

Advancing Science and Challenges to Departments and to Graduate Training in Research

Linda Smith
Indiana University



Is Psychology over? At the end of its run?

*Originally organized by Danny Shaw at University of Pittsburgh
and then reprised at the Council for Graduate Departments of
Psychology (COGDOP)*

*with Richard Petty, chair, Psychology, Ohio State University,
Danny Shaw, chair, Psychology, University of Pittsburgh
Stephen Hinshaw, chair, Psychology, UC-Berkeley*



*Are there going to be Psychology Departments
(as we now know them) in the future?**

*Is Psychology over? ***

* maybe not

** most certainly NOT, the questions, the importance of behavior and research approach will remain even if Psychology departments as they exist today do not



All research training departments want

“to be ahead of the curve, where the field is going”

“to train the *next*-generation of scientists”

“to train students for the future”



But how do you do that, where is the field going?



But how do you do that, where is the field going?

increasingly multi-disciplinary
increasing biological
increasing translational



But how do you do that, where is the field going?

increasingly multi-disciplinary
increasing biological
increasing translational

strong centrifugal forces of change



Signs of change



Signs of change

who is *doing* psychology?

mechanisms and principles of behavior and intelligence (all the topics one would see in an introductory psychology text)



Who is doing psychology?

- K. Gold, M. Doniec, C. Crick, and B. Scassellati.(2009) Robotic Vocabulary Building Using Extension Inference and Implicit Contrast., *Artificial Intelligence Journal*. Vol. 173(1), p. 145-166. 2009.
- K. Gold & B. Scassellati (2010). Using Probabilistic Reasoning over Time to Self-Recognize. *Robotics and Autonomous Systems*
- Shic & B. Scassellati. (2010) A behavioral analysis of robotic models of visual attention. *International Journal of Computer Vision*

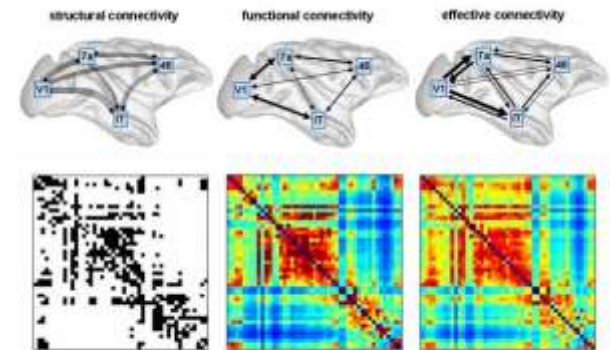
- Robotocists like Brian Scassellati at Yale



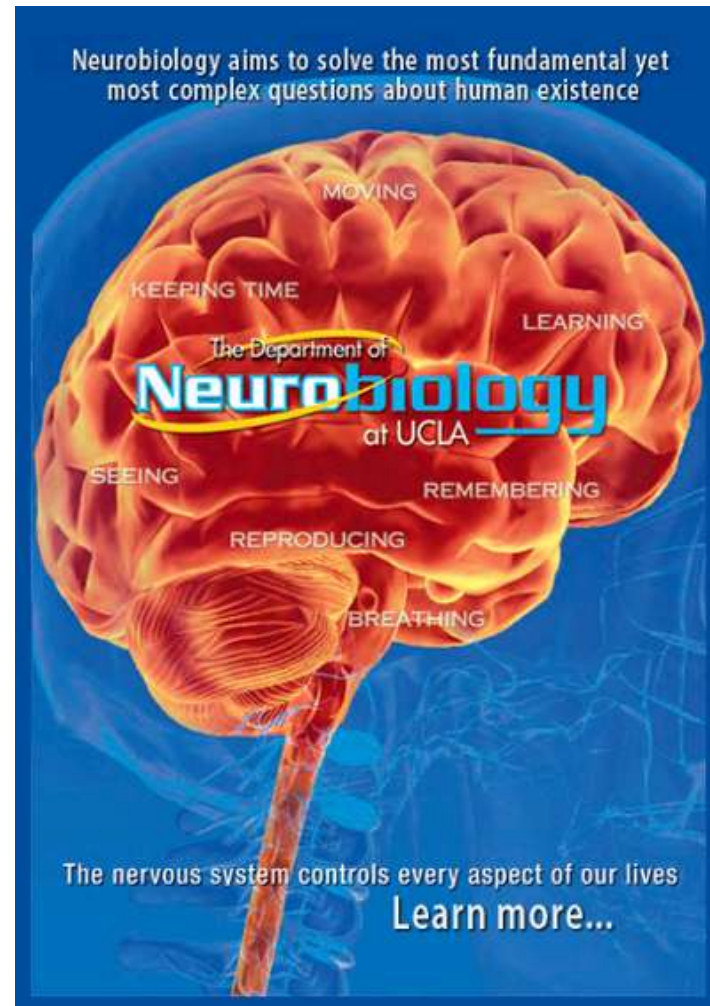
Who is doing psychology?

- Honey CJ, Sporns O, Cammoun L, Gigandet X, Thiran JP, Meuli R, Hagmann P (2009) Predicting human resting-state functional connectivity from structural connectivity. *Proc. Natl. Acad. Sci. USA* 106, 2035-2040.
- Bullmore, E.T, Sporns, O. (2009) Complex brain networks: graph-theoretical analysis of structural and functional systems. *Nature Reviews Neuroscience* 10, 186-198.

- Physicists like Olaf Sporns at Indiana



Who is doing psychology?



Who is doing psychology?

- Neurobiologists
- Computational linguists
- Experimental philosophers
- Law Professors
- MDs
- Physicists!
- Roboticists!

It is not our own guild of like-minded and like-trained any more. Breakout advances can be coming from anywhere. The discoveries that advance knowledge will determine the future of psychology whether or not they are made by a psychology PhD in a psychology department.



Signs of change

where “psychology” was being published

Nature (occasionally), APA, APS, the Psychonomic Society Journals,
Archives of Psychiatry, Journal of Personality and Social Psychology

(how did we know these journals were “good” because the members of our
guild –the folks we respected –told us they were)



Signs of change

where “psychology” is being published

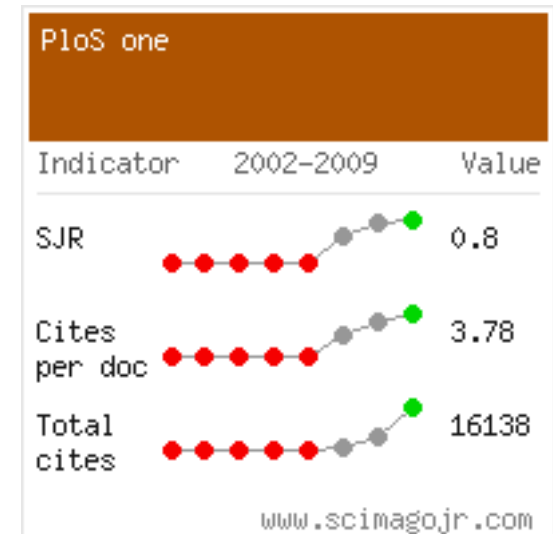
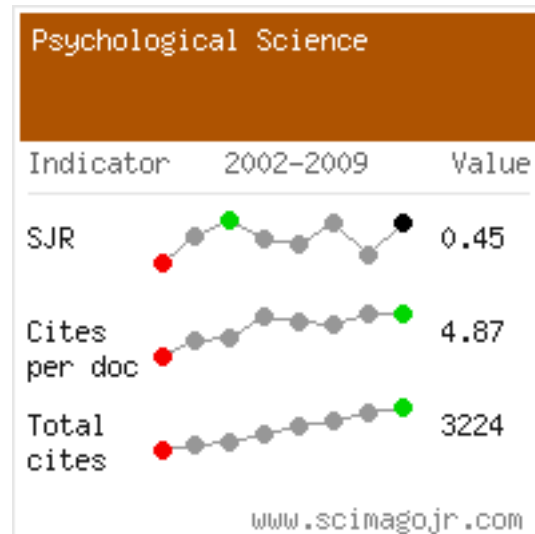
Nature, APA, APS, the Psychonomic Society Journals, Archives of Psychiatry, JPSP

Science, Neuron, PNAS, PloS, Cell, Nature Neuroscience, Experimental Brain Research, Law and Psychology Review, Computational Linguistics, Frontiers in Cognition, Artificial Intelligence, IEEE journals, Neuroscience Letters.....



Objective ALL SCIENCES metrics, the rise of open journals?

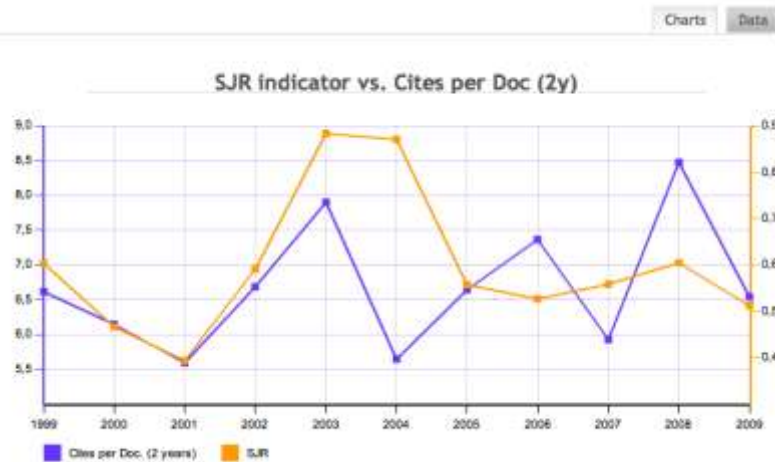
where do you want your paper: Psychological Review, Psychological Science, PloS One?



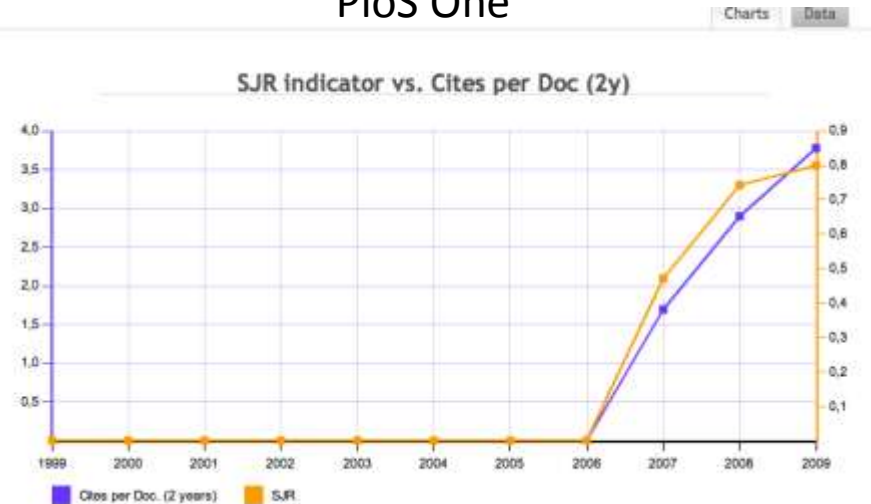
The **SJR indicator** measures the scientific influence of the average article in a journal, it expresses how central to the global scientific discussion an average article of the journal is. Cites per Doc. (2y) measures the **scientific impact of an average article** published in the journal, it is computed using the same formula that **journal impact factor**™ (Thomson Reuters).

Psychological Review versus PloS One?

Psychological Review

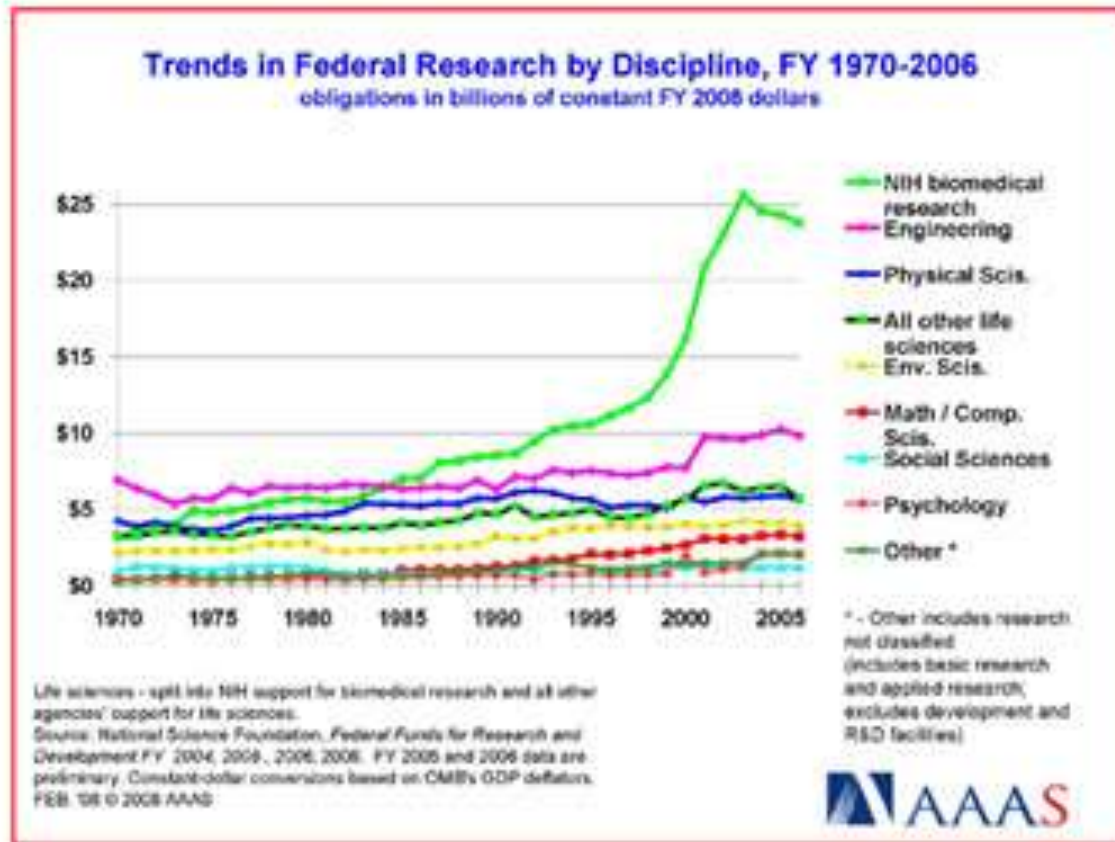


PloS One



Open access vs. traditional Journals)
Psychology vs. Broad cross-discipline readership?

Signs of change



Signs of change

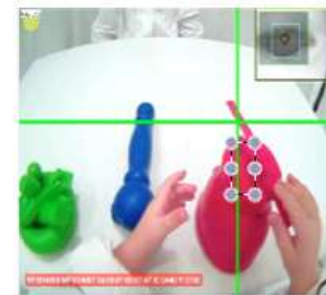
The buzzwords in NIH and NSF roadmaps and calls *indicators of the direction of the science*

- interplay between behavioral, computational, and neural approaches
- integrative neuroscience -- from molecular to systems to behavioral to cognitive to social neuroscience
- from genes to proteins to behavior to developmental process *and back*
- massive data streams, nested scales
- complex systems, connectivity (neural, social, multi-sensory systems)
- in the integration of advances in basic science with applications through translational research (medical, educational, technical)





child's first person view



from eye camera

from head camera

child eye tracker



Signs of change

Who is getting jobs?

Last year: 69% of jobs in psychology* in research 1 institutions asked for **more than behavioral experimental research** (e.g., for computational, neural, human genomics, genetics, atypical populations)

*all job listings on PBS 2010 Indiana joblistserve
for our graduate students and post-docs as coded
by key words



Signs of change reflect advances in science

- interplay between behavioral, computational, and neural approaches
- integrative neuroscience -- from molecular to systems to behavioral to cognitive to social neuroscience
- from genes to proteins to behavior to developmental process *and back*
- massive data streams, nested scales
- complex systems, connectivity (neural, social, multi-sensory systems)
- in the integration of advances in basic science with applications through translational research (medical, educational, technical)

if our students are going to be prepared for the future, if they are going to be competitive, what do Psychology department's and training programs need to be like?



Changes at Indiana

One change, as a consequence of all this at Indiana,
our name: ***Psychological and Brain Sciences*** (2003)

The name change emerged because of our decision for concerted growth
in both cognitive neuroscience and in molecular and cellular neuroscience



an area-less dept
(not quite there yet but trying)

admissions, training of graduate students

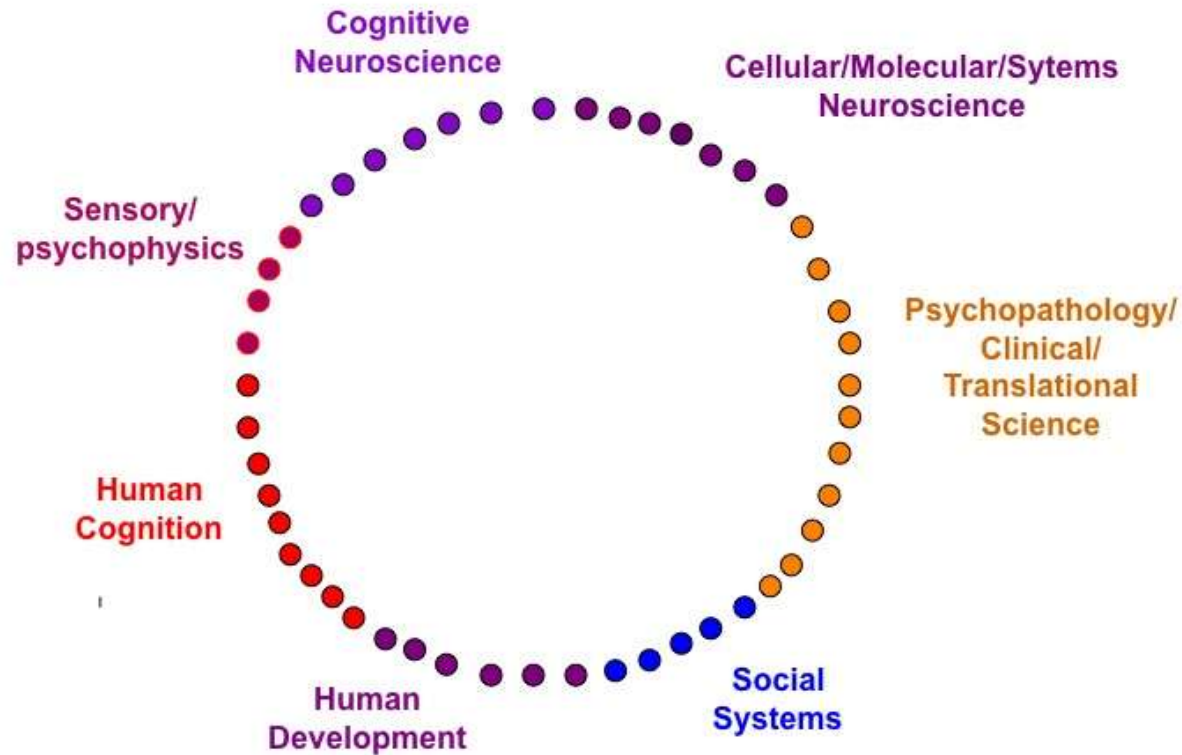


Figure 1. Extramurally funded collaborations in PBS.

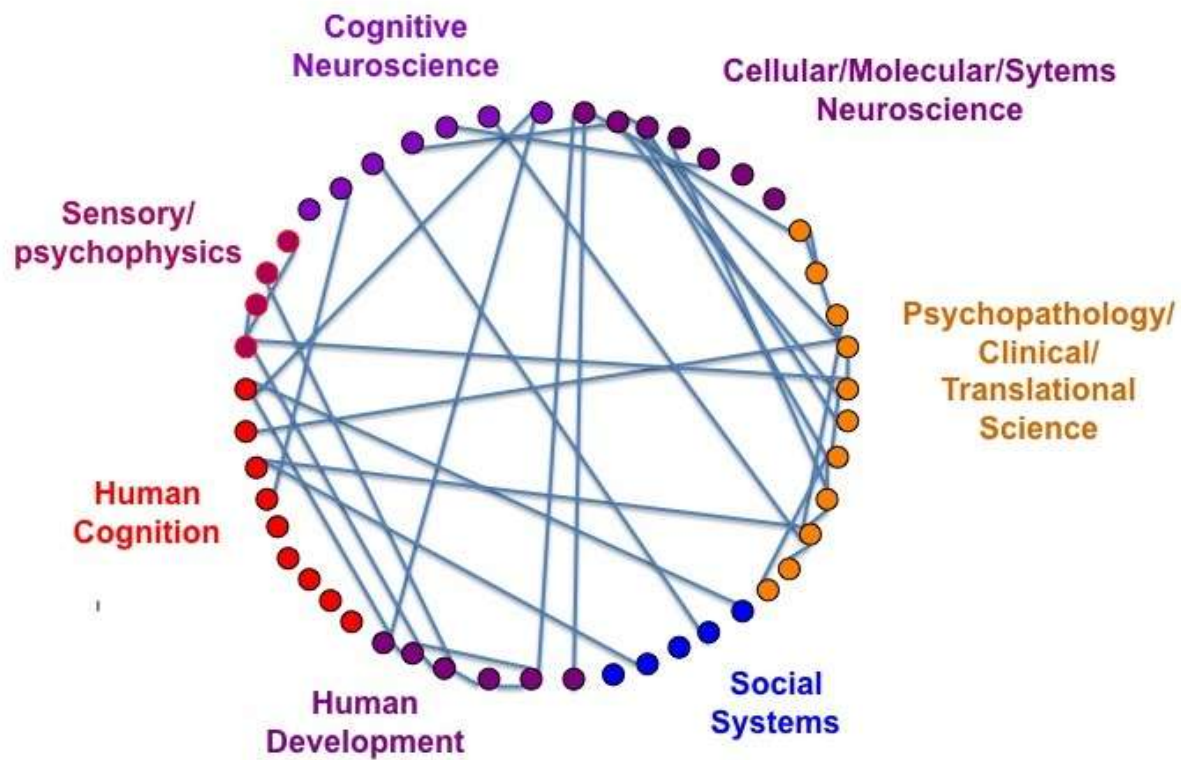
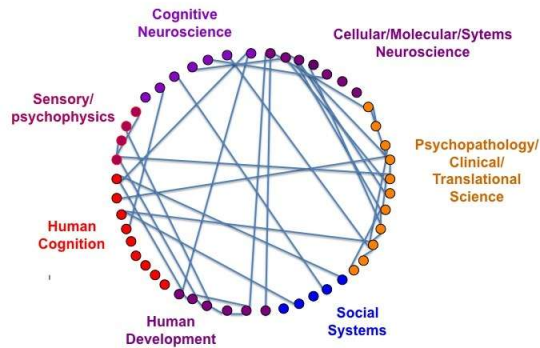


Figure 1. Extramurally funded collaborations in PBS.

rethinking graduate admission and training



- 5 training grants (2NSF, 3NIH) all Integrative multi-level and include folks across traditional areas
- Graduate training by committee
- Admission –any 5 faculty may nominate a student to admit
- All hiring department wide, not by area

traditional training areas? clusters of integrative training? a common core of knowledge?



different approach to hiring
Not all are PhDs in psychology

- MD (1)
- PhDs in biology (2)
- PhD in biomedical engineering (2)
- PhD in computer science/informatics (2)

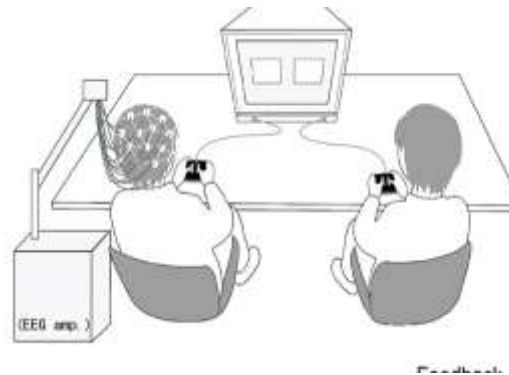
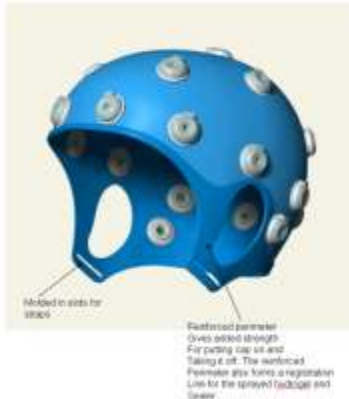
why not just link up to other departments for training but only hire PhDs in psychology?

We need people committed to psychology's questions and to linking to behavior.



Shared facilities

- labs (size and infrastructure)
 - functional magnetic imaging center
 - multimodal methods cog. neuro (eeg, eyetracking in magnet, tms, optical imaging etc., advanced microscopes)
 - multimodal social interactions (eeg, multi-person motion capture and eyetracking)



central hubs and centrifugal forces

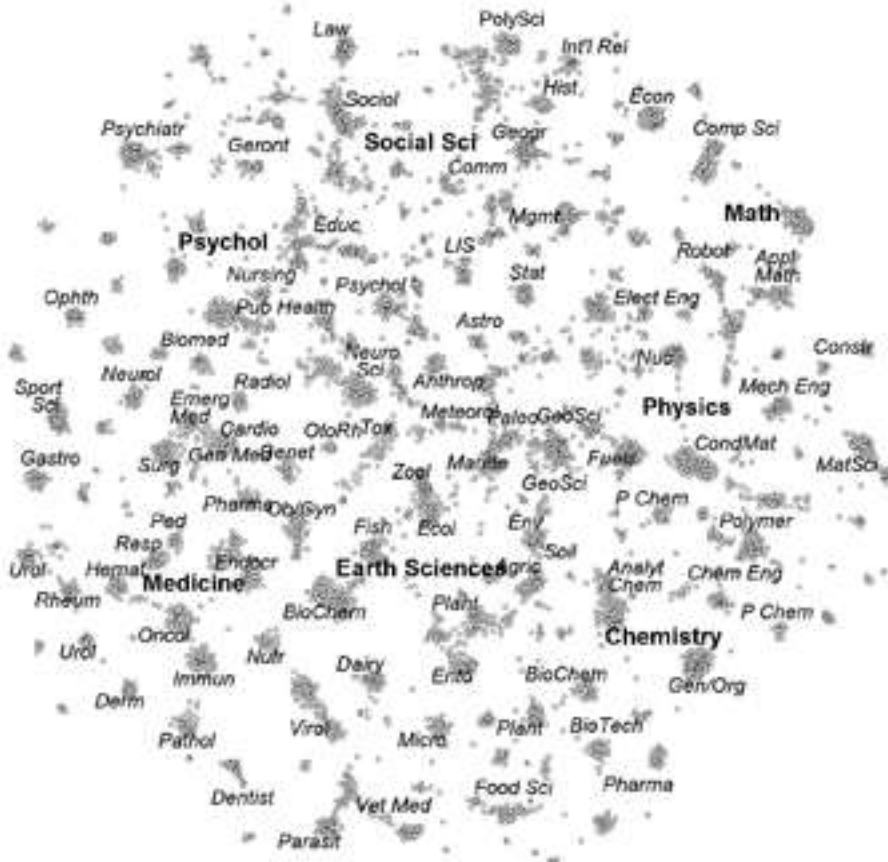
- Neurobiology/neuroscience
- computational neuroscience
- Physics, informatics (many body behaviors and large data sets)

Where is psychology in all this?



central hubs and centrifugal forces

Katy Borner,
Indiana University,
Informatics of Science



central hubs and centrifugal forces



Katy Borner,
Indiana University,
Informatics of Science



two futures

bring it under one roof,
behavior does the integration
therefore, “psychology” owns the integrative question

break it up (very few research campuses have a biology department any more,
they have lots of biology, but not organized in one department
(e.g. molecular and cellular biology, biochemistry, genetics, protonomics)

not your father's –not even your – psychology department



Graduate training?

across-levels depth (neuroscience to **behavior**)

integration

multi-methods

collaboration and big teams

how to the retain the core? connect to behavior

