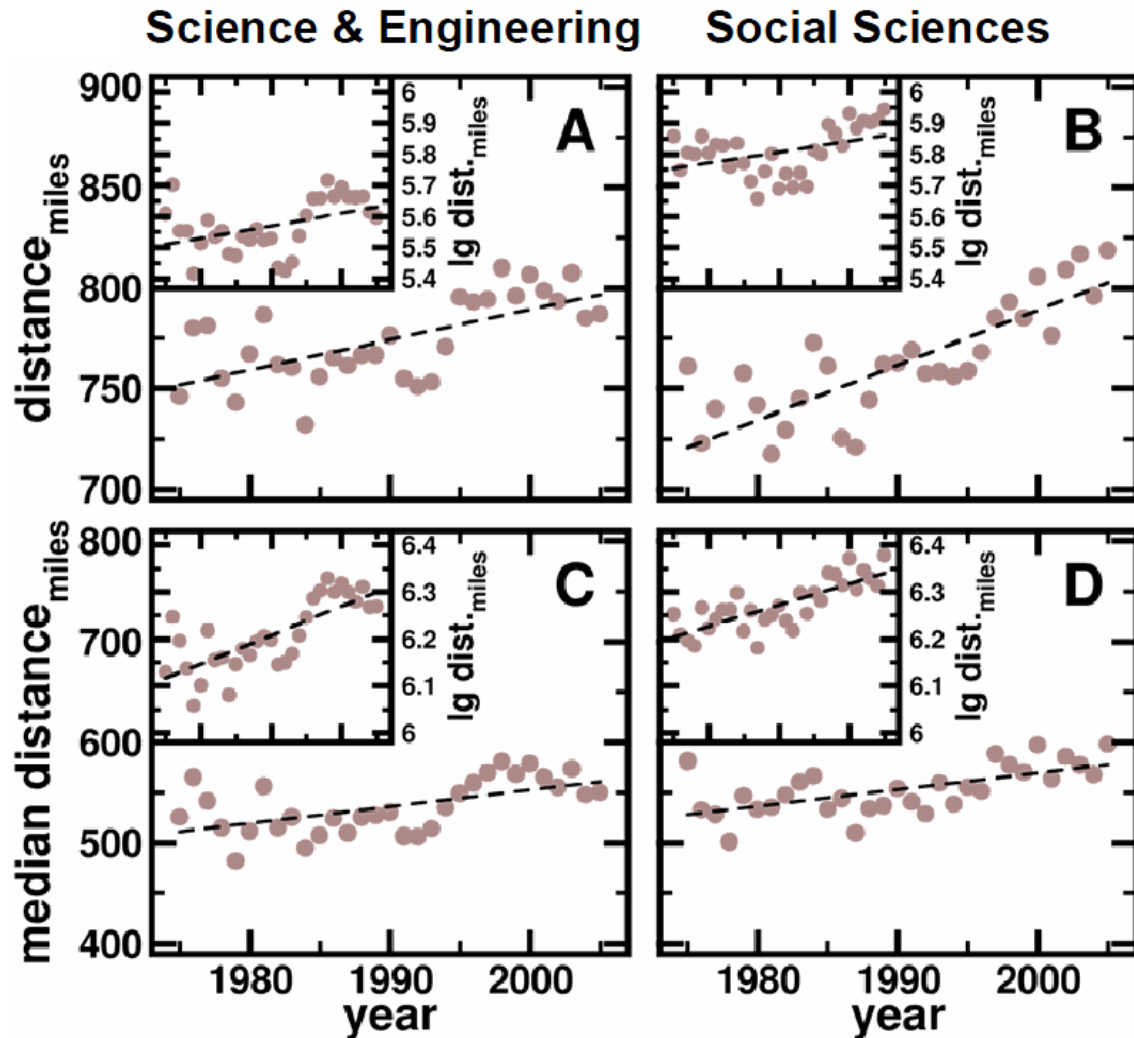
Patterns by Subfiled

Fields	Total subfields (<i>N</i>)	Increasing collaborations			
		Within-school		Between schools	
		Subfields (<i>N</i>)	Subfields (%)	Subfields (<i>N</i>)	Subfields (%)
SE	172	114	66.3	168	97.7
SS	54	47	87.0	54	100.0
AH	27	16	59.3	18	66.7

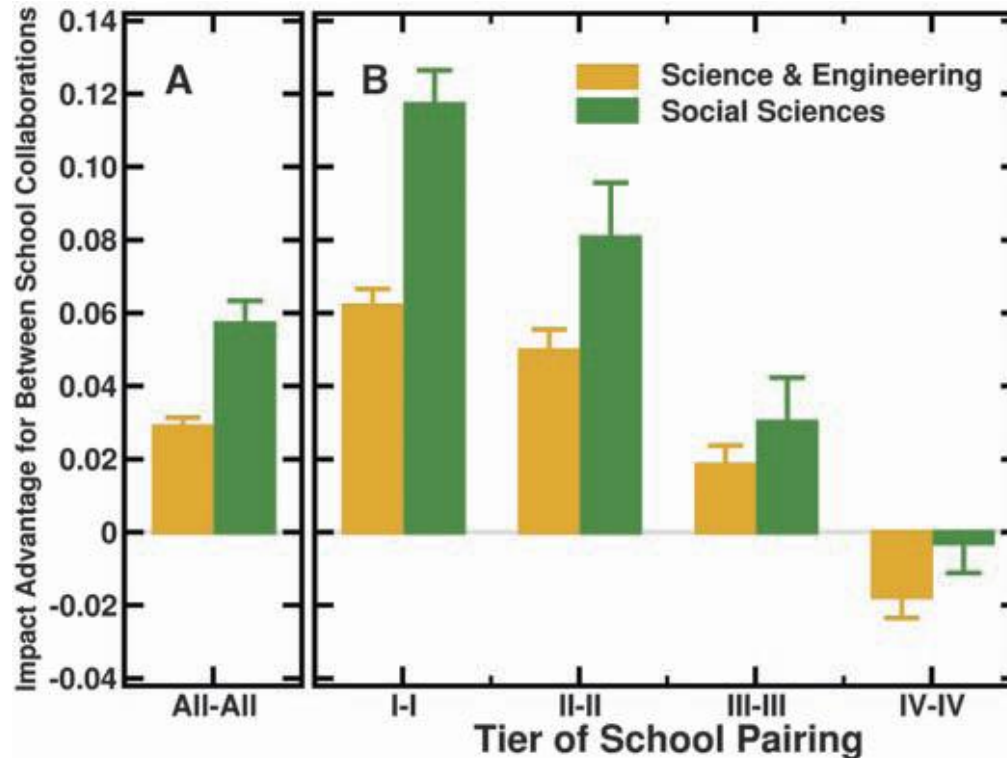
- 1) Comparison of the incidence of these authorship structure between the early and late period
 - 2) collaboration itself is increased
 - 3) collaborations between schools is increased
-



The Average Distance Between Collaborators

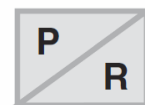
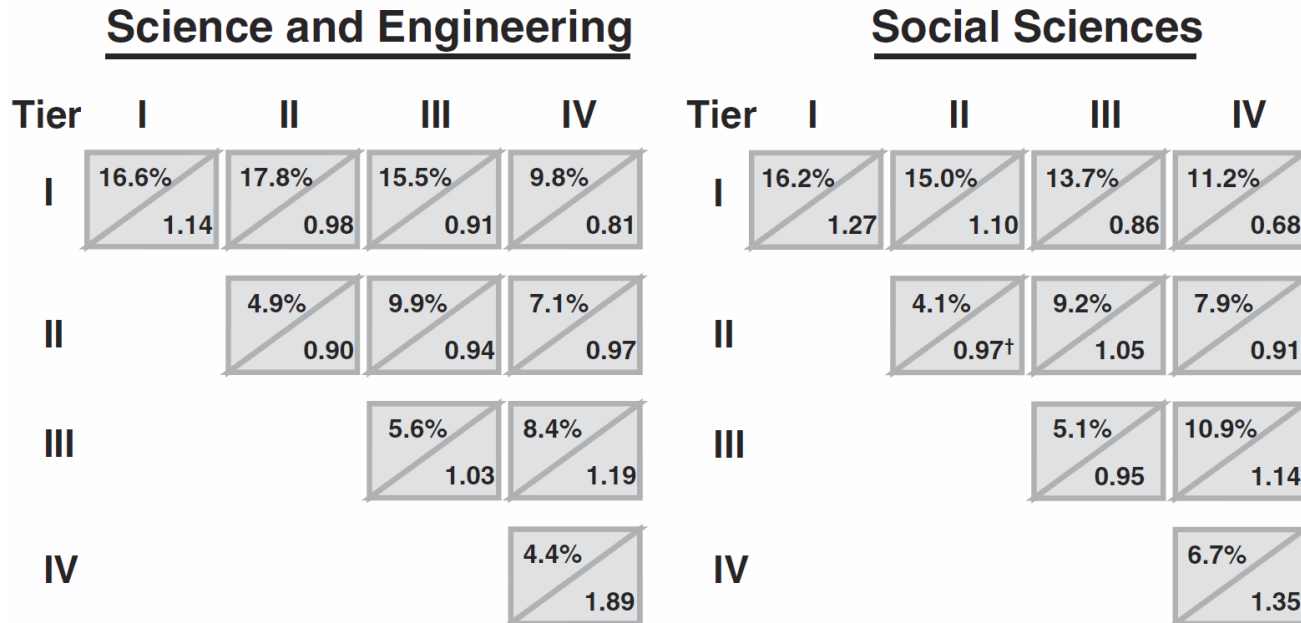


Analysis of Citation Impact



By estimation using probability that papers written with these two different authorship structure receive above-average citations.

Frequencies on Cross-tier Collaborations



P: Frequency of tier combination (in %)

R: Ratio of frequency to expected frequency

1) Tend to lie between the impact of the upper and lower tiers' within-school collaborations.

2) The between-school impact tends to lie closer to the upper-tier baseline than the lower-tier baseline. (Follow Stronger Partner!)



Impact of collaborations with Schools of Different Tiers

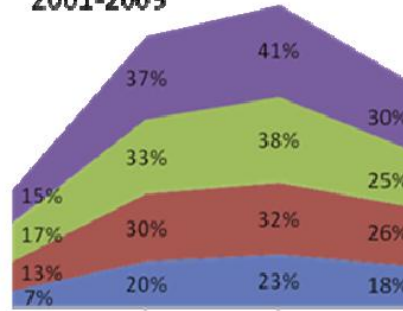
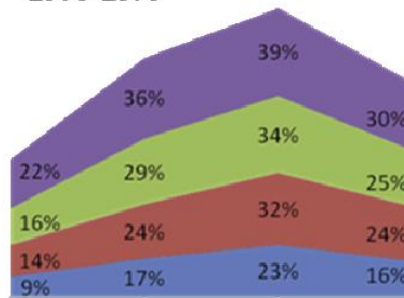
Authorship Structure			
solo	within school coll.	between school collaboration	
		top	non-top

1975-1979

Authorship Structure			
solo	within school coll.	between school collaboration	
		top	non-top

2001-2005

Science & Engineering



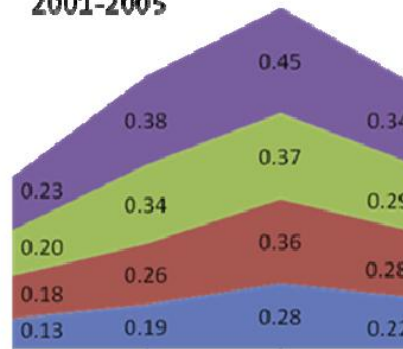
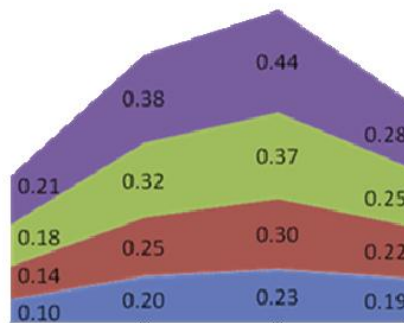
- Tier 1
- Tier 2
- Tier 3
- Tier 4

Probability that a publication earns more than the average number of citations in the indicated time frame and fields.

1975-1979

2001-2005

Social Sciences



Ranking Results with Citation

Rank Total Citations

- 1 HARVARD UNIVERSITY
- 2 STANFORD UNIVERSITY
- 3 UNIVERSITY OF CALIFORNIA BERKELEY
- 4 UNIVERSITY OF MICHIGAN
- 5 UNIVERSITY OF CALIFORNIA LOS ANGELES
- 6 UNIVERSITY OF WASHINGTON
- 7 UNIVERSITY OF PENNSYLVANIA
- 8 YALE UNIVERSITY
- 9 UNIVERSITY OF WISCONSIN
- 10 MASSACHUSETTS INSTITUTE OF TECHNOLOGY
- 11 UNIVERSITY OF CALIFORNIA SAN FRANCISCO
- 12 UNIVERSITY OF ILLINOIS
- 13 JOHNS HOPKINS UNIVERSITY, THE
- 14 UNIVERSITY OF CALIFORNIA SAN DIEGO
- 15 WASHINGTON UNIVERSITY IN ST. LOUIS
- 16 UNIVERSITY OF MINNESOTA
- 17 DUKE UNIVERSITY
- 18 CORNELL UNIVERSITY
- 19 UNIVERSITY OF NORTH CAROLINA
- 20 NORTHWESTERN UNIVERSITY

Hirsch Index

- HARVARD UNIVERSITY
- STANFORD UNIVERSITY
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- DUKE UNIVERSITY
- ROCKEFELLER UNIVERSITY
- UNIVERSITY OF TEXAS SOUTHWESTERN MEDICAL C
- CALIFORNIA INSTITUTE OF TECHNOLOGY
- UNIVERSITY OF WISCONSIN
- CORNELL UNIVERSITY
- UNIVERSITY OF NORTH CAROLINA



Ranking Results with Citation

Rank	Citations/Paper	Citations/Faculty member
1	ROCKEFELLER UNIVERSITY	BARNARD COLLEGE
2	HARVARD UNIVERSITY	ROCKEFELLER UNIVERSITY
3	PONCE SCHOOL OF MEDICINE	MGH INSTITUTE OF HEALTH PROFESSIONS
4	MGH INSTITUTE OF HEALTH PROFESSIONS	CUNY GRADUATE CENTER
5	UNIVERSITY OF TEXAS SOUTHWESTERN MEDICAL CENTER	LINCOLN UNIVERSITY
6	BRANDEIS UNIVERSITY	SARAH LAWRENCE COLLEGE
7	YALE UNIVERSITY	HAVERFORD COLLEGE
8	STANFORD UNIVERSITY	IONA COLLEGE
9	UNIVERSITY OF CALIFORNIA SAN FRANCISCO	ROOSEVELT UNIVERSITY
10	BAYLOR COLLEGE OF MEDICINE	BRANDEIS UNIVERSITY
11	RICE UNIVERSITY	HARVARD UNIVERSITY
12	WASHINGTON UNIVERSITY IN ST. LOUIS	RICE UNIVERSITY
13	MASSACHUSETTS INSTITUTE OF TECHNOLOGY	STANFORD UNIVERSITY
14	JOHNS HOPKINS UNIVERSITY, THE	PONCE SCHOOL OF MEDICINE
15	UNIVERSITY OF PENNSYLVANIA	HAMILTON COLLEGE
16	CALIFORNIA INSTITUTE OF TECHNOLOGY	YALE UNIVERSITY
17	EMORY UNIVERSITY	UNIVERSITY OF TEXAS SOUTHWESTERN MEDICAL CENTER
18	NEW YORK UNIVERSITY	CALIFORNIA INSTITUTE OF TECHNOLOGY
19	MOUNT SINAI SCHOOL OF MEDICINE	PRINCETON UNIVERSITY
20	UNIVERSITY OF TEXAS M. D. ANDERSON CANCER CENTER	HARTWICK COLLEGE



Conclusion

- ▶ **Multi-university partnerships:**
 - ▶ 1) are the fastest growing type of authorship structure
 - ▶ 2) produce the highest-impact papers when they include a top-tier university
 - ▶ 3) are increasingly stratified by in-group university rank
- ▶ Although geographic distance is of decreasing importance, social distance is of increasing importance in research collaborations



Thank you for listening!

