

Supplementary Information: Whose Social Capital?

jimi adams & Kate Vinita Fitch

2023 June 01

This document provides further details and justification for some of the analytic decisions made in the primary manuscript. We also provide some additional ancillary descriptive characteristics of our analytic corpus and results.¹

Network Construction

First, some basic information about the scope of the corpus and constructed networks.

- Number of papers in corpus: 21,160
- Total citations: 985,749 (to 533,111 unique papers)
- Giant component (Harary 1969) size in citation network: 546,159
 - this drops 4,073 papers from focal corpus
- Citations in GC: 981,875 (to 529,244 unique papers)

Identifying Key Papers

Next, here are the identified “key papers” (those receiving >1000 citations from within the corpus; the *least* cited of these is cited by >5% of *all* papers in the corpus) and the number of citations each received from within the corpus, sorted by number of citations received:

Citation	Cites
Coleman (1988)	4095
Putnam (2000)	3594
Putnam (1993)	2802
Portes (1998)	2289
Granovetter (1973)	2157
Nahapiet and Ghoshal (1998)	2113
Coleman (1990)	2097
Bourdieu (1986)	2090
Putnam (1995)	1785
Adler and Kwon (2002)	1609
Lin (2001)	1220
Burt (1992)	1062

Alphabetized:

Citation	Cites
Adler and Kwon (2002)	1609
Bourdieu (1986)	2090

¹Code for all analyses can be found at: <https://github.com/jimiadams/SocialCapital-Viz>.

Citation	Cites
Burt (1992)	1062
Coleman (1990)	2097
Coleman (1988)	4095
Granovetter (1973)	2157
Lin (2001)	1220
Nahapiet and Ghoshal (1998)	2113
Portes (1998)	2289
Putnam (2000)	3594
Putnam (1995)	1785
Putnam (1993)	2802

Given that two of these papers are not primarily original theorization of the social capital concept, but review papers summarizing its application in particular fields, the prominence of their citations in those fields (and central role in defining 2 of the clusters described in the manuscript itself) provides additional evidence of a pattern of citation “hijacking” by review articles as described by McMahan and McFarland (2021).

Estimating Community Structure

For conducting the community structure analyses on this citation network, the paper presents results using (Blondel et al. 2008), but we also ran all analyses using (Clauset, Newman, and Moore 2004). In the summaries in this SI, we include both, and also elaborate the demonstrated similarities and differences between these strategies. After applying the community detection algorithms on the citation giant component, we have:

- Number of papers in components size > 10k
 - louvain solution: 304,163
 - fast-greedy solution: 307,977

The modularity-maximized solutions identify 6 (Louvain) and 5 (fast greedy) communities respectively containing >1000 papers in each, and each these provide *clear* cut-points, as is common graph theoretically (e.g., the next largest component in the fast-greedy solution has fewer than 100 papers). Within those components, the largest clusters include respectively (N, %) of the papers from the focal corpus:

Louvain Solution

Cluster	Papers	% of Corpus
1	2516	11.9
2	2319	11.0
3	2212	10.5
4	1514	7.2
5	1449	6.8
6	1210	5.7
Total	11220	53

Fast-Greedy Solution

Cluster	Papers	% of Corpus
1	3980	18.8
2	3060	14.5
3	2692	12.7

Cluster	Papers	% of Corpus
4	1485	7.0
5	754	3.6
Total	11971	56

Across these clusters, the key papers collectively receive the following number of citations:²

- Louvain solution - {7149 4090 3467 3263 3626 3106}
- fast greedy solution - {9363 8433 4320 3202 933}

```
apply(matrix(fg_cites, nrow=12), 2, sum) [1] 9363 8433 4320 3202 933
apply(matrix(lc_cites, nrow=12), 2, sum) [1] 7149 4090 3467 3263 3626 3106
```

How many citations are there to the set of those top citations in the largest citation clusters? - Raw count: 681 777 868 354 427 1929 2886 6022 4306 1656 - As a proportion of citations sent within those clusters:

Which communities are each of the top_cites in (recognizing this isn't the question here)?

- In FG solution, they're all in the same community.
- In louvain, they are in five separate communities
 - {adler, burt, coleman_1990, granovetter, nahapiet}
 - {bourdieu, lin, putnam_2000}
 - {coleman_1988}
 - {portes, putnam_1995, putnam_1993}).

References

- Adler, Paul S., and Seok-Woo Kwon. 2002. "Social Capital: Prospects for a New Concept." *The Academy of Management Review* 27 (1): 17–40. <http://www.jstor.org/stable/4134367>.
- Blondel, Vincent D., Jean-Loup Guillaume, Renaud Lambiotte, and Etienne Lefebvre. 2008. "Fast Unfolding of Communities in Large Networks." *Journal Article. Journal of Statistical Mechanics* 10: 10008–20. <https://doi.org/10.1088/1742-5468/2008/10/P10008>.
- Bourdieu, Pierre. 1986. "The Forms of Capital." In *Handbook of Theory and Research for the Sociology of Education*, edited by J. Richardson, 241–58. Greenwood.
- Burt, Ronald S. 1992. *Structural Holes: The Social Structure of Competition*. Harvard University Press.
- Clauset, Aaron, M. E. J. Newman, and Cristopher Moore. 2004. "Finding Community Structure in Very Large Networks." *Physical Review E* 70 (December): 066111. <https://doi.org/10.1103/PhysRevE.70.066111>.
- Coleman, James S. 1988. "Social Capital in the Creation of Human Capital." *American Journal of Sociology* 94: S95–120. <http://www.jstor.org/stable/2780243>.
- . 1990. *Foundations of Social Theory*. Harvard University Press.
- Granovetter, Mark S. 1973. "The Strength of Weak Ties." *American Journal of Sociology* 78 (6): 1360–80. <http://www.jstor.org/stable/2776392>.
- Harary, Frank. 1969. *Graph Theory*. Addison-Wesley.
- Lin, Nan. 2001. *Social Capital : A Theory of Social Structure and Action*. Vol. 19. Structural Analysis in the Social Sciences. Routledge.
- McMahan, Peter, and Daniel A. McFarland. 2021. "Creative Destruction: The Structural Consequences of Scientific Curation." *American Sociological Review* 86 (2): 341–76. <https://doi.org/10.1177/0003122421996323>.
- Nahapiet, Janine, and Sumantra Ghoshal. 1998. "Social Capital, Intellectual Capital, and the Organizational Advantage." *The Academy of Management Review* 23 (2): 242–66. <http://www.jstor.org/stable/259373>.
- Portes, Alejandro. 1998. "Social Capital: Its Origins and Applications in Modern Sociology." *Annual Review of Sociology* 24 (1): 1–24. <https://doi.org/10.1146/annurev.soc.24.1.1>.

²The paper-specific citations can be found in the top panel of Figure 1 in the manuscript, and the [solution_name]_cites object in the .Rda files in the GitHub repo data folder.

- Putnam, Robert D. 1993. *Making Democracy Work: Civic Traditions in Modern Italy*. Princeton University Press.
- . 1995. “Bowling Alone: America’s Declining Social Capital.” *Journal of Democracy* 6 (1): 65–78.
- . 2000. *Bowling Alone: The Collapse and Revival of American Community*. Simon; Schuster.