

The role of incumbency in field emergence: The case of Internet studies

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Objective: Use the case of ‘Internet studies’ to see what role previous incumbents versus newcomers play in field emergence.

Motivation: Internet studies appears to have come of age. There are multiple handbooks, dedicated journals (*New Media & Society*, *Cyberpsychology*, etc.), and increasing representation in existing journals. Can we confirm that the field exists, and if so, what role did incumbents play?

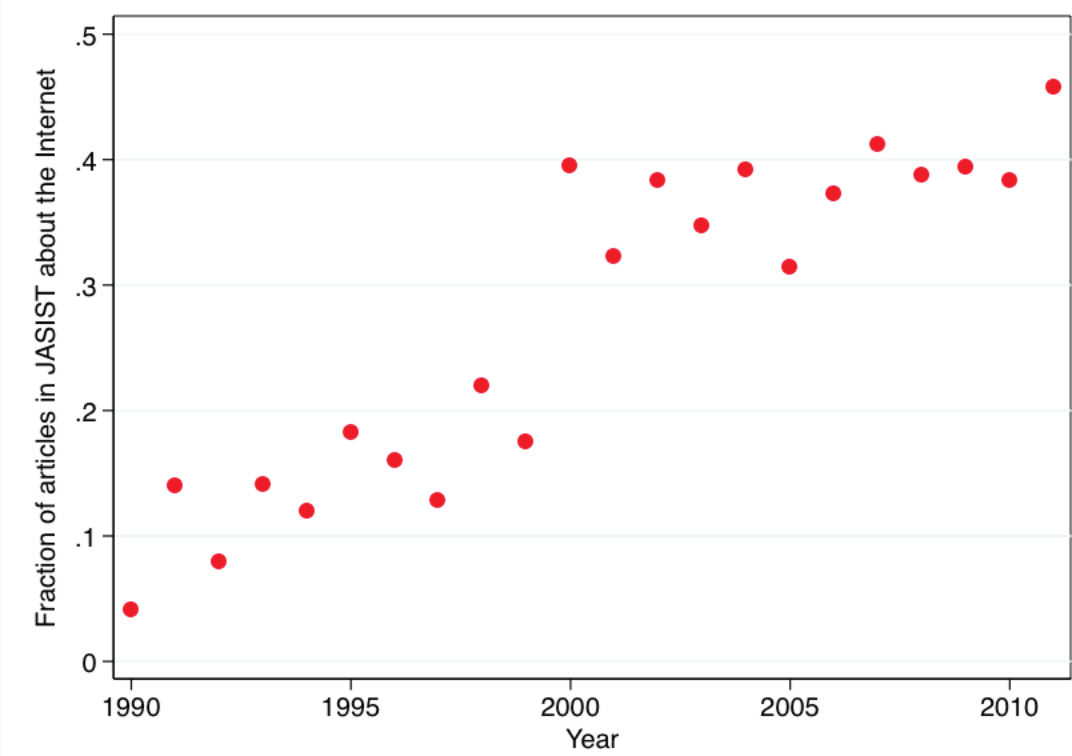


Fig 1. Papers about the Internet have been increasing. Shown is the fraction of articles in the *Journal of the American Society for Information Science & Technology* about the Internet as an illustration. Note: there was no special issue about the Internet in 2000, the jump there appears to be unsolicited.

Background: I use as a ‘null model’ the findings of Kaiser, Bettencourt, & Kaur (2009), which are motivated by Kuhn’s idea of paradigms as social entities. Successful fields each underwent a percolation transition in their co-authorship network, but an unsuccessful field (cold fusion) did not. Based on this, I give the fraction of edges in the largest connected component a substantive interpretation, calling it ‘coherence.’

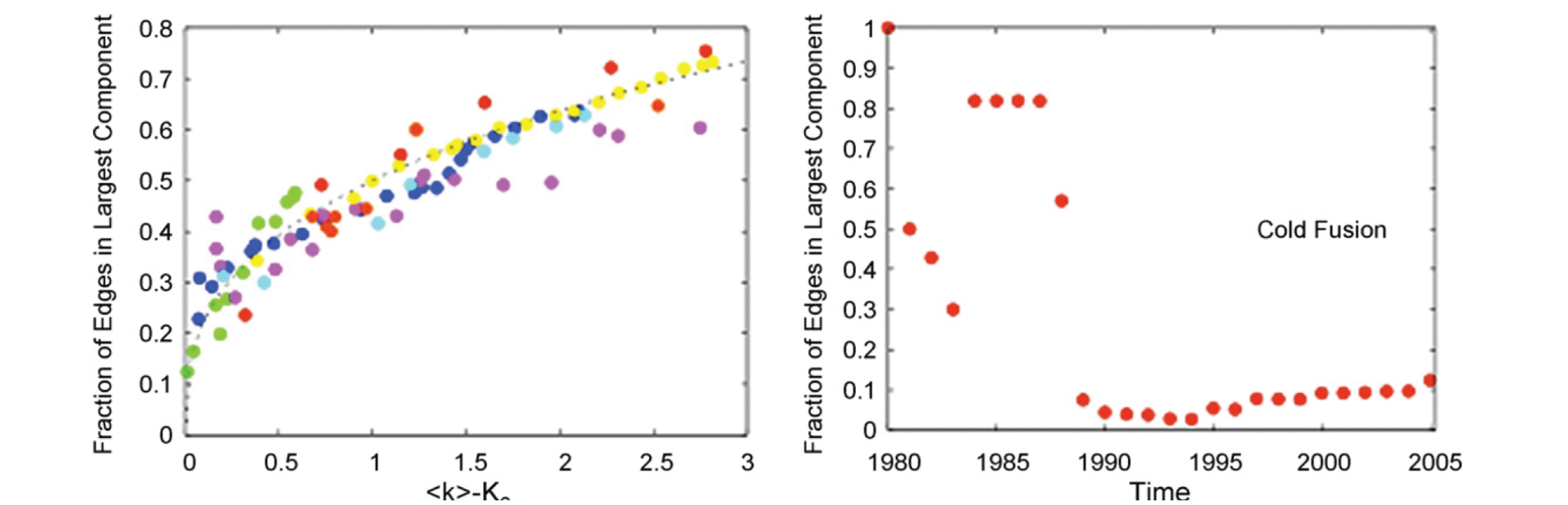


Fig 2. Figure 7 in Bettencourt, Kaiser, & Kaur (2009), used with permission. “Field development and topological critical behavior (left). All successful fields (different colors) display the same approximate critical behavior... The critical [fraction] is not universal and varies from one field to another. Fields without an established (and shared) set of concepts and techniques, such as cold fusion (right), do not display a topological transition.”

Methods 1: I collected 130,000 records from the Web of Science from 1990 to 2011. From this, I generated a co-authorship network of 115,000 nodes. At 2011, there was a giant component of about 70,000 authors (the next-largest component was 78 authors).

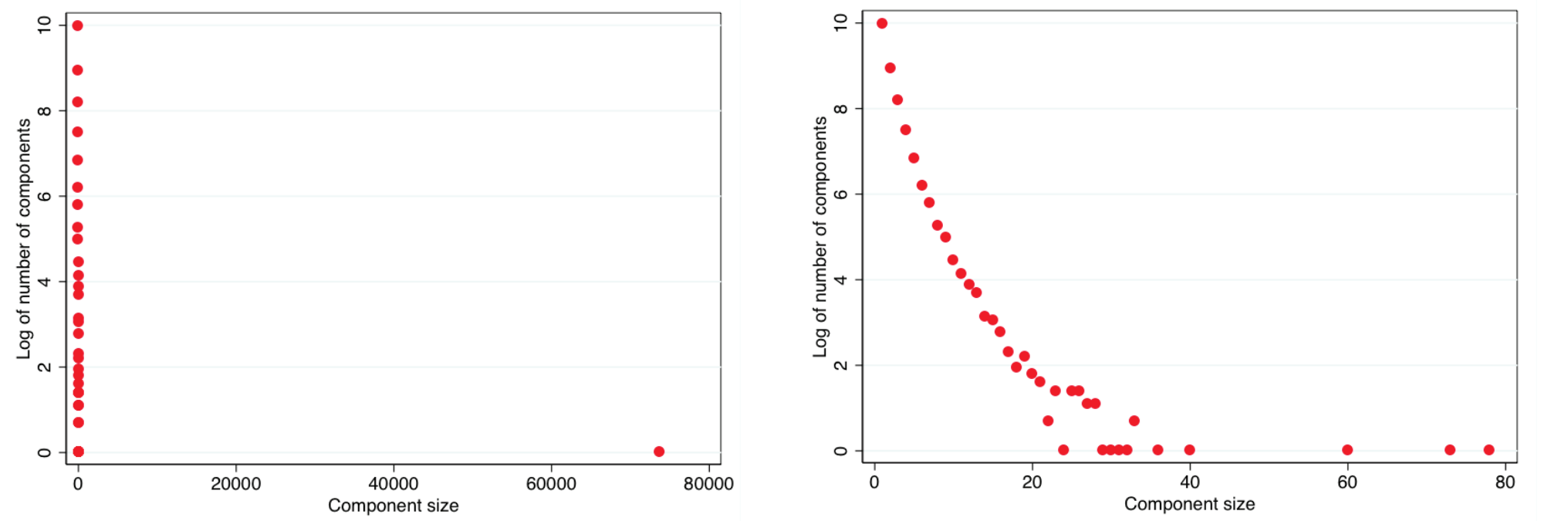


Fig 3. Size of all components (left), and excluding the giant component (right).

Findings 1: There is indeed a field of Internet studies, and the critical moment where it coalesced is 2000.

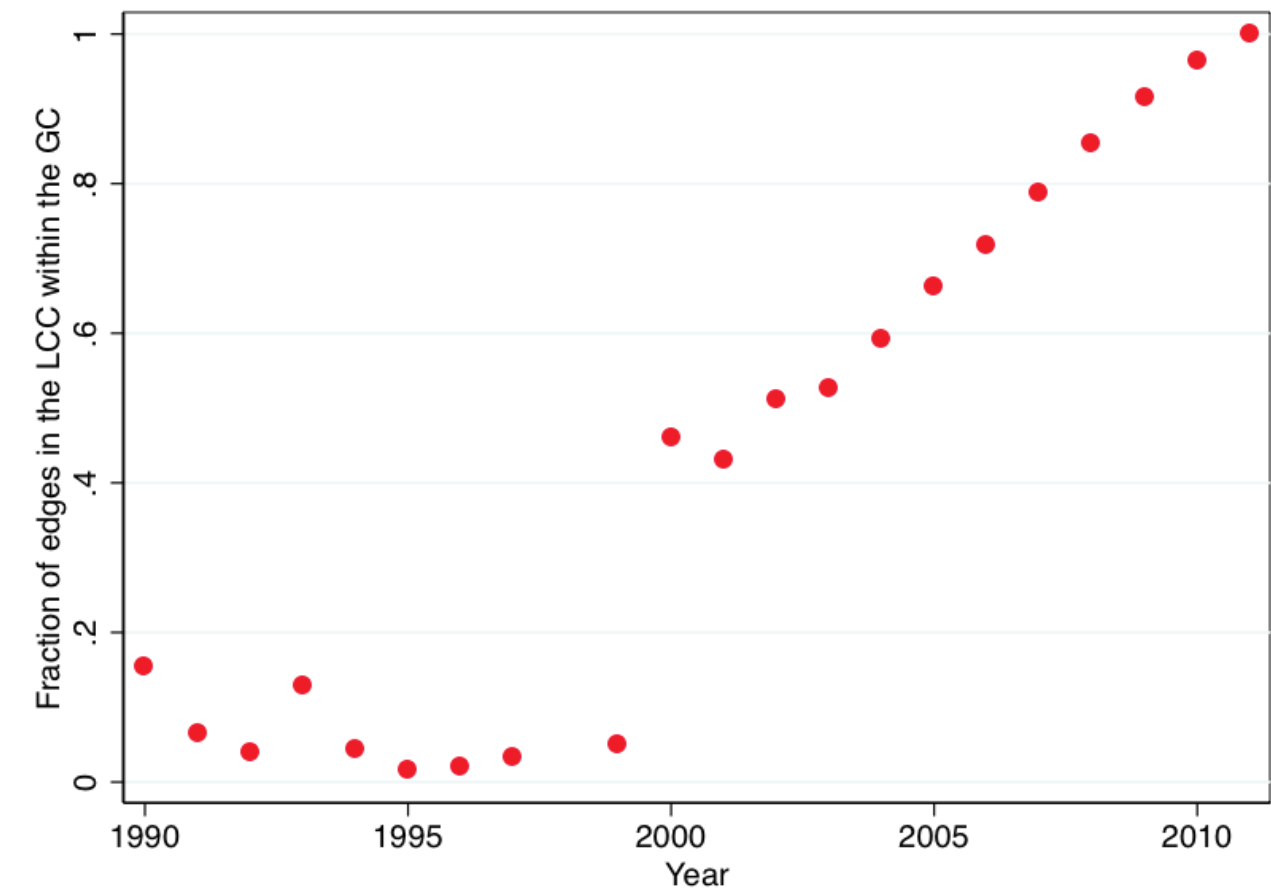


Fig 4. Growth of the giant component.

WOS query: TS=(internet OR cyber* OR online OR "on line" OR web* OR google OR facebook OR twitter OR myspace OR youtube OR ebay OR wiki* OR "blog*" OR "digital divi*" OR "e book*" OR ebook* OR "e business*" OR ebusiness* OR "e govern*" OR egovern* OR "e learn*" OR elearn* OR "e market*" OR emarket* OR "e mail*" OR "electronic mail*" OR email*)
Databases=SSCI, A&HCI, CPCI-SSH, BKCI-SSH
Timespan=1990-2011

Methods 2: I developed a non-statistical method of analysis that consists of projecting the edges of a later timeslice onto the nodes of an earlier timeslice. The fraction of edges in the largest connected component of repeated such projections is a way to see the growth of linkages between early entrants, and thus give information about the role of incumbency in field emergence.

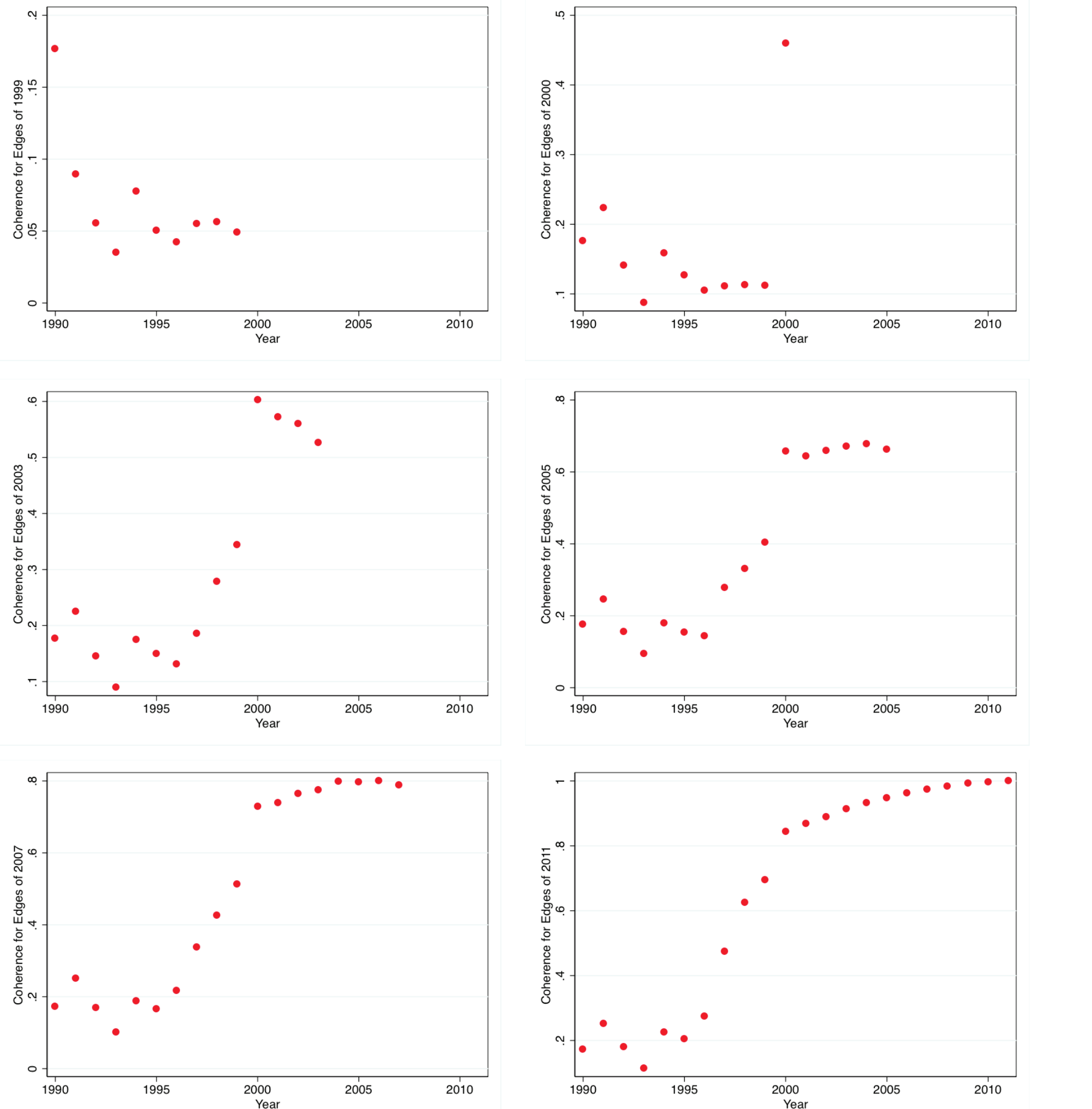


Fig 5. Projecting the edges of years 1999, 2000, 2003, 2005, 2007, and 2011 onto the nodes of the various years (x-axis) and seeing the resulting coherence (fraction of edges in the largest connected component) (y-axis).

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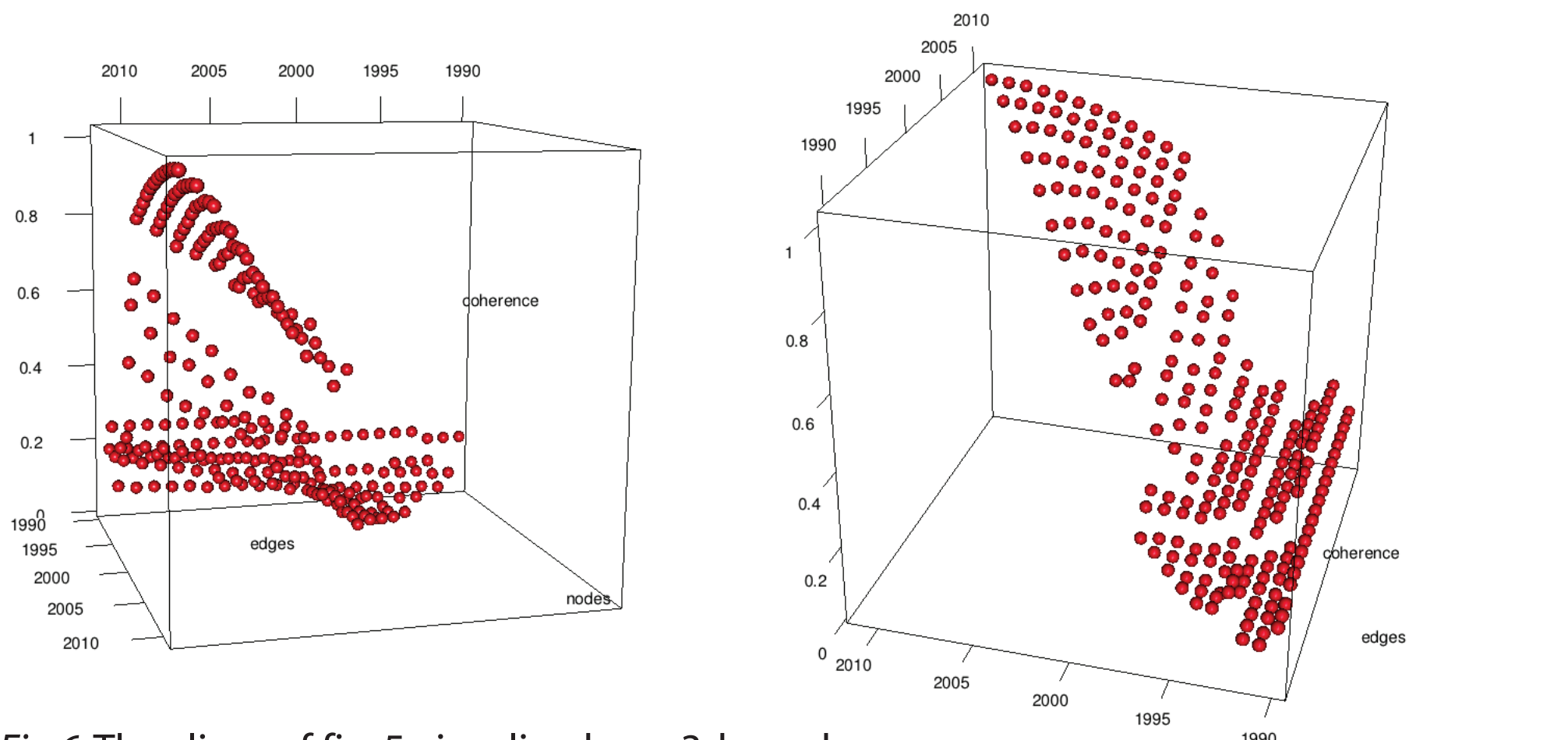


Fig 6. The slices of fig. 5 visualized as a 3d graph.

Findings 2: Ties between the incumbents who were in the network early on are structurally sufficient to characterize a coherent community. This suggests that these ties, not just the ties created by newcomers, characterize field emergence.

Discussion: The critical point identified here at 2000 predates discussions of the state of the field (*The Information Society*, 21(4) and *New Media & Society*, 6(1)), suggesting either that reflection was a product rather than the producer of emergence, or that the people having such discussions had also already successfully created the field.

Limitations: First, the Web of Science is curated, not complete or random. Second, academic communities are not captured completely by co-authorship. Third, name records are not 1-to-1 with individuals (Newman, 2001). Fourth, the Bettencourt et al. null model applies to science, and application of Kuhnian model to social science has been critiqued. Fifth, the null model takes well-defined fields, whereas I use a keyword search. Sixth, causality is unclear (whether new links between incumbents drives field emergence or vice versa). Seventh, analysis is retrospective and cannot be predictive. Lastly, my method, while itself avoiding the complications of network statistics, uses a null model that requires further investigation to confirm.

Future Work: It would not be difficult to build a domain-specific null model by mining the WOS to see how many random records are needed to get a co-authorship giant component (sufficient), and see if all established fields have such a giant component (necessary).

References

Baron, N. S. (2005). Who wants to be a discipline? *The Information Society*, 21(4), 269–271.
Bettencourt, L. M. A., Kaiser, D. I., & Kaur, J. (2009) Scientific discovery and topological transitions in collaboration networks. *Journal of Informetrics*, 3, 210-221.
Guimera, R., Uzzi, B., Spiro, J., & Amaral, L. A. N. (2005). Team assembly mechanisms determine collaboration network structure and team performance. *Science*, 308, 697-702.
Jones, S. (2005). Fizz in the field: Toward a basis for an emergent Internet studies. *The Information Society*, 21(4), 233–237.
Markham, A. N. (2005). Disciplining the future: A critical organisational analysis of Internet studies. *The Information Society*, 21(4), 257–267.
Newman, M. E. J. (2001). The structure of scientific collaboration networks. *PNAS*, 98(2), 404-409.
<http://www.cis.upenn.edu/~mkearns/teaching/NetworkedLife/newman-sci.pdf>
Peng, T. Q., Zhang, L., Zhong, Z. J., & Zhu, J. J. H. (2013, forthcoming). Mapping the landscape of Internet studies: Text mining of social science journal articles 2000-2009. *New Media & Society*.
Shrum, W. (2005). Internet indiscipline: Two approaches to making a field. *The Information Society*, 21(4), 273-275.
Wellman, B. (2004). The three ages of Internet studies: Ten, five and zero years ago. *New Media & Society*, 6(1), 123-129.