One-to-One and Onto

Nick Switanek
Northwestern University
Kellogg School of Management
Northwestern Institute on Complex Systems (NICO)

8 June 2012
Workshop on Name Disambiguation
UIUC


Brian Uzzi
Jim Bagrow
James Bagrow
Dirk Brockmann
Nick Switanek

Outline

- Motivation
- Context
- Method
- Initial findings

Pioneering science of science

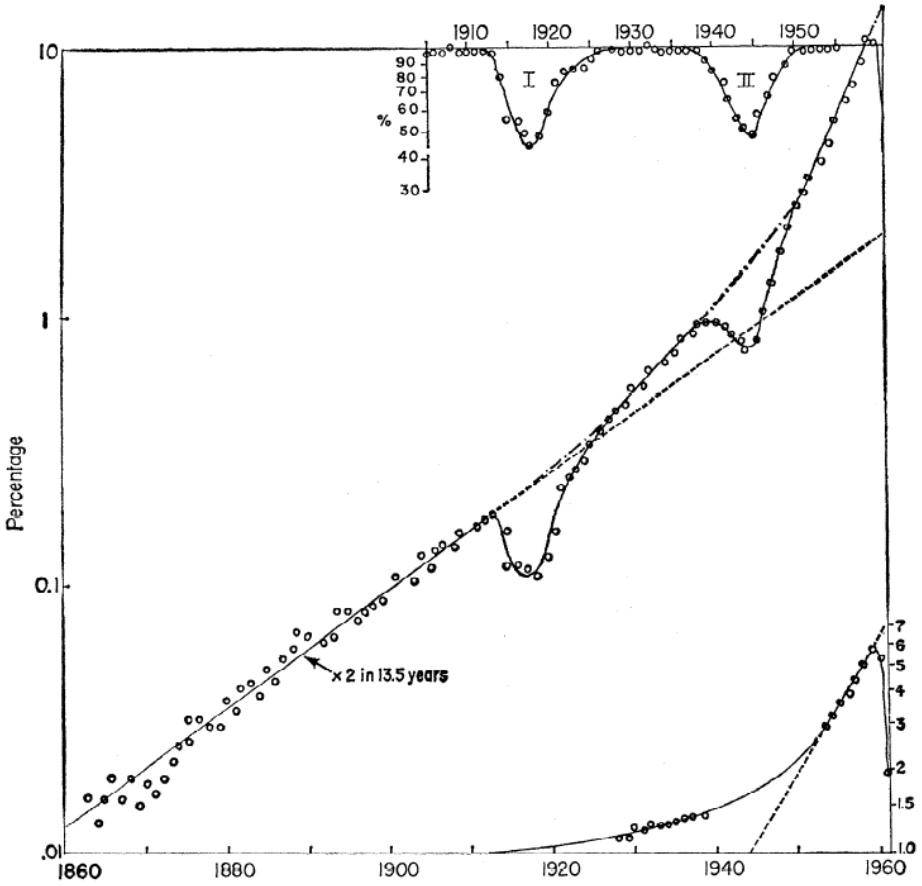
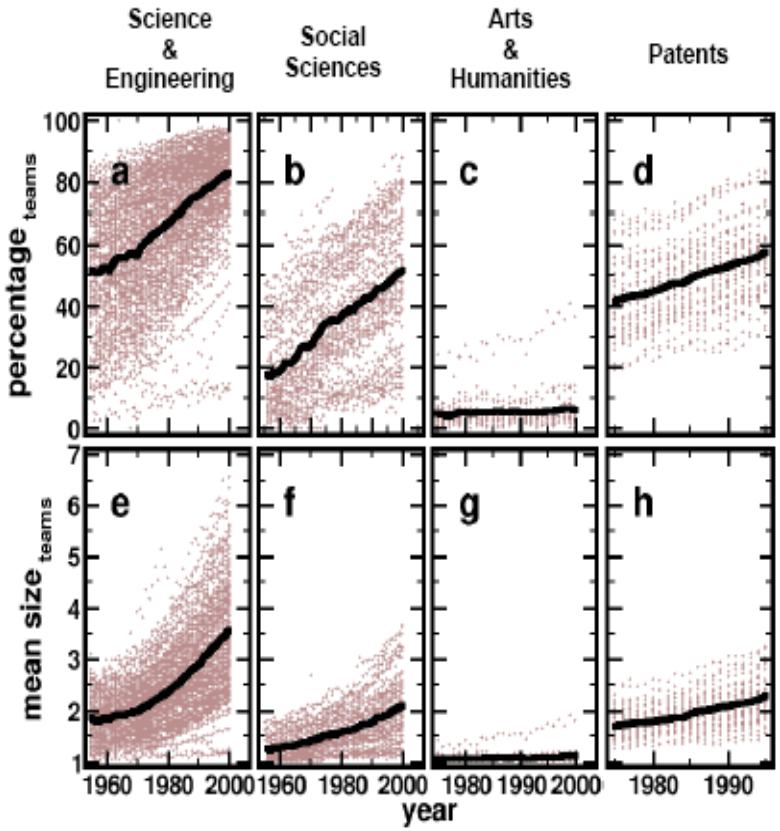


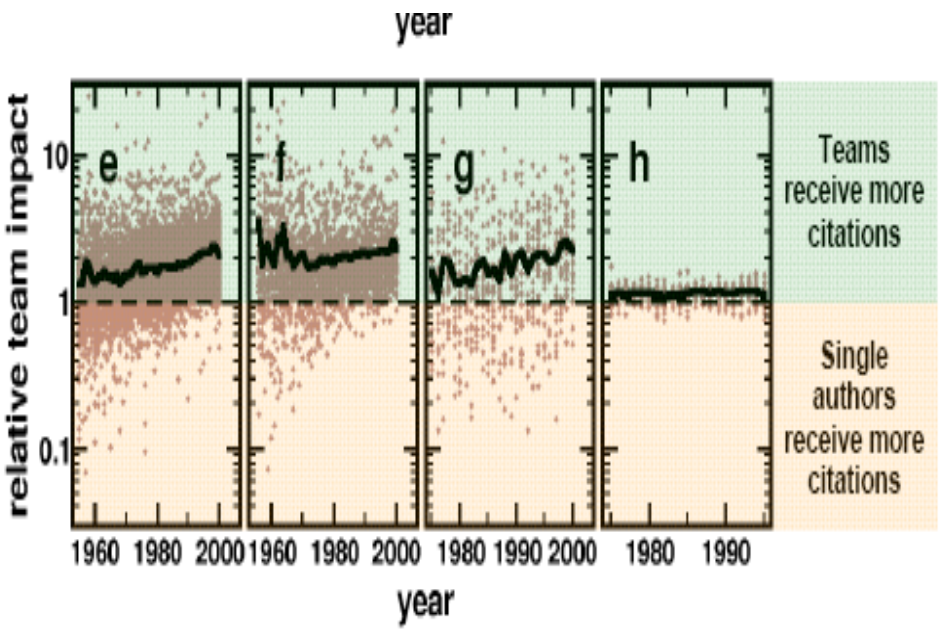
Fig. 4. Percentages (relative to total number of papers cited in 1961) of all papers cited in 1961 and published in each of the years 1862 through 1961 [data are from

De Solla Price, 1965

Prevalence of Teams & Team Dominance

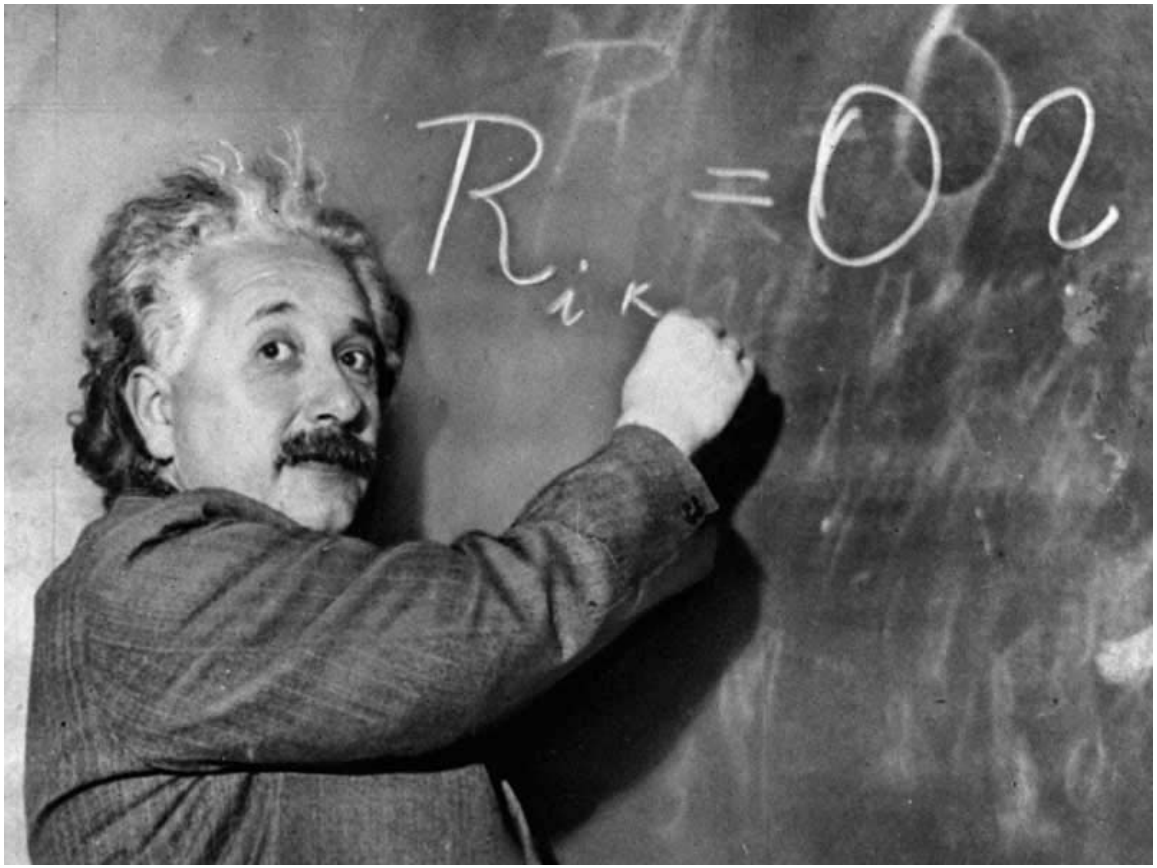
Wuchty, Jones and Uzzi , 2007

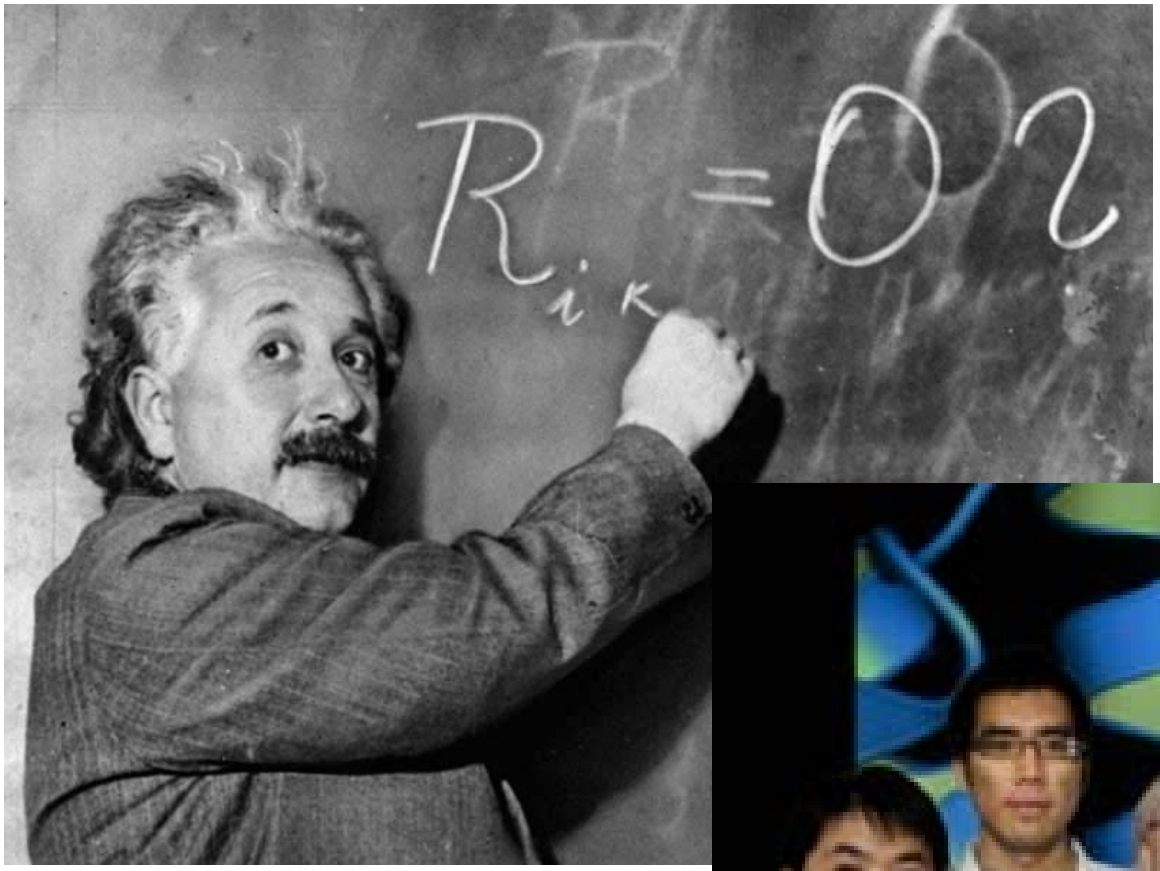


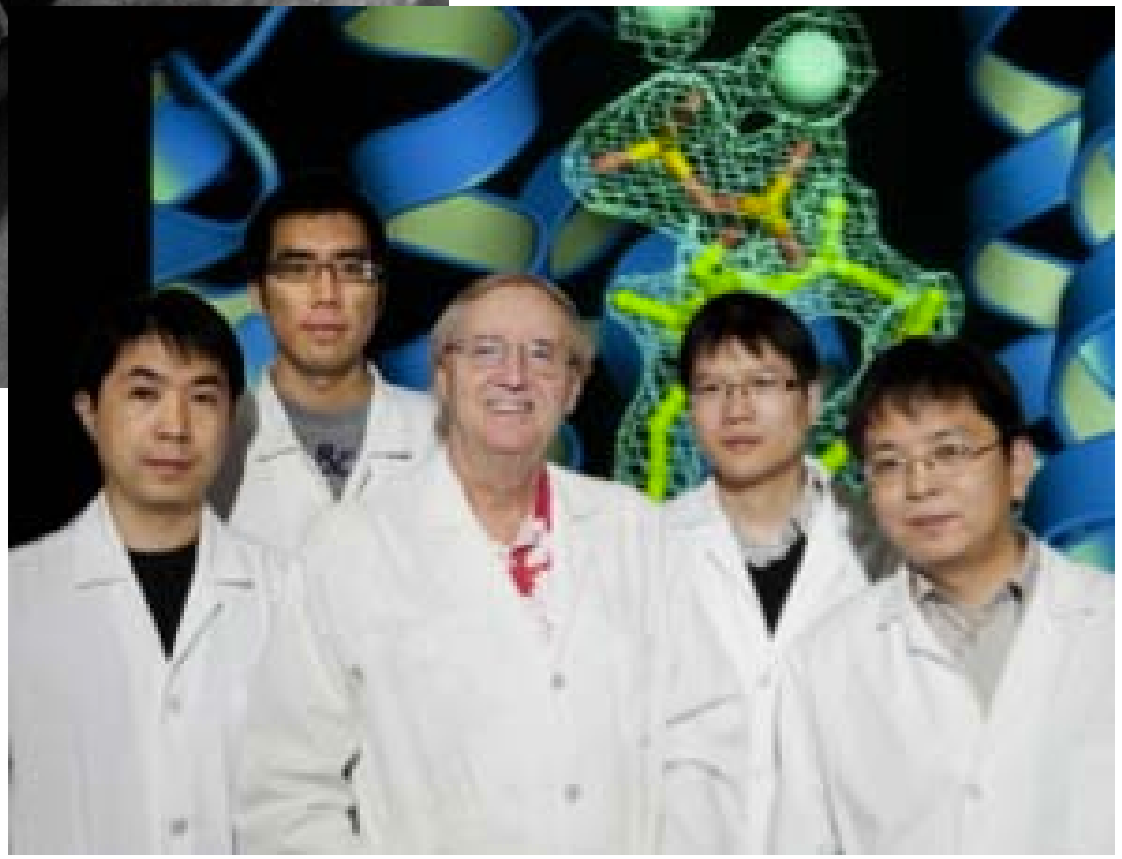


21.1 Million Papers from 1945-2006
1.9 Million Worldwide Patents

Teams get *more Citations* than Solo authored Papers

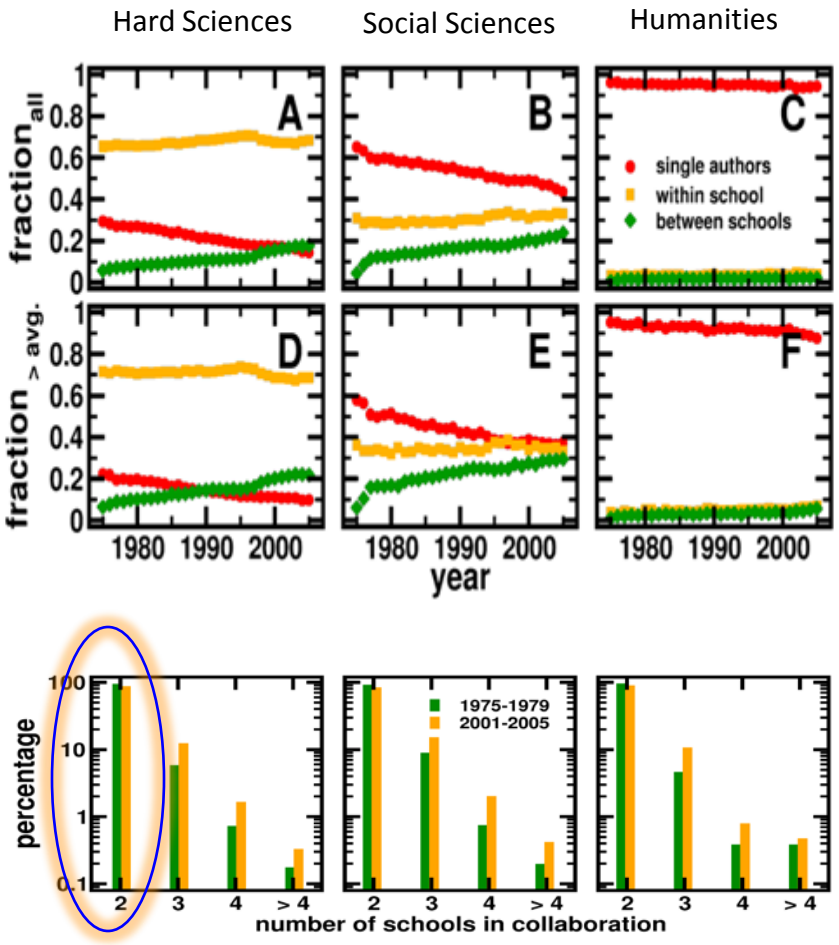

$R_{ik} = 0$


$R_{ik} = 0$

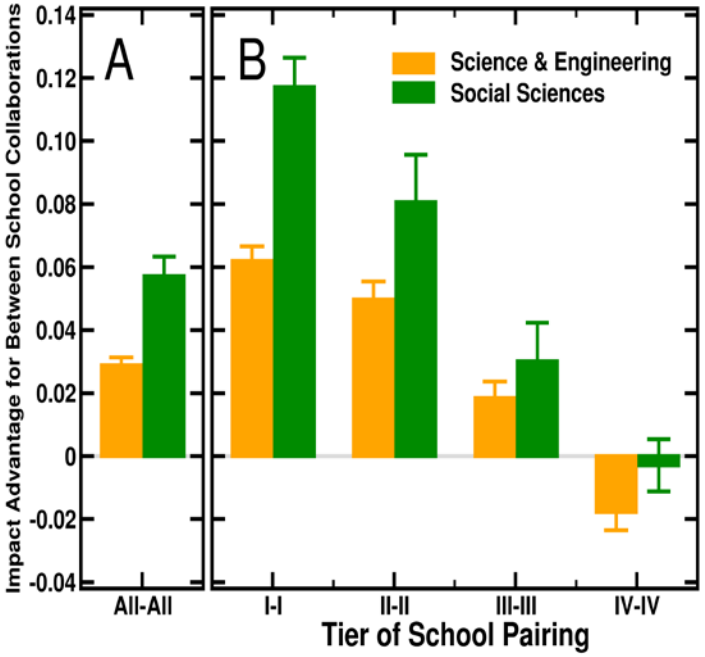


Team Growth has Created Vast Cross University Networks

Single Authored, within, and between school papers



Between-school collaborations have a impact advantage over within-school collaborations all tiers. *Harvard+Stanford > Harvard+Harvard*



Jones, Wuchty, and Uzzi, 2008

Marginal advantages are calculated from regressions that include field, team size, and year fixed effects (p< .0001). Each pairing is a separate regression. SE are clustered. Data cover 95-05.

Disambiguation & Doubt

- Team size from length of name list
  - Two name variants for one author = two-person team
- Cross-institution teams
  - Two institutions affiliated with one person, as opposed to two institutions across two people
- Ambiguity about both nodes and ties

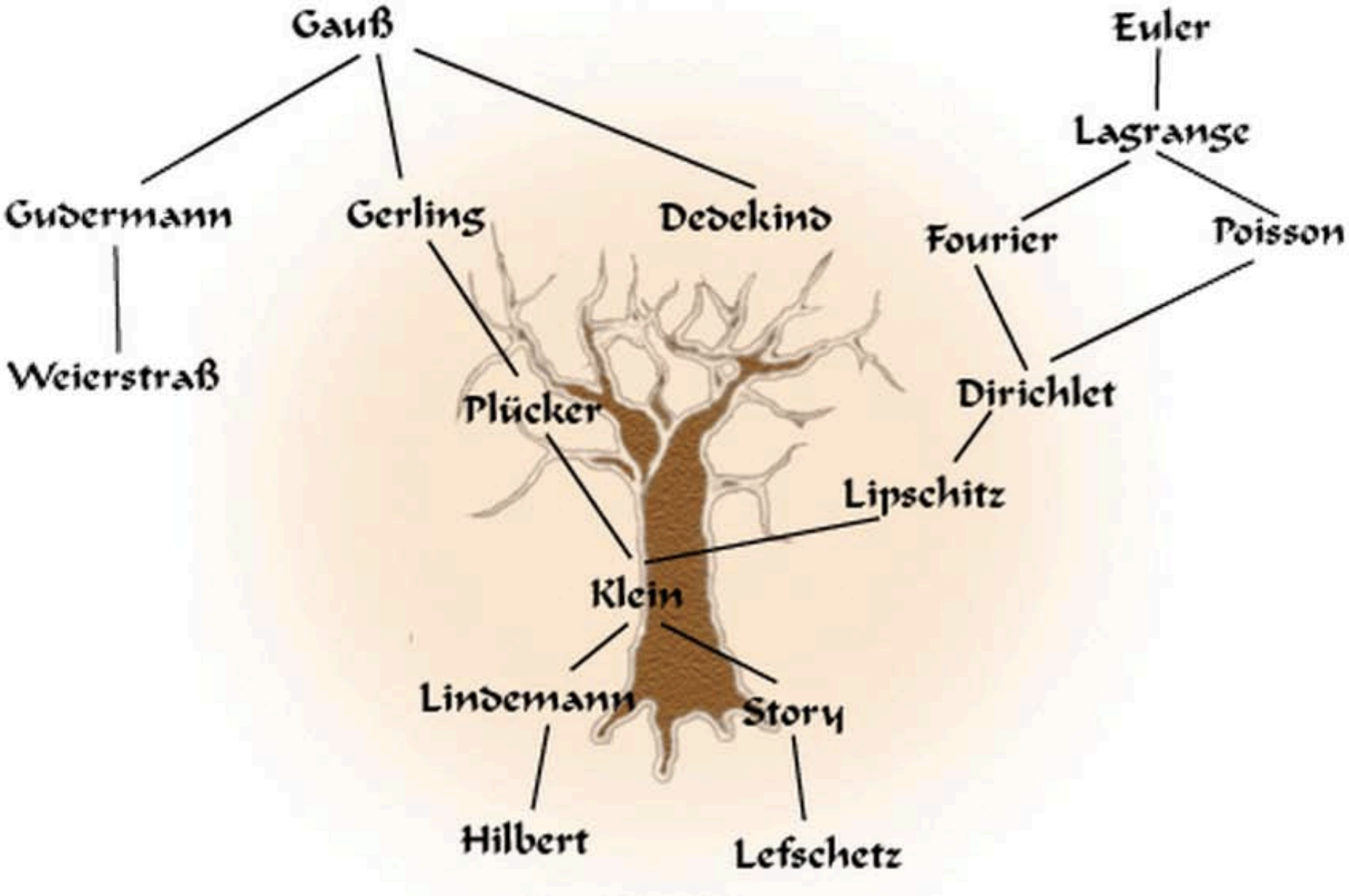
Ideas evolving over networks

Modeling touchstones: Genetics, Epidemics

Time scales: Tweets, Trading Decisions, IMs, Rumors,
Scientific papers, Patents, Ideologies,
Nation-states, Religions

"Ignoring frontiers is an essential catalyst for creative thought. Ideas should flow without hindrance in their natural course."

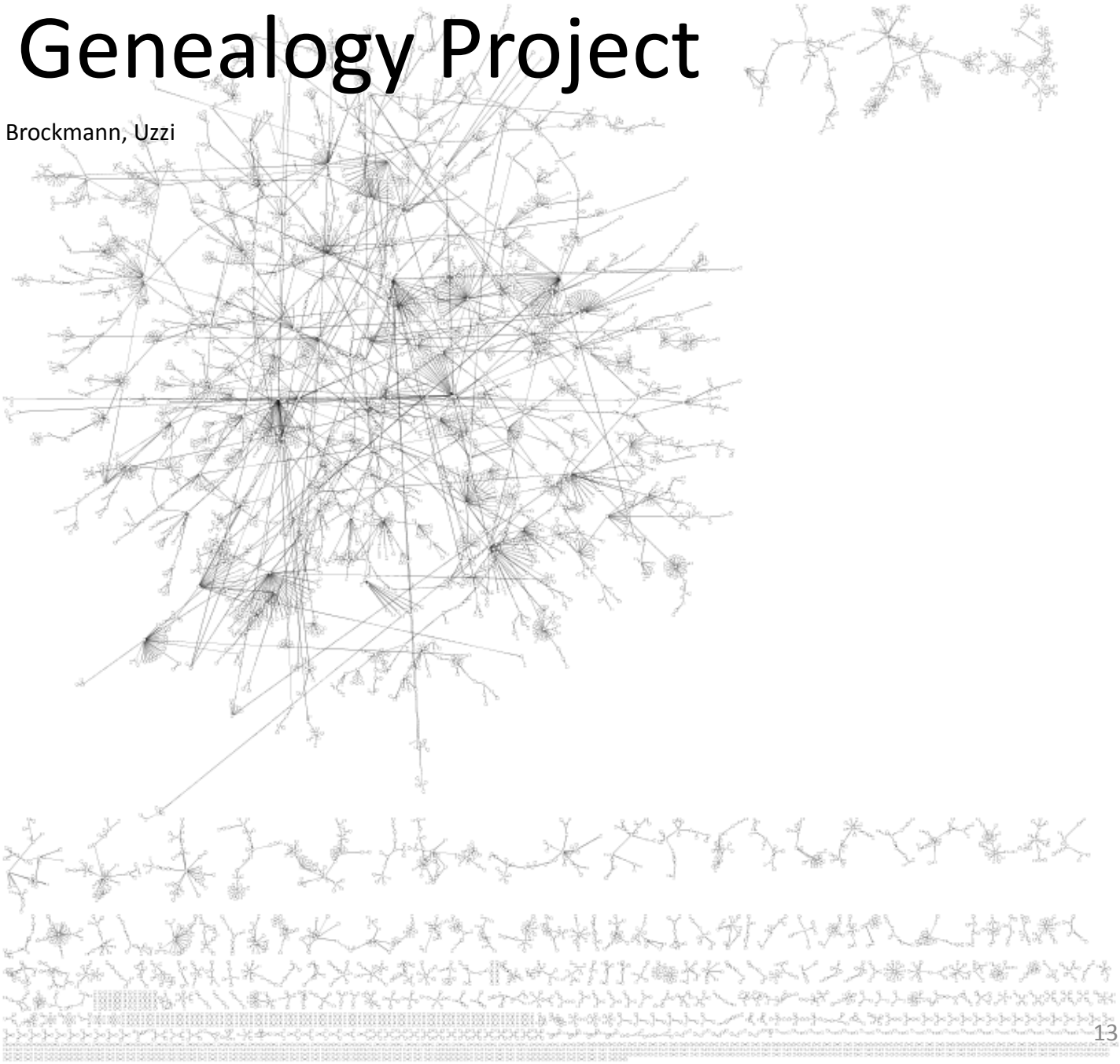
Michael Atiyah
Cambridge University



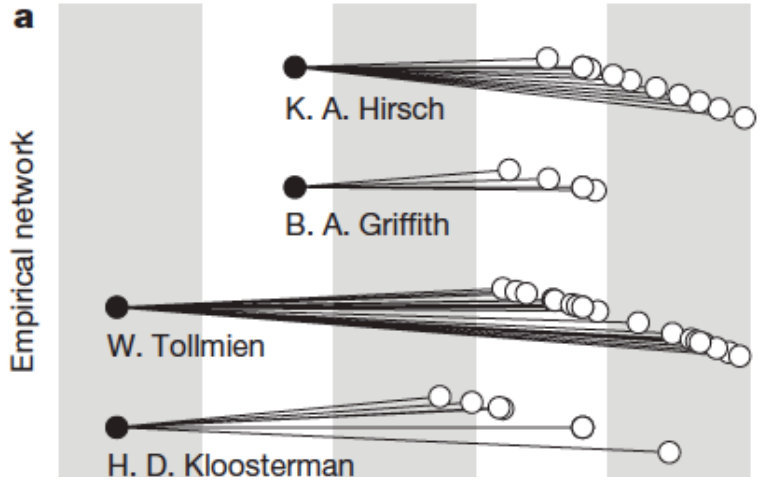
Math Genealogy Project 2012

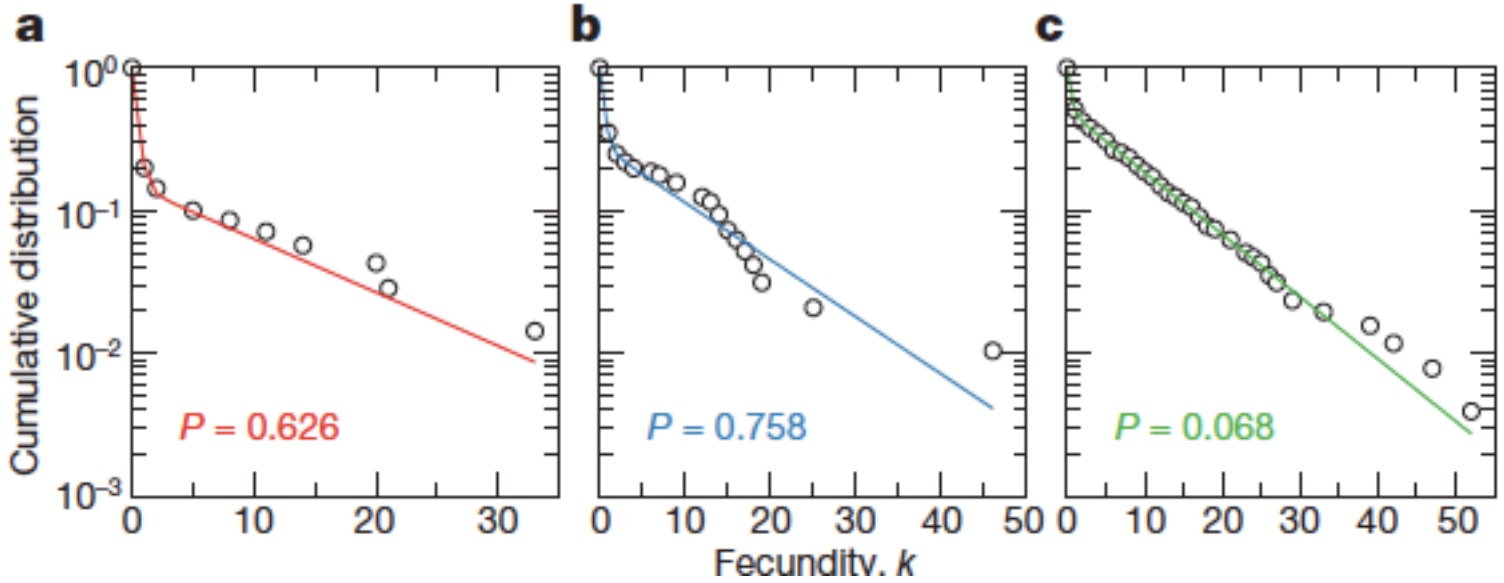
Math Genealogy Project

Switanek, Bagrow, Brockmann, Uzzi



Advisor Fecundity

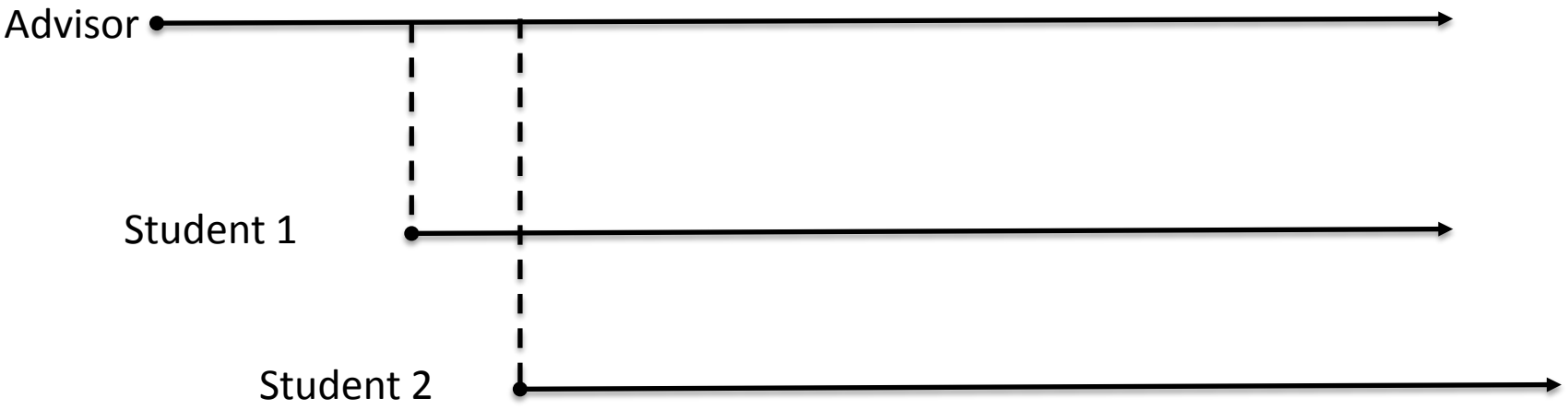




Malmgren et al 2010

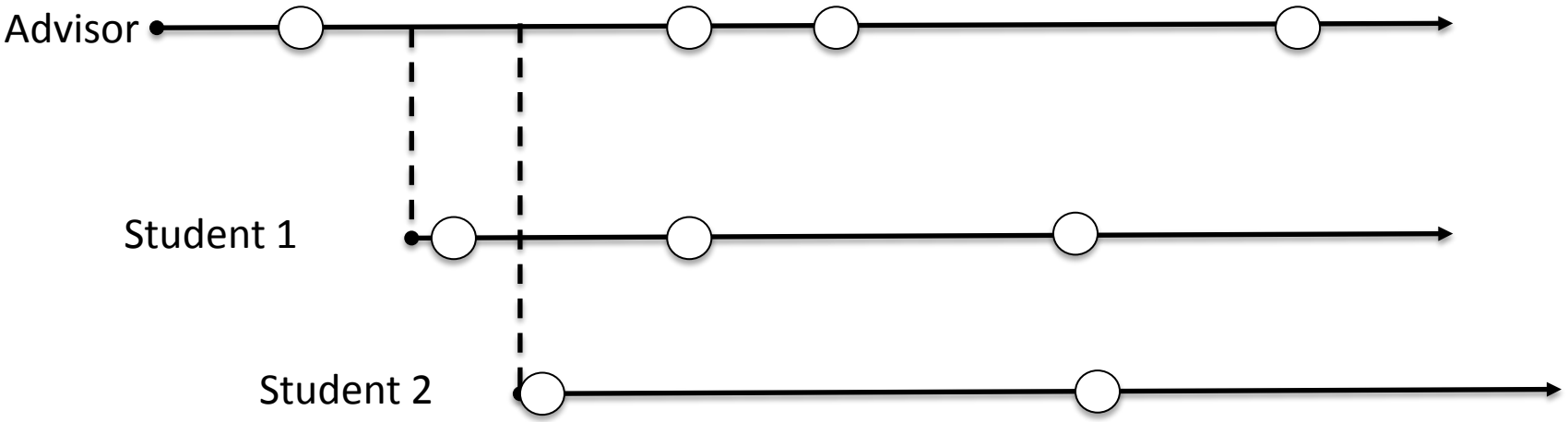
Scholars have lives

Scholars produce students



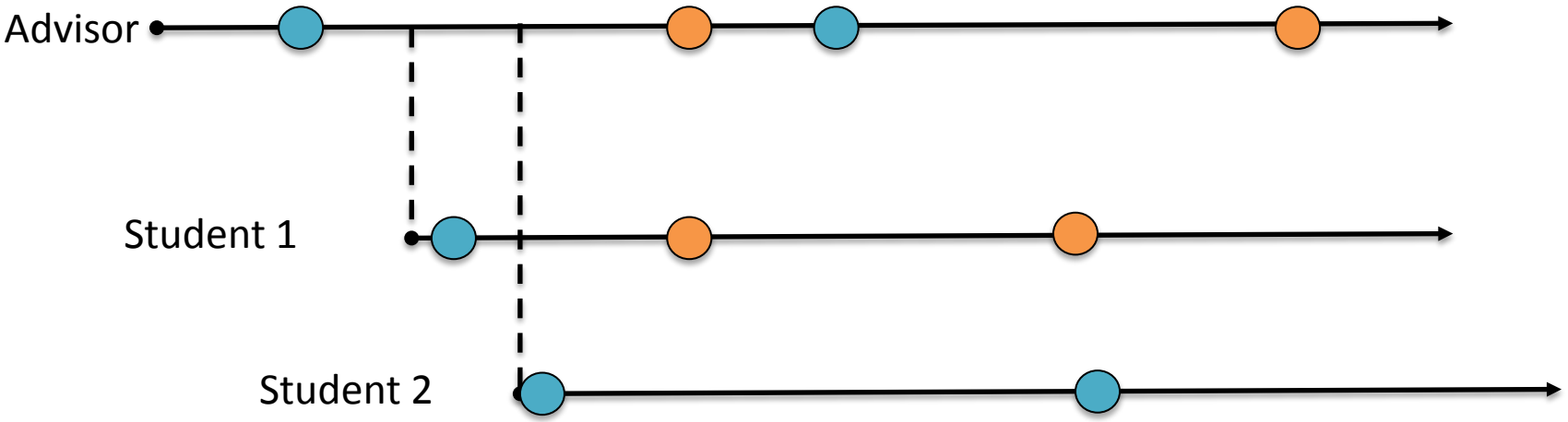
Scholars have lives

Scholars produce students **and papers**



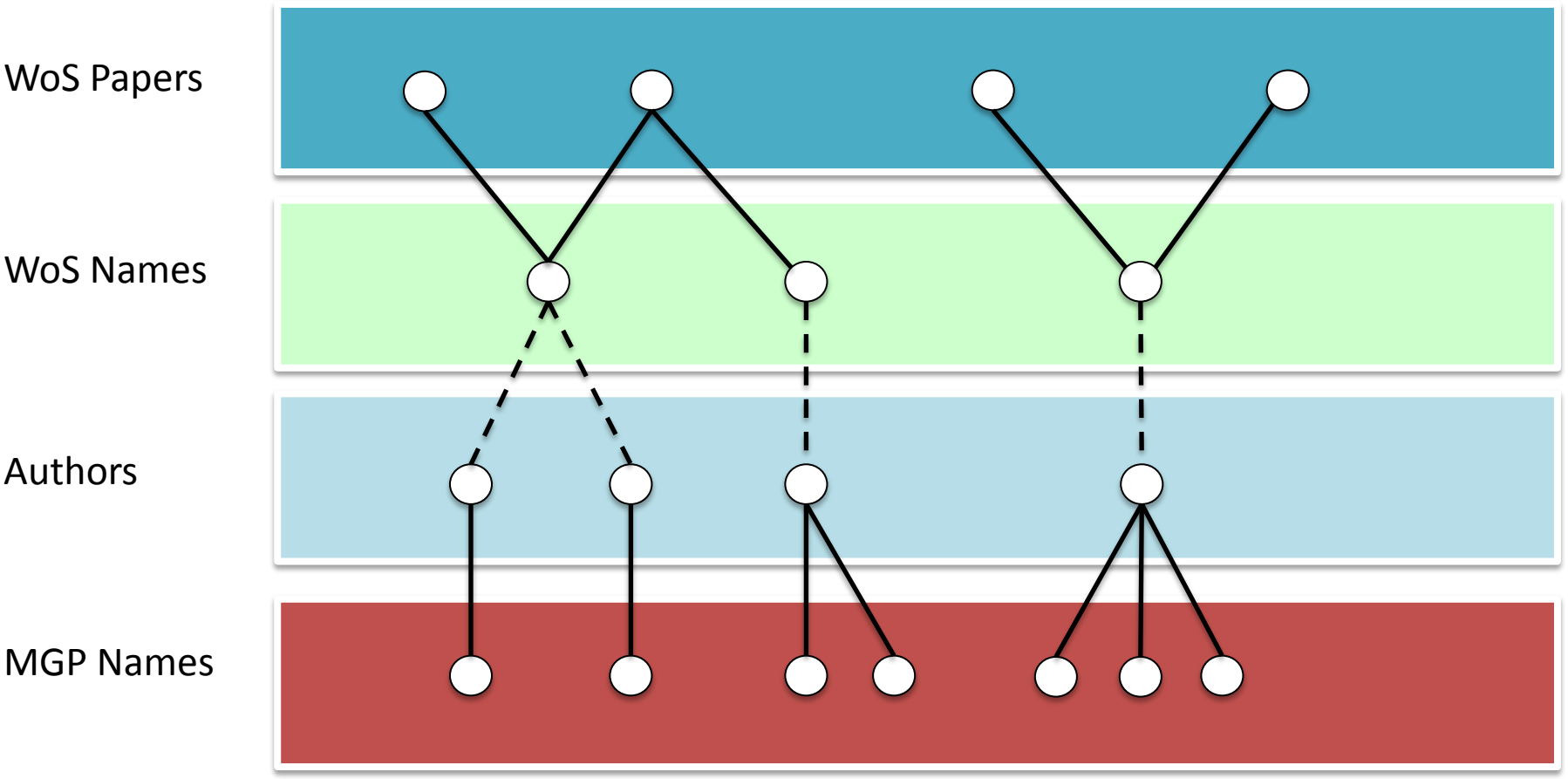
Scholars (and topics) have lives

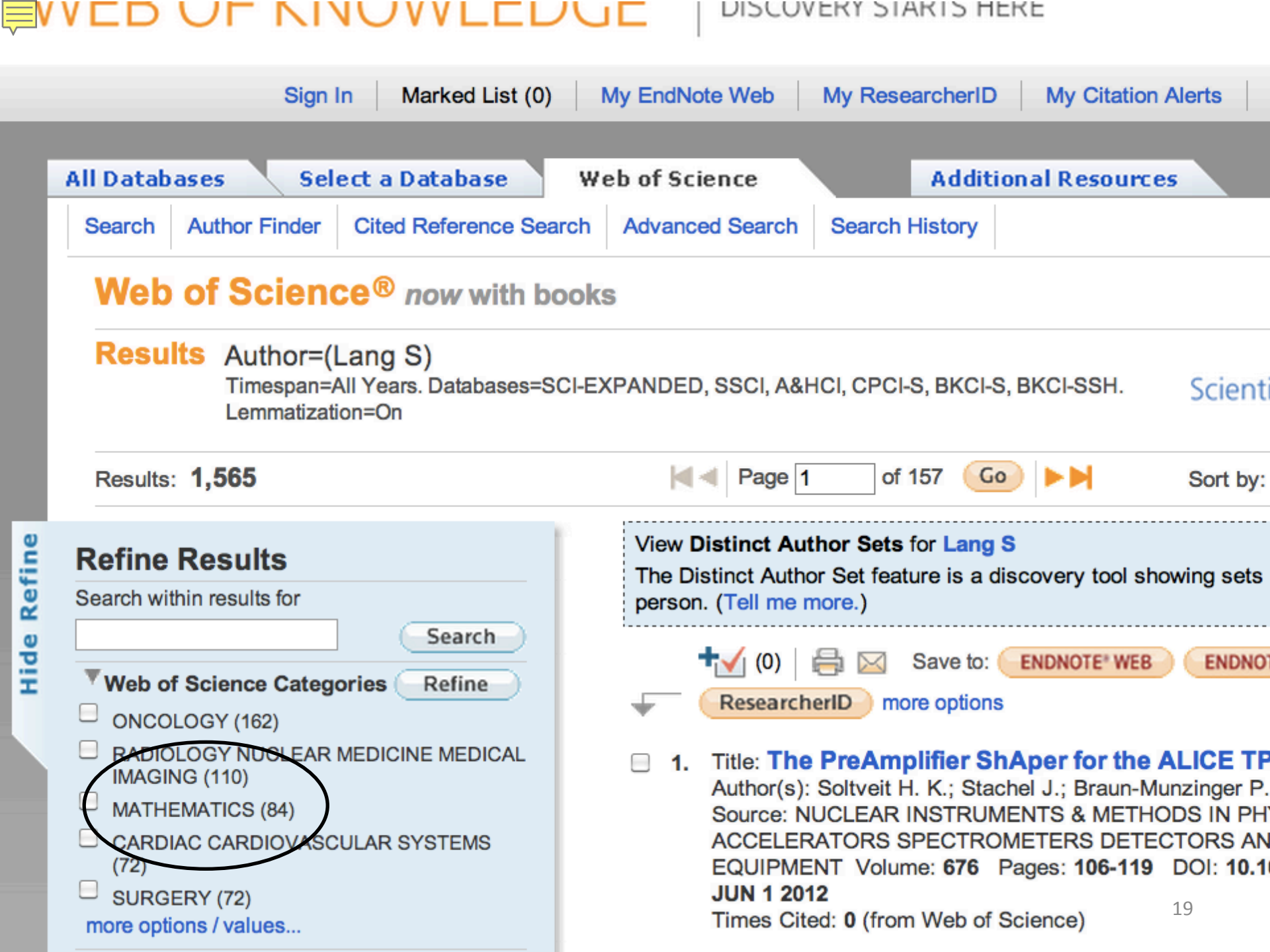
Scholars produce students and papers



…but first we need to get the dots on the lines.

The missing mapping




WEB OF KNOWLEDGE
DISCOVERY STARTS HERE
Sign In
Marked List (0)
My EndNote Web
My ResearcherID
My Citation Alerts
All Databases
Select a Database
Web of Science
Additional Resources
Search
Author Finder
Cited Reference Search
Advanced Search
Search History
Web of Science® now with books
Results
Author=(Lang S)
Timespan=All Years. Databases=SCI-EXPANDED, SSCI, A&HCI, CPCI-S, BKCI-S, BKCI-SSH.
Lemmatization=On
Results: 1,565
Page 1 of 157
Go
Sort by:
Hide Refine
Refine Results
Search within results for
Search
Web of Science Categories
Refine
ONCOLOGY (162)
RADIOLOGY NUCLEAR MEDICINE MEDICAL IMAGING (110)
MATHEMATICS (84)
CARDIAC CARDIOVASCULAR SYSTEMS (72)
SURGERY (72)
more options / values...
View Distinct Author Sets for Lang S
The Distinct Author Set feature is a discovery tool showing sets
person. (Tell me more.)
(0)
Save to:
ENDNOTE WEB
ENDNOT
ResearcherID
more options
1.
Title: The PreAmplifier ShAper for the ALICE TP
Author(s): Soltveit H. K.; Stachel J.; Braun-Munzinger P.
Source: NUCLEAR INSTRUMENTS & METHODS IN PH
ACCELERATORS SPECTROMETERS DETECTORS AN
EQUIPMENT Volume: 676 Pages: 106-119 DOI: 10.1
JUN 1 2012
Times Cited: 0 (from Web of Science)

5. ☐	LANG S	61	Univ Klinikum Essen	1994 - 2011

Source Titles for this author (top 5 by record count) :

HNO (7)

ANTICANCER RESEARCH (6)

LARYNGO RHINO OTOLOGIE (6)

BRITISH JOURNAL OF CANCER (4)

EUROPEAN JOURNAL OF CANCER (3)

A Sampling of Publications by this Author : ⊞

6. ☐	LANG S LANG SM	58	Undetermined	1949 - 1990

Source Titles for this author (top 5 by record count) :

AMERICAN JOURNAL OF MATHEMATICS (13)

MATHEMATISCHE ANNALEN (9)

BULLETIN OF THE AMERICAN MATHEMATICAL SOCIETY (7)

JOURNAL OF RESEARCH OF THE NATIONAL BUREAU OF STANDARDS (4)

PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES OF THE UNITED STATES OF AMERICA (3)

A Sampling of Publications by this Author : ⊞

All Databases | Select a Database | Web of Science | Additional Resources

Search | Author Finder | Cited Reference Search | Advanced Search | Search History

Web of Science® *now* with books

<< Back to previous page

Results Author=(Lang S)
Refined by: Web of Science Categories=(MATHEMATICS) AND Document Type=(ARTICLE) AND Document Type=(AR
Document Type=(BOOK CHAPTER)
Timespan=All Years. Databases=SCI-EXPANDED, SSCI, A&HCI, CPCI-S, BKCI-S, BKCI-SSH.
Lemmatization=On

Results: **59** Page 1 of 6 Go Sort by: Publicatio

Hide Refine

Refine Results

Search within results for

Search

Web of Science Categories Refine

- MATHEMATICS (59)
- MATHEMATICS APPLIED (3)

more options / values...

Document Types Refine

- ARTICLE (59)

Subject Areas

Authors

Group Authors

Editors

Source Titles

(0) Save to: ENDNOTE® WEB ENDNOTE®

ResearcherID more options

1. Title: **Heat Eisenstein Series on SLn(C)**
Author(s): Jorgenson Jay; Lang Serge
Source: MEMOIRS OF THE AMERICAN MATHEMATICAL SOCIET
Pages: **1-+** Published: **SEP 2009**
Times Cited: **0** (from Web of Science)

Find it NU [View abstract]

2. Title: **A gaussian space of test functions**
Author(s): Jorgenson J; Lang S
Source: MATHEMATISCHE NACHRICHTEN Volume: **278** Issue:
10.1002/mana.200310275 Published: **2005**
Times Cited: **2** (from Web of Science)

Find it NU Full Text [View abstract]

Hacking forward: WoS

- Identifying information
  - Last name
  - (one or more initials)
  - (First name)
  - Publication year
  - (Institutions affiliated with publication)
  - Publication journal

    (items in parentheses not uniformly available)

Mathematics Genealogy Project

- Home
- Search
- Extrema
- About MGP
- Links
- FAQs
- Posters
- Submit Data
- Mirrors

A service of the NDSU Department of Mathematics, in association with the American Mathematical Society.

Please email us with feedback.

Serge Lang

Biography MathSciNet

Ph.D. Princeton University 1951 

Dissertation: *On Quasi Algebraic Closure*

Advisor: Emil Artin

Students:
Click here to see the students ordered by family name.

Name	School	Year	Descendants
Marvin Greenberg	Princeton University	1959	
Newcomb Greenleaf	Princeton University	1961	4
Stephen Schanuel	Columbia University	1963	16
Warren May	Columbia University	1963	7
William Adams	Columbia University	1964	13
Bernard Berlowitz	Columbia University	1966	1
Allen Altman	Columbia University	1968	
Joseph Repka	Yale University	1975	7
David Rohrlich	Yale University	1976	7
Donald Kersey	Yale University	1980	
Jing Yu	Yale University	1980	3
Minhyong Kim	Yale University	1990	9
William Cherry	Yale University	1993	
Michael Nakamaye	Yale University	1994	1
Lisa Fastenberg	Yale University	1996	
Andrew Sinton	University of California, Berkeley	2004	
Eliot Brenner	Yale University	2005	

According to our current on-line database, Serge Lang has 17 students and 85 descendants.
We welcome any additional information.

Procedure

Collect papers from journals

Collect names from articles

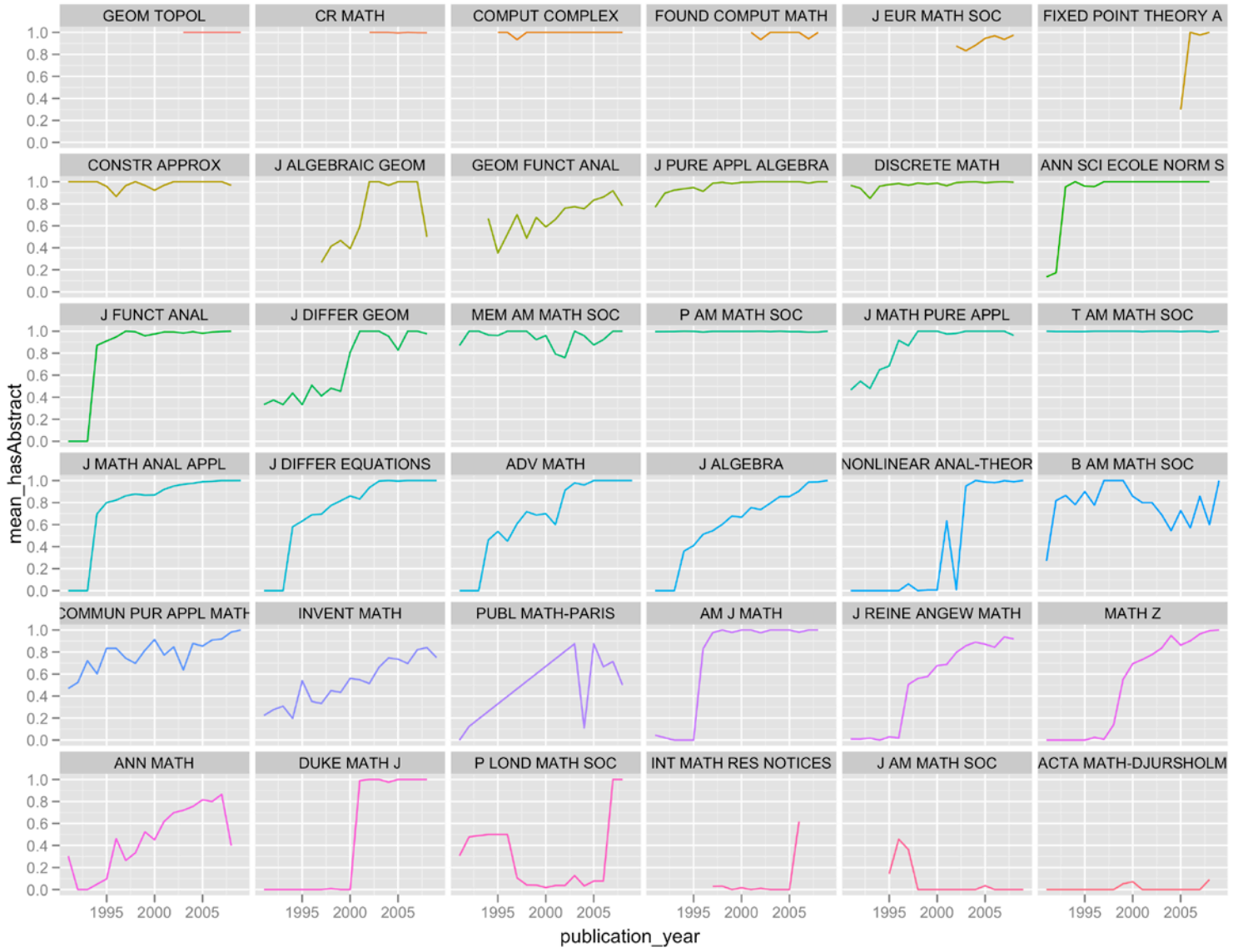
Check names against MGP/MR names

Check pub year against MGP author career span

Check coauthors against students

Check organization against MGP author orgs

Prefiltering by Journal



Check names against MGP

- Include MRA name variants
- If in list, keep
- Find lastname in MGP with small edit distance
- Check initials, score similarity

- WoS uses ASCII
- MGP uses unicode
- python unidecode package

Check year against MGP career span

- Infer career span from PhD grad date and grad dates of author's students (if any)
- Record overlap, gap, gap direction
  - Accept less gap in before-PhD direction

Mathematics Genealogy Project

- Home
- Search
- Extrema
- About MGP
- Links
- FAQs
- Posters
- Submit Data
- Mirrors

A service of the NDSU Department of Mathematics, in association with the American Mathematical Society.

Please email us with feedback.

Serge Lang

Biography MathSciNet

Ph.D. Princeton University 1951 

Dissertation: *On Quasi Algebraic Closure*

Advisor: Emil Artin

Students:
Click here to see the students ordered by family name.

Name	School	Year	Descendants
Marvin Greenberg	Princeton University	1959	
Newcomb Greenleaf	Princeton University	1961	4
Stephen Schanuel	Columbia University	1963	16
Warren May	Columbia University	1963	7
William Adams	Columbia University	1964	13
Bernard Berlowitz	Columbia University	1966	1
Allen Altman	Columbia University	1968	
Joseph Repka	Yale University	1975	7
David Rohrlich	Yale University	1976	7
Donald Kersey	Yale University	1980	
Jing Yu	Yale University	1980	3
Minhyong Kim	Yale University	1990	9
William Cherry	Yale University	1993	
Michael Nakamaye	Yale University	1994	1
Lisa Fastenberg	Yale University	1996	
Andrew Sinton	University of California, Berkeley	2004	
Eliot Brenner	Yale University	2005	

According to our current on-line database, Serge Lang has 17 students and 85 descendants.
We welcome any additional information.

Check coauthors against students

Count coauthors among the author’s students

Check organizations against MGP

- Infer set of organizations from PhD grad institution and grad institutions of author's students (if any)
- Location
  - Missing until 1972, affiliations not linked to AU
  - Inferred from student graduation institutions

Mathematics Genealogy Project

Home
Search
Extrema
About MGP
Links
FAQs
Posters
Submit Data
Mirrors

A service of the NDSU Department of Mathematics, in association with the American Mathematical Society.

Please email us with feedback.

Serge Lang

Biography MathSciNet

Ph.D. Princeton University 1951 

Dissertation: *On Quasi Algebraic Closure*

Advisor: Emil Artin

Students:
Click here to see the students ordered by family name.

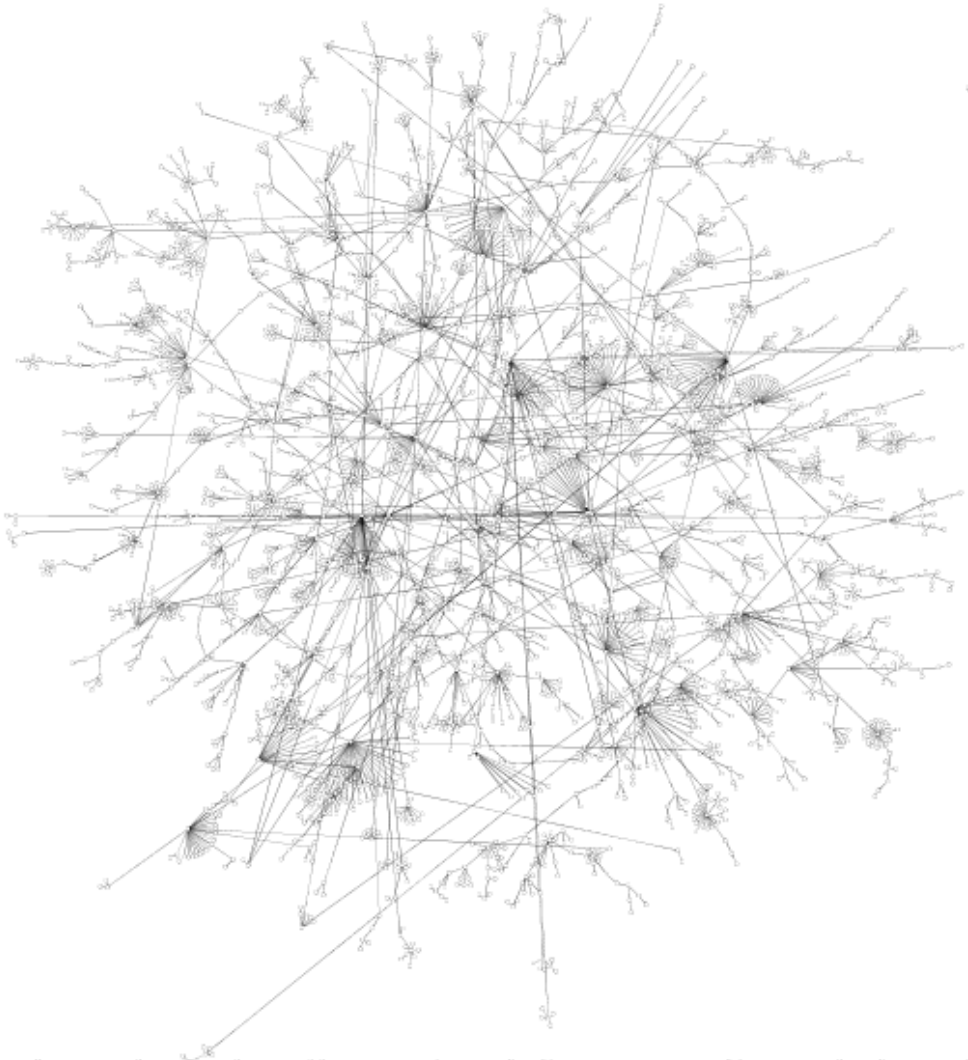
Name	School	Year	Descendants
Marvin Greenberg	Princeton University	1959	
Newcomb Greenleaf	Princeton University	1961	4
Stephen Schanuel	Columbia University	1963	16
Warren May	Columbia University	1963	7
William Adams	Columbia University	1964	13
Bernard Berlowitz	Columbia University	1966	1
Allen Altman	Columbia University	1968	
Joseph Repka	Yale University	1975	7
David Rohrlich	Yale University	1976	7
Donald Kersey	Yale University	1980	
Jing Yu	Yale University	1980	3
Minhyong Kim	Yale University	1990	9
William Cherry	Yale University	1993	
Michael Nakamaye	Yale University	1994	1
Lisa Fastenberg	Yale University	1996	
Andrew Sinton	University of California, Berkeley	2004	
Eliot Brenner	Yale University	2005	

According to our current on-line database, Serge Lang has 17 students and 85 descendants.
We welcome any additional information.

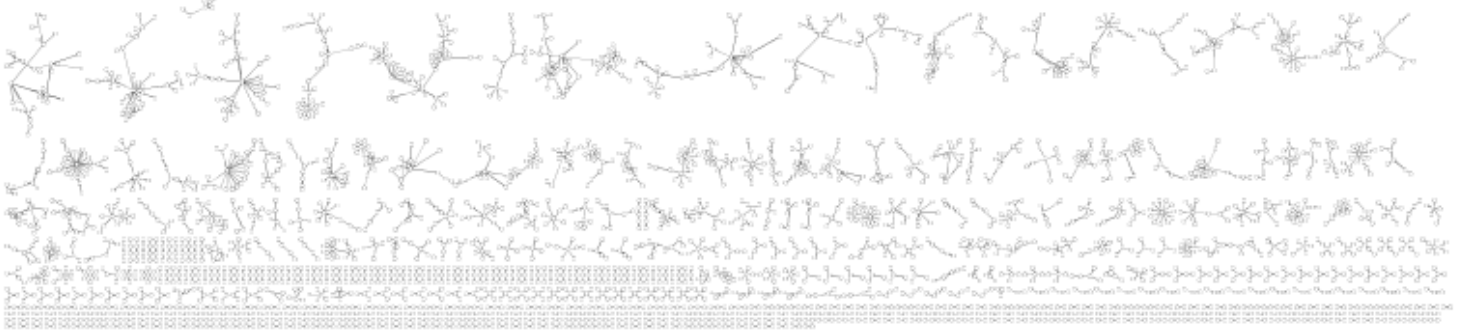
Varying Parameters & Spot Checking

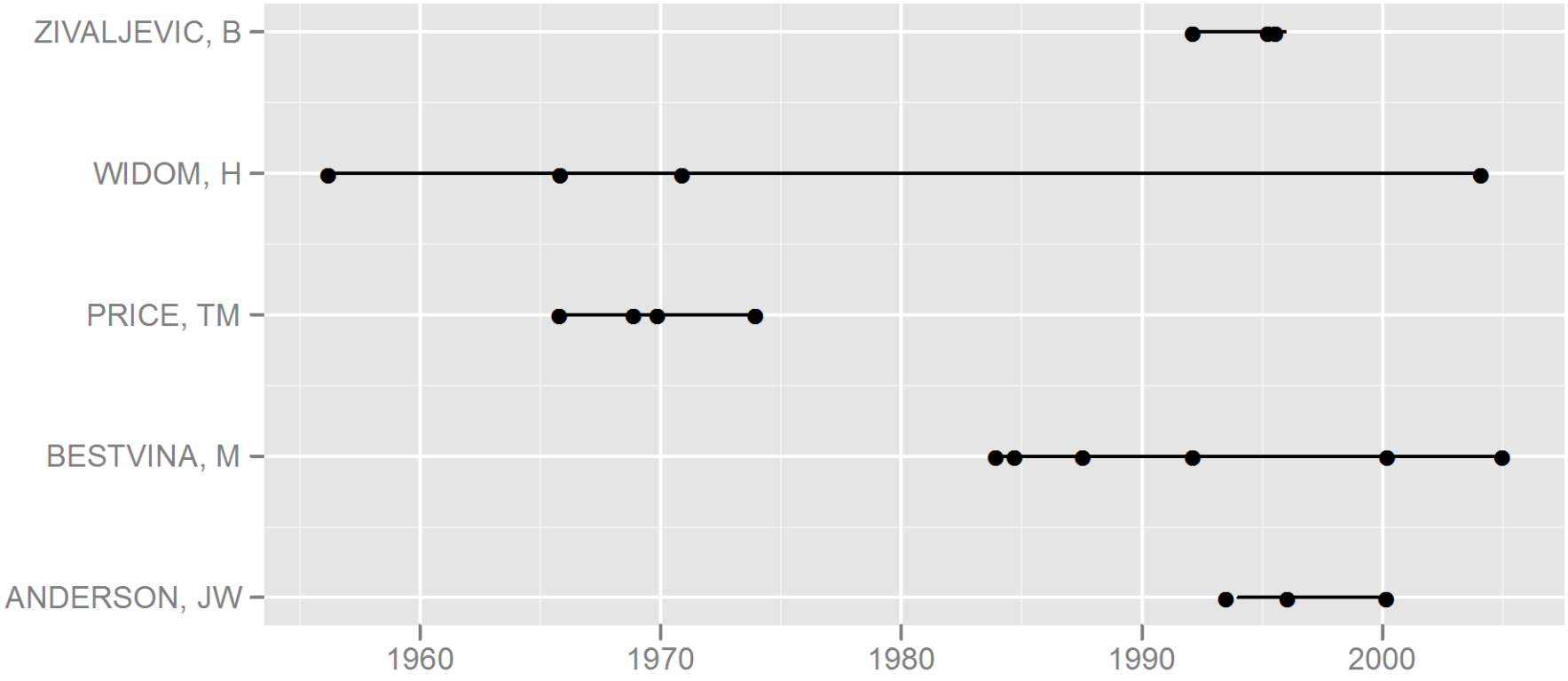
A hack…

Inspired here to be more principled with next iteration / expansion



Matched Subgraph of Math Genealogy Project




ZIVALJEVIC, B
WIDOM, H
PRICE, TM
BESTVINA, M
ANDERSON, JW
1960
1970
1980
1990
2000

title

Doi-Hopf modules, Yetter-Drinfel'd modules and Frobenius type properties

abstract

We study the following question: when is the right adjoint of the forgetful functor from the category of (H, A, C)-Doi-Hopf modules to the category of A-modules also a left adjoint? We can give some necessary and sufficient conditions; one of the equivalent conditions is that C x A and the smash product A # C* are isomorphic as (A, A # C*)-bimodules. The isomorphism can be described using a generalized type of integral. Our results may be applied to some specific cases. In particular, we study the case A = H, and this leads to the notion of k-Frobenius H-module coalgebra. In the special case of Yetter-Drinfel'd modules over a field, the right adjoint is also a left adjoint of the forgetful functor if and only if H is finite dimensional and unimodular.

keywords

DOI-HOPF-MODULES FROBENIUS-EXTENSIONS HOPF-ALGEBRAS YETTER-DRINFEL'D-MODULES ALGEBRAS CATEGORIES

references

Gradings of finite support. Application to injective objects HOMOLOGICAL COALGEBRA UNIFYING HOPF MODULES ON FROBENIUS EXTENSIONS DEFINED BY HOPF-ALGEBRAS PHYSICS FOR ALGEBRAISTS - NONCOMMUTATIVE AND NONCOCOMMUTATIVE HOPF-ALGEBRAS BY A BICROSSPRODUCT CONSTRUCTION MODULES GRADED BY G-SETS WHEN HOPF ALGEBRAS ARE FROBENIUS ALGEBRAS MINIMAL QUASI-TRIANGULAR HOPF-ALGEBRAS YETTER-DRINFELD CATEGORIES ASSOCIATED TO AN ARBITRARY BIALGEBRA CORRESPONDENCE BETWEEN HOPF IDEALS AND SUB-HOPF ALGEBRAS QUANTUM GROUPS AND REPRESENTATIONS OF MONOIDAL CATEGORIES

title

Doi-Hopf modules, Yetter-Drinfel'd modules and Frobenius type properties

abstract

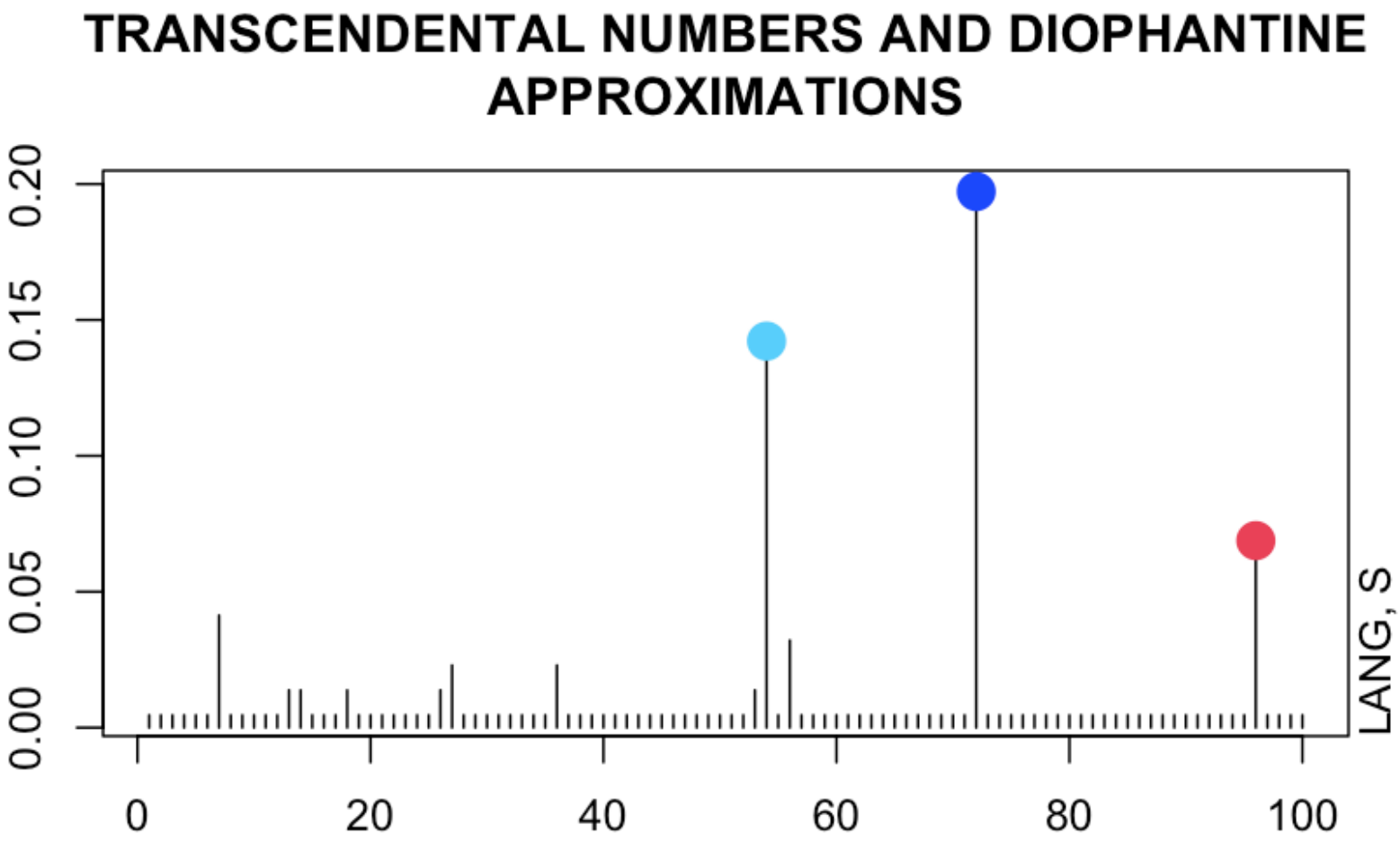
We study the following question: when is the right adjoint of the forgetful functor from the category of (H, A, C)-Doi-Hopf modules to the category of A-modules also a left adjoint? We can give some necessary and sufficient conditions; one of the equivalent conditions is that C x A and the smash product A # C* are isomorphic as (A, A # C*)-bimodules. The isomorphism can be described using a generalized type of integral. Our results may be applied to some specific cases. In particular, we study the case A = H, and this leads to the notion of k-Frobenius H-module coalgebra. In the special case of Yetter-Drinfel'd modules over a field, the right adjoint is also a left adjoint of the forgetful functor if and only if H is finite dimensional and unimodular.

keywords

DOI-HOPF-MODULES FROBENIUS-EXTENSIONS HOPF-ALGEBRAS YETTER-DRINFEL'D-MODULES ALGEBRAS CATEGORIES

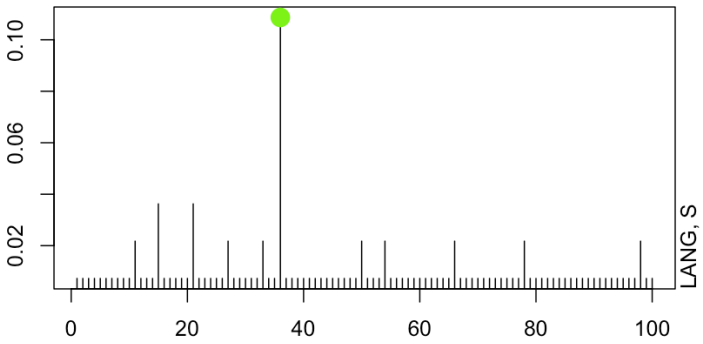
references

Gradings of finite support. Application to injective objects HOMOLOGICAL COALGEBRA UNIFYING HOPF MODULES ON FROBENIUS EXTENSIONS DEFINED BY HOPF-ALGEBRAS PHYSICS FOR ALGEBRAISTS - NONCOMMUTATIVE AND NONCOCOMMUTATIVE HOPF-ALGEBRAS BY A BICROSSPRODUCT CONSTRUCTION MODULES GRADED BY G-SETS WHEN HOPF ALGEBRAS ARE FROBENIUS ALGEBRAS MINIMAL QUASI-TRIANGULAR HOPF-ALGEBRAS YETTER-DRINFELD CATEGORIES ASSOCIATED TO AN ARBITRARY BIALGEBRA CORRESPONDENCE BETWEEN HOPF IDEALS AND SUB-HOPF ALGEBRAS QUANTUM GROUPS AND REPRESENTATIONS OF MONOIDAL CATEGORIES

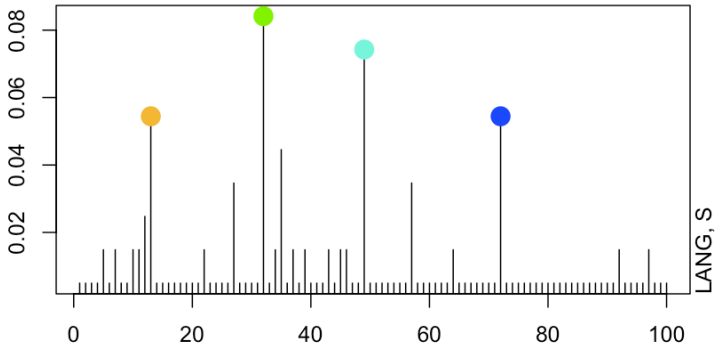

TRANSCENDENTAL NUMBERS AND DIOPHANTINE APPROXIMATIONS
0.00
0.05
0.10
0.15
0.20
0
20
40
60
80
100
LANG, S

Lang, S

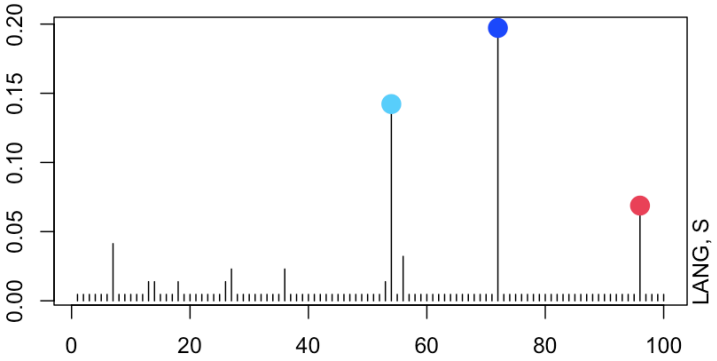
UNRAMIFIED CLASS FIELD THEORY OVER FUNCTION FIELDS IN SEVERAL VARIABLES

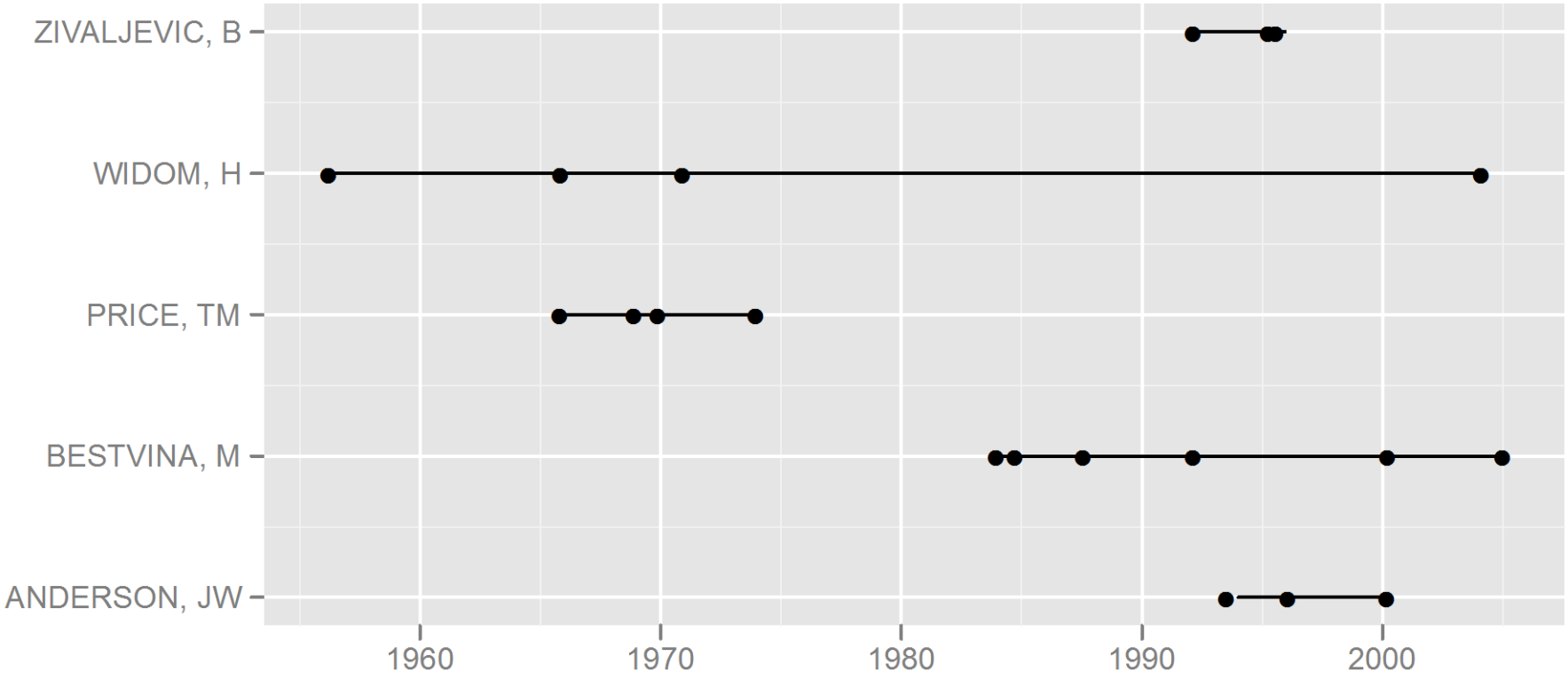


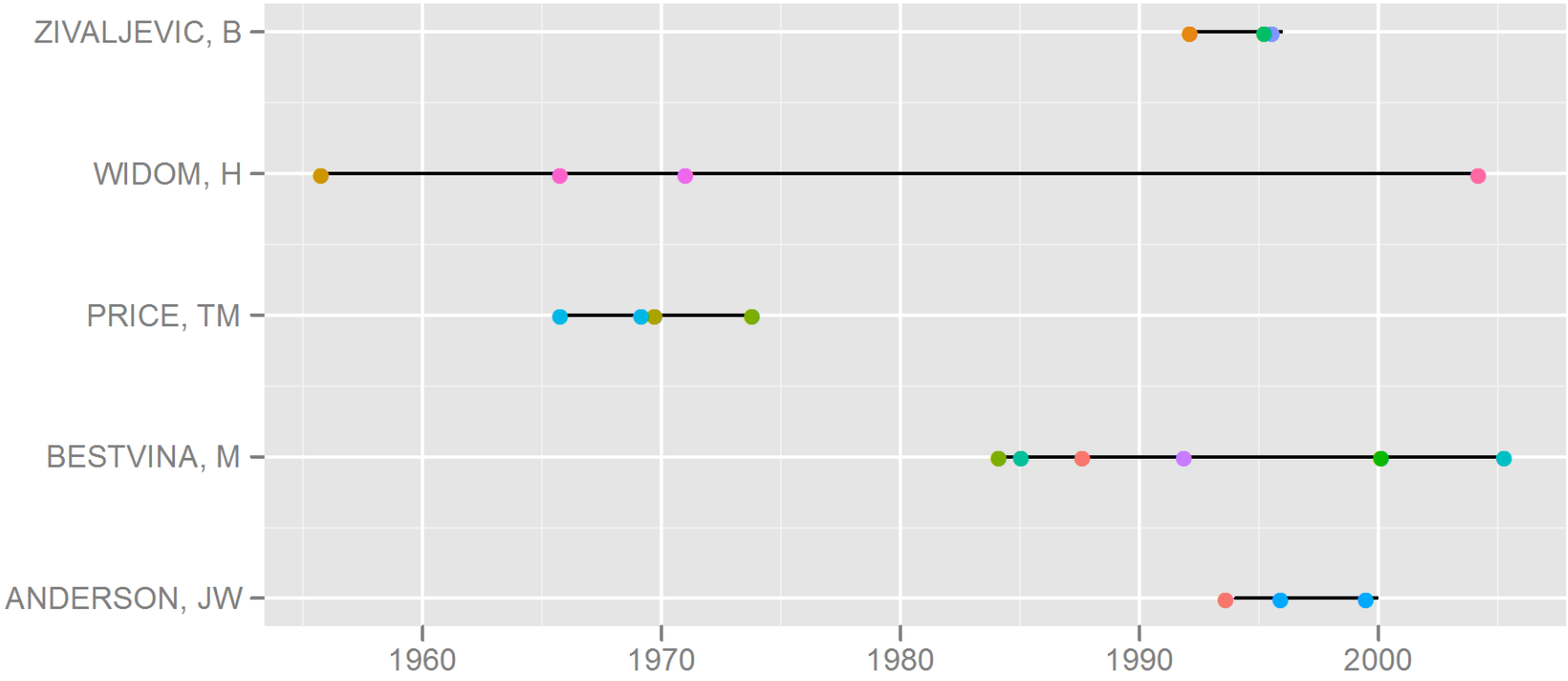
HYPERBOLIC AND DIOPHANTINE ANALYSIS



TRANSCENDENTAL NUMBERS AND DIOPHANTINE APPROXIMATIONS




ZIVALJEVIC, B
WIDOM, H
PRICE, TM
BESTVINA, M
ANDERSON, JW
1960
1970
1980
1990
2000


ZIVALJEVIC, B
WIDOM, H
PRICE, TM
BESTVINA, M
ANDERSON, JW
1960
1970
1980
1990
2000

Collaboration & Topic Attention

"At every stage my mathematical trajectory was a very ***social process****, in which close friendships were formed, which* ***broadened my horizons****."*

Michael Atiyah
Cambridge University

Geography & Topics

"I realized I had everything I needed to prove the resolution of singularities in all dimensions. ***The bits and pieces of technical ideas came together*** *and crystallized into a single proof, based upon what I had acquired earlier: (1) commutative algebra from* ***Kyoto****, (2) geometry of polynomials from* ***Harvard****, (3) globalization technique from* ***IHES*** *[in Paris]. I called this my Lucky Triplet."*

Heisuke Hironaka

Harvard University

Questions

- Life course of topic attention within author
  - Focused, or spread
  - Competing influences: Advisor, collaborators, fads, geography
- Life course of topics themselves
  - Contagion, reproduction number
  - Carrying capacity, ecology of ideas

One-to-One and Onto

Nick Switanek
Northwestern University
Kellogg School of Management
Northwestern Institute on Complex Systems (NICO)

8 June 2012
Workshop on Name Disambiguation
UIUC