

Rete-Netzwerk-Red

Scholarly Networks
in Network Workbench

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KATY BÖRNER

Goal: Develop a large-scale network analysis, modeling and visualization toolkit for physics, biomedical, and social science research.

Amount: \$1,120,926, NSF IIS-0513650 award

Duration: Sept. 2005 - Aug. 2008

Website: <http://nwb.slis.indiana.edu>

Investigators

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* Santiago Schnell

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* Stanley Wasserman

* Eric Wernert



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✿ Tim Kelley

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✿ Stephen North

✿ Tom Snijders

✿ Noshir Contractor



Outline

- ❄ Where Scholarly Data Comes From
- ❄ A Simple Scientometrics Pipeline
- ❄ The Pipeline in Detail
- ❄ Going From Tables To Networks

Where Scholarly Data Comes From



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 Source: **BIOPOLYMERS** Volume: 89 Issue: 8 Pages: 668-679 Published: 2008 Jun 16
[IU-Link](#)
- Title: Comparability of composition of carbon functional groups in humic acid between inverse-gated decoupling and cross polarization/magic angle spinning 13C nuclear magnetic resonance techniques.
 Authors: Watanabe, Akira; Fujitake, Nobuhide
 Source: **Anal Chim Acta** Volume: 618 Issue: 1 Pages: 110-5 Published: 2008 Jun 16
[IU-Link](#)
- Title: Reperfusion injury after hemorrhage: a collective review.
 Authors: Rushing, G D; Britt, L D
 Source: **Ann Surg** Volume: 247 Issue: 6 Pages: 929-37 Published: 2008 Jun 16
[IU-Link](#)
- Title: Current status of therapy for chronic myeloid leukemia: a review of drug development.
 Authors: Padmanabhan, Swami; Ravella, Saritha; Curiel, Tyler, et al.
 Source: **Future Oncol** Volume: 4 Issue: 3 Pages: 359-77 Published: 2008 Jun 16
[IU-Link](#)
- Title: Resolution of creatine and phosphocreatine (1)H signals in isolated human skeletal muscle using HR-MAS (1)H NMR.
 Authors: Chen, Jin-Hong; Wu, Yuhsin V; Decarolis, Penelope, et al.
 Source: **Magn Reson Med** Volume: 59 Issue: 6 Pages: 1221-4 Published: 2008 Jun 16
[IU-Link](#)
- Title: Quantitation with QUEST of brain HRMAS-NMR signals: Application to metabolic disorders in experimental epileptic seizures.
 Authors: Rabeson, H; Fauvel, F; Testylier, G, et al.
 Source: **Magn Reson Med** Volume: 59 Issue: 6 Pages: 1266-73 Published: 2008 Jun 16
[IU-Link](#)
- Title: High-resolution 3D structure determination of kallotoxin by solid-state NMR spectroscopy.
 Authors: Korukottu, Jegannath; Schneider, Robert; Vijayan, Vinesh, et al.
 Source: **PLoS ONE** Volume: 3 Issue: 6 Pages: e2359 Published: 2008 Jun 16
[IU-Link](#)

OMFRET, JC

ELL, RJ

OMFRET, JOANNE C.

ELL, ROBERT J.

OWDING, SEX RATIO AND HORN EVOLUTION IN A SOUTH AFRICAN BEETLE
COMMUNITY

JOURNAL ARTICLE

ARIFAKIOGLU, E.

ILMAZ, A. E.

GORPELIOGLU, C.

008

AIL ALTERATIONS IN 250 INFANT PATIENTS: A CLINICAL STUDY

EUR ACAD DERMATOL VENEREOL

EB 25

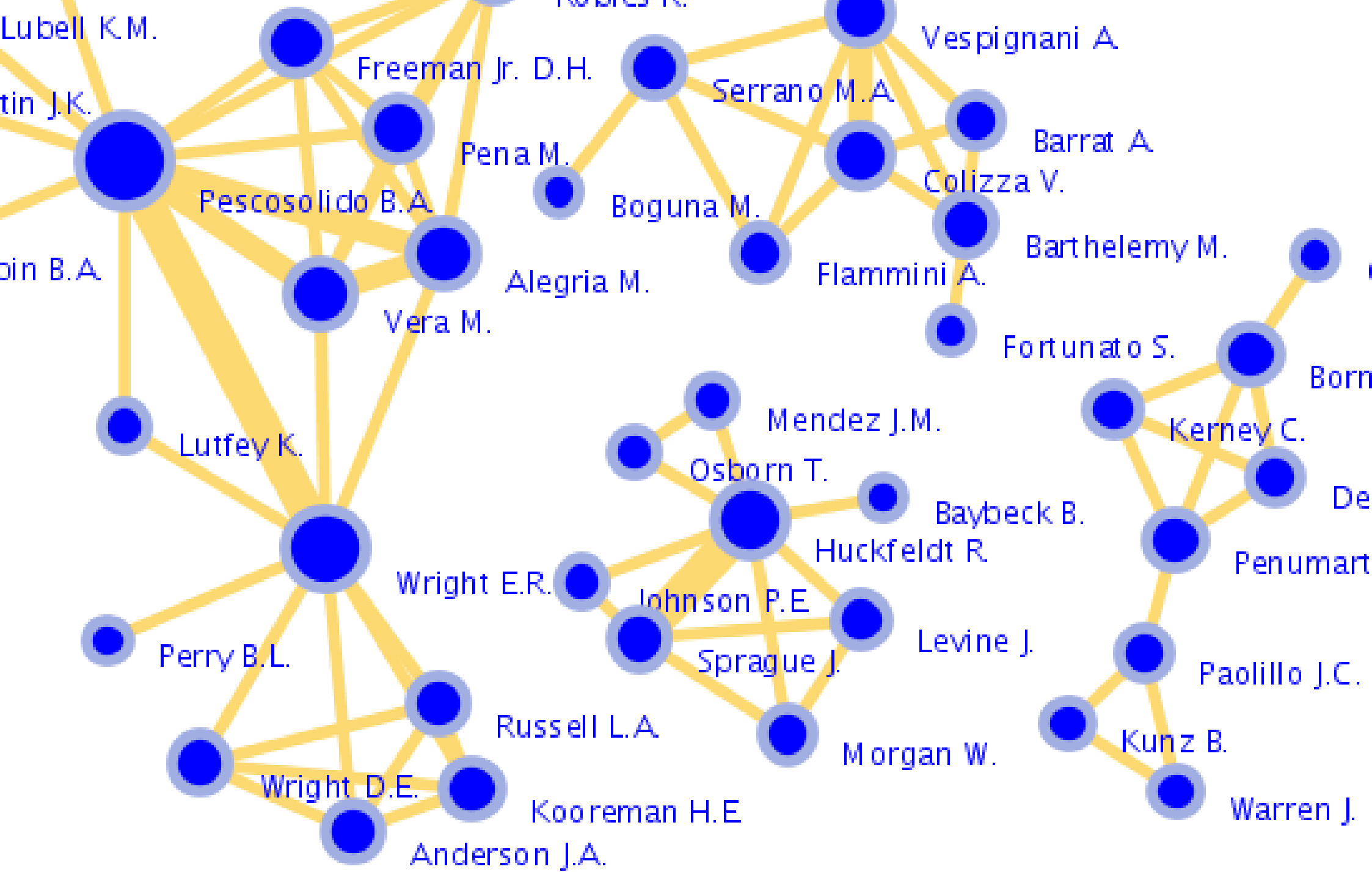
AIL ALTERATIONS IN 250 INFANT PATIENTS: A CLINICAL STUDY

OK{COMMUNITIES2006,

E = {SUSTAINABLE COMMUNITIES: A SHARED AGENDA, A SHARE OF THE ACTION: A GUIDE FOR L
HORITIES},

HOR = { {DEPARTMENT FOR ENVIRONMENT, FOOD AND RURAL AFFAIRS} AND {LOCAL GOVERNMENT
OCIATION}},

ISHER = {LONDON: DEFRA},



on We Want Networks

There are many useful parsers, but no general approach.

A Simple Scientometrics Pipeline

- ❄ Small, special purpose parsers **minimally transform** the original data into usable tabular structures.
- ❄ Generalized algorithms **create networks** from the tabular structures based on simple configuration files.
- ❄ Derived networks are created by appropriate **graph projections**.

Simple Tables Make Many Things Simple

- ✱ Want to look at a subset? **Filter** by value or date before extracting a network.
- ✱ Use algorithms that work on tables and other collections of records, like **Burst Detection**.
- ✱ Work effortlessly with similar data, such as for **Event Co-Attendance**.

The Pipeline in Detail

Downloaded Scholarly Data Like This

FN ISI EXPORT FORMAT

VR 1.0

PT J

AU POMFRET, JC

KNELL, RJ

AF POMFRET, JOANNE C.

KNELL, ROBERT J.

TI CROWDING, SEX RATIO AND HORN EVOLUTION IN A SOUTH AFRICAN BEETLE
COMMUNITY

SO PROCEEDINGS OF THE ROYAL SOCIETY B-BIOLOGICAL SCIENCES

LA ENGLISH

DT ARTICLE

DE SEXUAL SELECTION; MEAN CROWDING; POPULATION DENSITY; SEXUAL WEAPONRY;
ONTHOPHAGINI; OPERATIONAL SEX RATIO

ID ONTHOPHAGUS-ACUMINATUS COLEOPTERA; ALTERNATIVE REPRODUCTIVE TACTICS;
MATE-LOCATING BEHAVIOR; MALE-MALE COMPETITION; POPULATION-DENSITY;

CALOGLYPHUS-BERLESEI; MATING SYSTEMS; ACARID MITE; DIMORPHISM; SELECTION

AB SEXUALLY SELECTED ORNAMENTS AND WEAPONS ARE EXCEPTIONALLY VARIABLE,
EVEN BETWEEN CLOSELY RELATED SPECIES. IT HAS LONG BEEN RECOGNIZED THAT

SOME OF THIS DIVERSITY CAN BE EXPLAINED BY DIFFERENCES IN MATING

SYSTEMS BETWEEN SPECIES, BUT THERE REMAINS SUBSTANTIAL VARIATION

BETWEEN SPECIES WITH SIMILAR MATING SYSTEMS. WE INVESTIGATED THE ROLES

OF SEX RATIO (MEASURED AS OPERATIONAL SEX RATIO, OSR) AND POPULATION

DENSITY (MEASURED AS MEAN MALE CROWDING, A MEASURE INDICATING THE

AVERAGE NUMBER OF CONSPECIFIC MALES THAT AN INDIVIDUAL MALE ANIMAL WILL

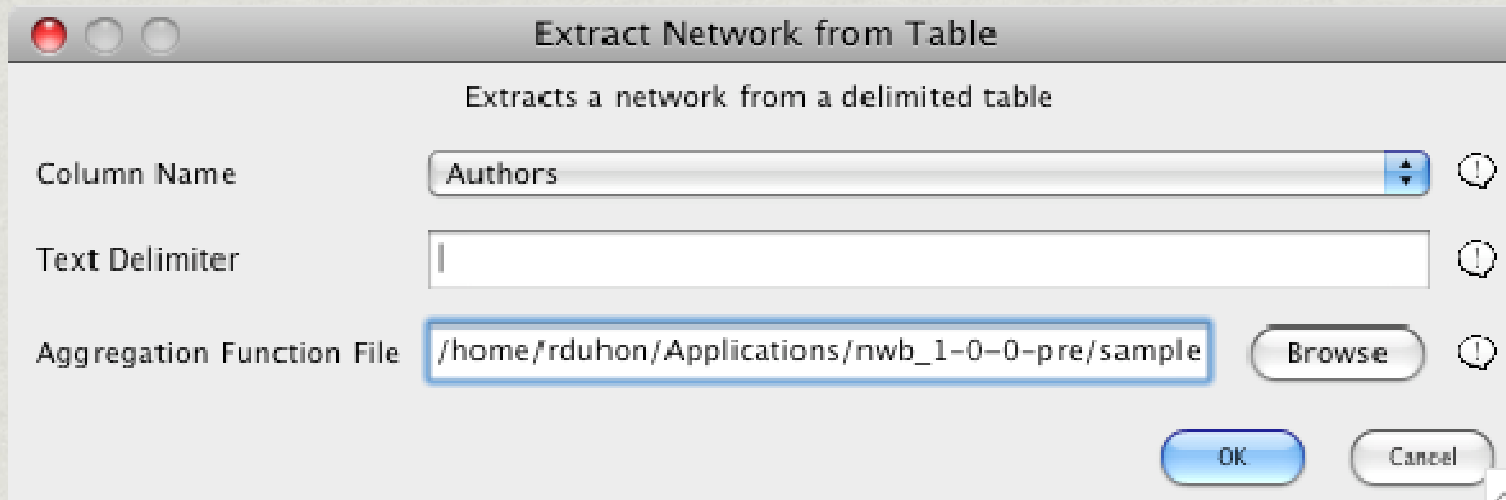
ENCOUNTER) IN DETERMINING HORN PRESENCE IN A COMMUNITY OF SOUTH AFRICAN

DUNG BEETLES.

becomes something like this

| Authors | Times Cited | Number of Pages | Publication Year | Title |
|----------------------------------|-------------|-----------------|------------------|--|
| Pomfret, JC Knell, RJ | 0 | 7 | 2008 | Crowding, sex ratio and horn evolution in a South African beetle |
| Madewell, R Moczek, AP | 2 | 10 | 2006 | Horn possession reduces maneuverability in the horn-polyphenic |
| Pomfret, JC Knell, RJ | 8 | 10 | 2006 | Sexual selection and horn allometry in the dung beetle |
| Lailvaux, SP Hathway, J Pomfret, | 13 | 8 | 2005 | Horn size predicts physical performance in the beetle |
| Emlen, DJ Marangelo, J Ball, | 27 | 25 | 2005 | Diversity in the weapons of sexual selection: Horn evolution in the |
| Ward, MA Collins, JM Morgan, SM | 0 | 2 | 2005 | First record of the flightless carrion beetle <i>Necrophilus pettitii</i> horn |
| Warriner, MD | 0 | 2 | 2004 | Occurence and conservation status of the milkweed beetle |
| Emlen, DJ | 0 | 1 | 2002 | Endocrine regulation of beetle horn expression: insights for horn |
| Fleenor, SB Taber, SW | 1 | 4 | 2001 | A new long-lipped beetle from Texas and a review of the genus |
| Moczek, AP Emlen, DJ | 0 | 1 | 2000 | Male horn dimorphism in the scarab beetle, <i>Onthophagus taurus</i> : |
| Moczek, AP Emlen, DJ | 83 | 8 | 2000 | Male horn dimorphism in the scarab beetle, <i>Onthophagus taurus</i> : |
| Halstead, JA Oldham, JA | 0 | 3 | 2000 | New distribution records for the elderberry longhorn beetle |
| Moczek, AP | 44 | 6 | 1998 | Horn polyphenism in the beetle <i>Onthophagus taurus</i> : larval diet |
| Moczek, AP Emlen, DJ | 66 | 11 | 1999 | Proximate determination of male horn dimorphism in the beetle |
| Emlen, DJ Nijhout, HF | 71 | 9 | 1999 | Hormonal control of male horn length dimorphism in the dung |
| Emlen, DJ | 46 | 8 | 1997 | Diet alters male horn allometry in the beetle <i>Onthophagus</i> |
| Rogers, DC | 1 | 2 | 1997 | <i>Aphodius alternatus</i> Horn (Aphodiinae: Scarabaeidae), first |
| Emlen, DJ | 99 | 12 | 1996 | Artificial selection on horn length body size allometry in the |
| Emlen, DJ | 131 | 6 | 1994 | ENVIRONMENTAL-CONTROL OF HORN LENGTH |
| Rasmussen, JL | 51 | 16 | 1994 | THE INFLUENCE OF HORN AND BODY-SIZE ON THE |
| Jensen, JC Zacharuk, RY | 5 | 8 | 1992 | THE FINE-STRUCTURE OF THE MULTIPOROUS SENSILLA |
| Jensen, JC Zacharuk, RY | 5 | 19 | 1991 | THE FINE-STRUCTURE OF UNIPOROUS AND NONPOROUS |
| Cooper, KW | 0 | 17 | 1989 | HORN,GEORGE,H., WRIGHT,WILLIAM,G., AND THE |
| Young, DK | 2 | 2 | 1989 | NOTES ON THE BIONOMICS OF XENOMYCETES- |
| Vulinec, K | 0 | 1 | 1985 | HORN SIZE IN THE MINUTE TREE-FUNGUS BEETLE |
| Brown, L Siegfried, BD | 15 | 3 | 1983 | EFFECTS OF MALE HORN SIZE ON COURTSHIP ACTIVITY IN |
| Eberhard, WG | 147 | 7 | 1982 | BEETLE HORN DIMORPHISM - MAKING THE BEST OF A BAD |
| Cowley, RJ Howard, DC Smith, RH | 14 | 4 | 1980 | THE EFFECT OF GRAIN STABILITY ON DAMAGE CAUSED BY |
| Evans, WG | 8 | 12 | 1976 | CIRCADIAN AND CIRCATIDAL LOCOMOTORY RHYTHMS IN |
| Baker, NW | 1 | 0 | 1971 | OBSERVATIONS ON BIOLOGY OF GIANT PALM-BORING BEET |

and is processed by a simple algorithm

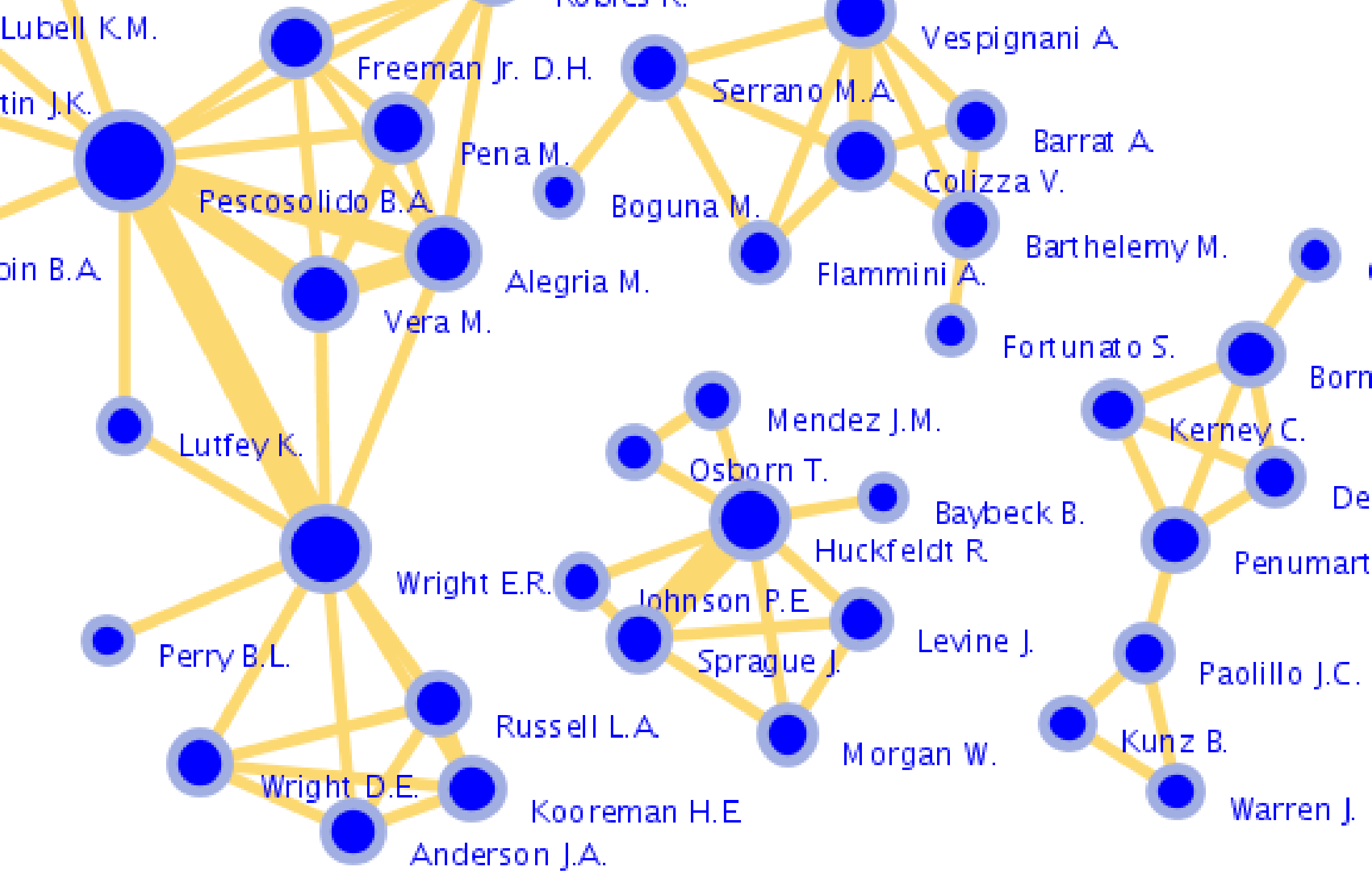


The image shows a dialog box titled "Extract Network from Table" with the subtitle "Extracts a network from a delimited table". It contains three input fields: "Column Name" with the value "Authors", "Text Delimiter" with the value "|", and "Aggregation Function File" with the value "/home/rduhon/Applications/nwb_1-0-0-pre/sample". There are "Browse", "OK", and "Cancel" buttons.

| Field | Value |
|---------------------------|--|
| Column Name | Authors |
| Text Delimiter | |
| Aggregation Function File | /home/rduhon/Applications/nwb_1-0-0-pre/sample |

with a simple properties file

```
node.cited = Times Cited.sum  
node.average_length = Number Of Pages.mean  
edge.cited_together = Times Cited.sum  
edge.first_copublication = Publication Year.min
```



Make Networks

Going From Tables To Networks

Table fields include:

- ❄ Multi-Valued Fields

- ❄ **Authors:** Lailvaux, SP|Hathway, J|Pomfret, J|Knell, RJ

- ❄ Numerical Fields

- ❄ **Times Cited:** 42

We can make networks based on co-occurrence

- Nodes are connected if **representative values co-occur** in the same table row.

LAILVAUX, SP

HATHWAY, J



```
graph LR; LAILVAUX, SP --- HATHWAY, J
```

Attributes Relate to Nodes and Edges

- Attributes associate by columns in the **same rows as node values**, or for pairs of node values in the case of edges.

LAILVAUX, SP

| Times Cited | Number of Pages | Publication Year |
|-------------|-----------------|------------------|
| 7 | | 2008 |
| 10 | | 2006 |
| 10 | | 2006 |

| Times Cited | Number of Pages | Publication |
|-------------|-----------------|-------------|
| 2 | 10 | 2006 |

HATHWAY, J

| Times Cited | Number of Pages | Publication |
|-------------|-----------------|-------------|
| 3 | 8 | 2008 |
| 2 | 10 | 2006 |
| 12 | 6 | 2006 |

Attributes are Aggregated

- ✦ The rules in a simple properties file define how they are aggregated to produce **derived values**.

LAILVAUX, SP

| cited | average_length |
|-------|----------------|
| 10 | 9 |

| cited_together | first_copublication |
|----------------|---------------------|
| 2 | 2006 |

HATHWAY, J

| cited | average_length |
|-------|----------------|
| 17 | 8 |

References

Thomson Reuters. 2008. ISI Web of Knowledge. <http://www.isiwebofknowledge.com/>. (accessed April 22, 2008)

Elsevier B.V. 2008. Scopus. <http://www.scopus.com/>

National Science Foundation. 2007. About Awards. <http://www.nsf.gov/awards/about.jsp> (accessed April 22, 2008)

Herr II, Bruce. W., Weixia (Bonnie) Huang, Shashikant Penumarthy and Katy Börner. 2007. Designing Highly Flexible and Usable Cyberinfrastructures for Convergence. In Bainbridge, William S. & Roco, Mihail C. (Eds.), Progress in Convergence - Technologies for Human Wellbeing (Vol. 1093, pp. 161-179). Annals of the New York Academy of Sciences, Boston, MA.

5. Weixia Huang, Bruce Herr, Russell Duhon, Katy Börner. 2007. Network Workbench – Using Service-Oriented Architecture and Component-Based Development to Build a Tool for Network Scientists, Proceedings of the International Workshop and Conference on Network Science.

6. NWB Team. 2006. Network Workbench Tool. Indiana University and Northeastern University. <http://nwb.slis.indiana.edu> (accessed April 22, 2008).

Thank you.

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[HTTP://NWB.SLIS.INDIANA.EDU](http://nwb.slis.indiana.edu)

Questions?