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Getting to Research Integrity:

An Eco-Systemic Perspective

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Disclaimers

- ▶ The views expressed here are my own and do not necessarily reflect the position or policy of HealthPartners Institute, the Department of Veterans Affairs or the United States government.



Research Integrity ≠ Absence of FFP

- ▶ Empirical research – primarily among biomedical researchers in academe
 - ▶ Has documented high levels of undesirable research related behaviors⁽¹⁻³⁾
 - ▶ Misconduct (FFP): 1% to 8%
 - ▶ Misappropriation: 10% – 25%
 - ▶ Circumventing federal regulations: 14%–18%
-
- ▶ 1. B. C. Martinson, M. S. Anderson, R. De Vries, Scientists behaving badly, *Nature* 435, 737–8 (2005)
 - ▶ 2. B. C. Martinson, A. L. Crain, R. De Vries, M. S. Anderson, The Importance of Organizational Justice in Ensuring Research Integrity, *Journal of Empirical Research on Human Research Ethics* 5, 67–83 (2010)
 - ▶ 3. A.L. Crain, B. C. Martinson, and C. R. Thrush. 2013. “Relationships Between the Survey of Organizational Research Climate (SORC) and Self-Reported Research Practices.” *Science and Engineering Ethics* 19 (3): 835–50



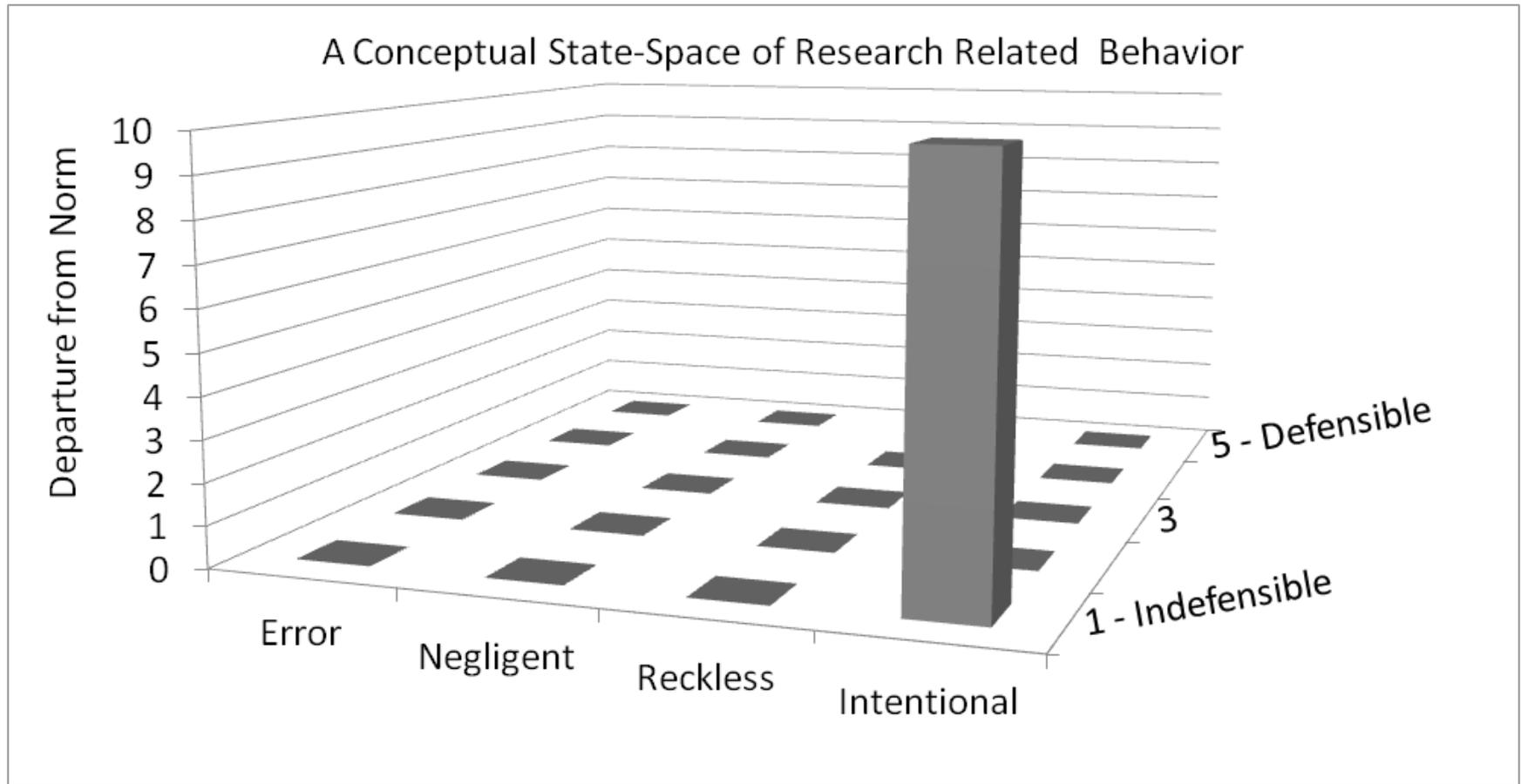
Misbehavior \neq Intentional Deceit

- ▶ “Neglect” was defined as having engaged in 1 or more of the following in the prior 3 yrs:
 - Inadequate record keeping related to research
 - Inadequate monitoring of research projects
 - Cutting corners in a hurry to complete a project
 - Circumventing or ignoring aspects of materials-handling research requirements
- ▶ 46.7% endorsed one or more of these items
- ▶ Of those admitting to any of these – more than half admitted to at least 2 of the 4, and nearly a quarter admitted to 3 of the 4.

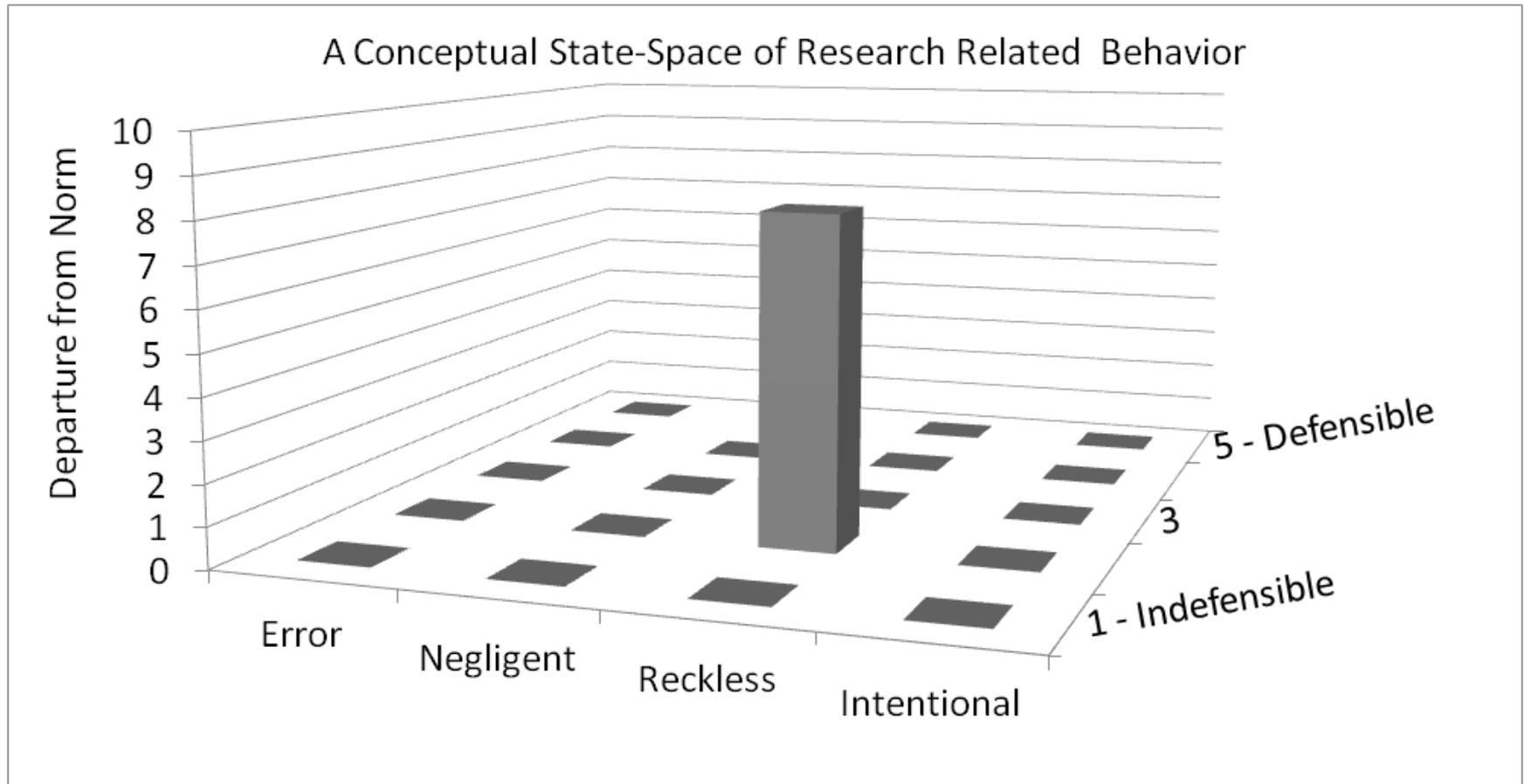
(Crain, A. Lauren, Brian C. Martinson, and Carol R. Thrush. 2013. “Relationships Between the Survey of Organizational Research Climate (SORC) and Self-Reported Research Practices.” *Science and Engineering Ethics* 19 (3): 835–50)



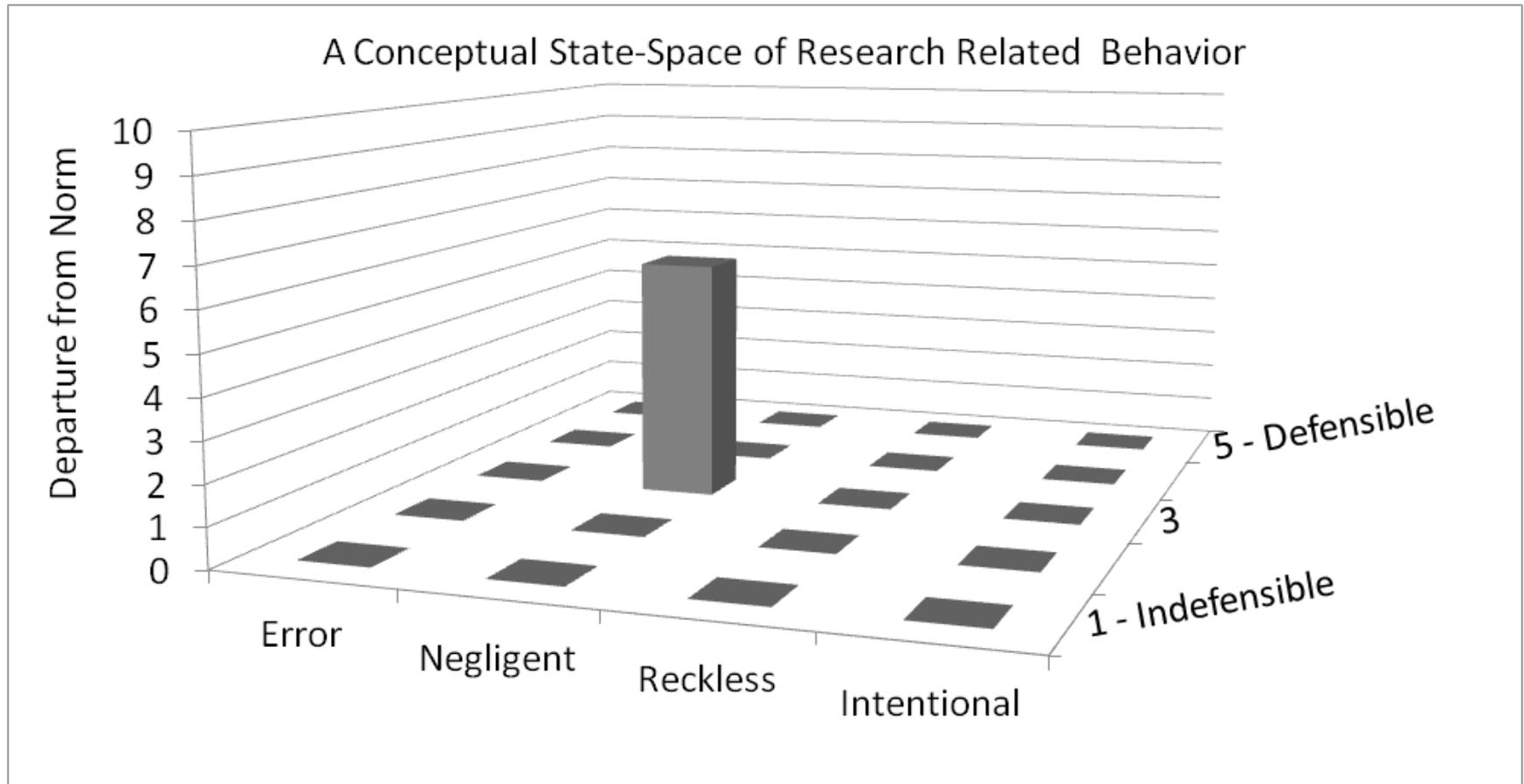
Typical headline news...



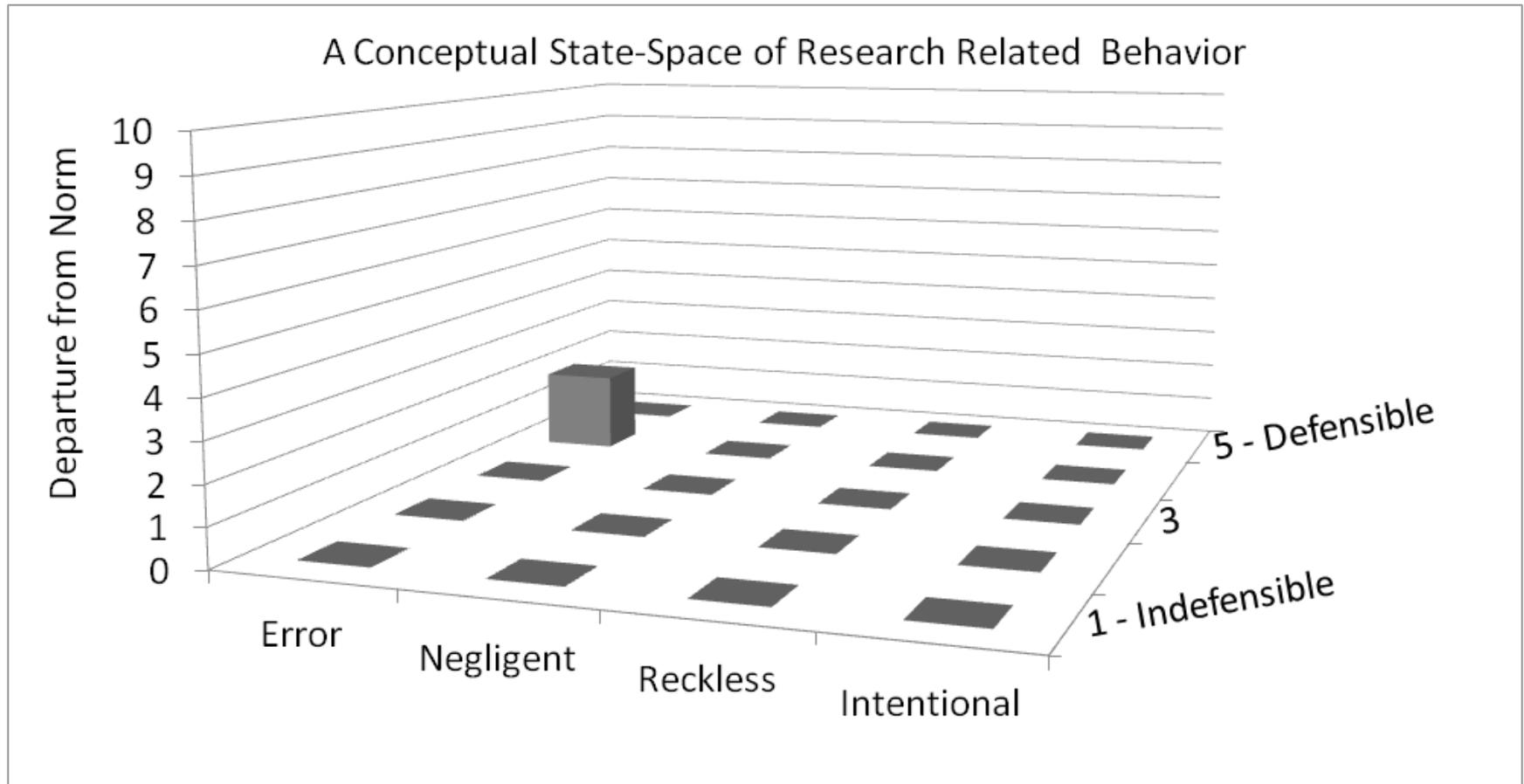
But what about this...



Or this...



Or this...?



Systemic Factors



Explore Worm Biology

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News

[Poster abstract deadline extended for Neuro Topic Meeting 2014!](#) Wed, 21 May 2014

The poster abstract deadline for the *C. elegans* topic meeting in Neuronal Development, Synaptic Function and Behavior has been extended! Submissions will be accepted through the end of the

[Abstracts due today for 2014 C. elegans Topic Meeting!](#) Mon, 05 May 2014

The 2014 *C. elegans* "Topics" Meeting, covering Aging, Metabolism, Pathogenesis, Stress, and Small RNAs, will be held July 10-13, 2014 on the campus of the University of Wisconsin, Madison.

[WormBase and the "Heartbleed" security issue](#) Wed, 09 Apr 2014

Recently, a serious security gap was identified in the software that provides the "secure" component of many websites. Called "Heartbleed", this issue could possibly affect upwards of 2/3

[View More >](#)

Discussion

Forums:

[Re: Cuticular defects and hypo-osmotic shock sensitivity phenotype](#) Wed, 28 May 2014

Yeah-bus-8 is a great control and available from the CGC. I used the e2885 allele in a recent PLoS

Activity

Random page:

go term: [outer membrane](#) 

The external membrane of Gram-negative bacteria or certain organelles such as mitochondria and chloroplasts; freely

What's popular on WormBase:

*information gathered from consenting users

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You must activate history logging to view the popular items on WormBase

You can save items on WormBase!

When you see a star on WormBase:

1. Click on the  **Questions, Feedback, or** 



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- Overview
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Comments (0)

Overview

Sydney Brenner

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Also known as: S Brenner

WormBase ID: WBPerson77

Institution: Institute of Molecular and Cell Biology, Singapore

Web Page: http://nobelprize.org/nobel_prizes/medicine/laureates/2002/brenner-autobio.html

Updates: [Add or update](#) your information in the lineage of *C. elegans* biologists and other nematologists.
[Add or update](#) your contact information.

▶ Previous Addresses

Lab Affiliation

Previous affiliations: [CB \(Jonathan Hodgkin\)](#)

Lineage

Supervised:

Search: [Save table](#)

Show entries

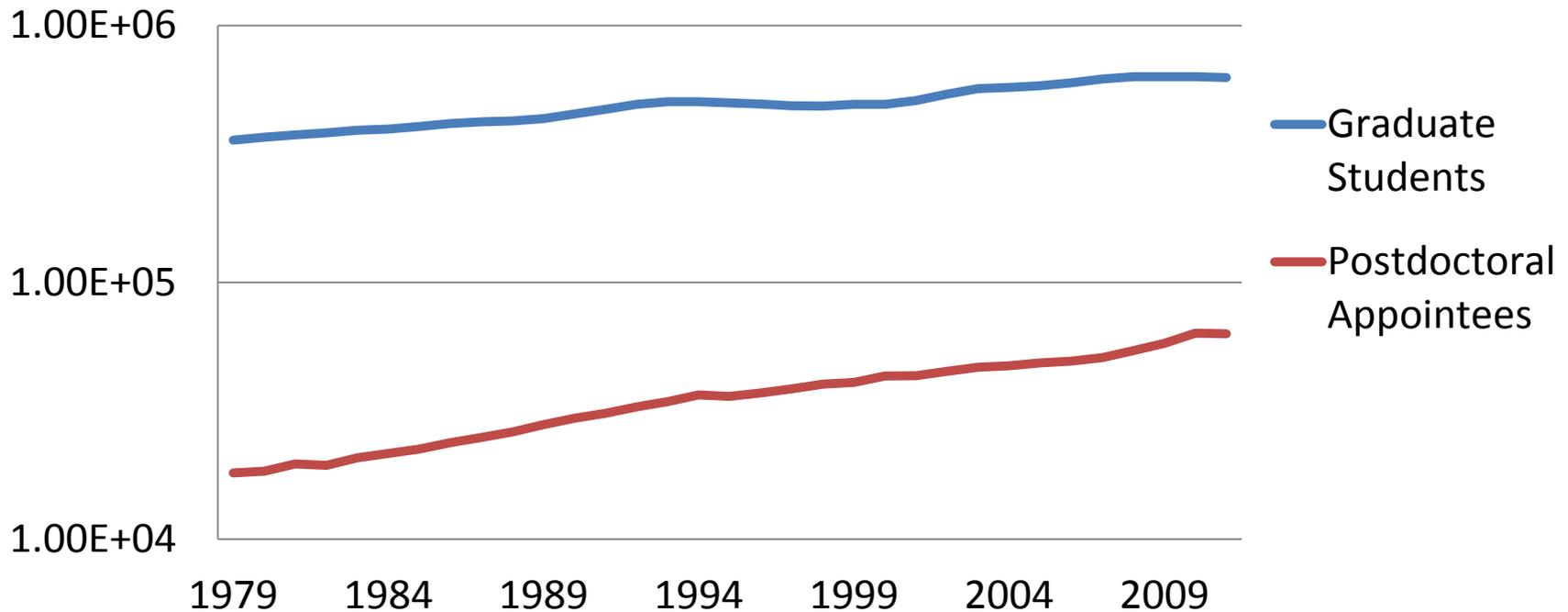
Name	Position	Period
Andras Fodor	Lab_visitor	1976 - 1977
Andrew Fire	Unknown	-
Anthony Otsuka	Postdoc	1979 - 1981
Antony Stretton	Postdoc	1961 - 1971
Barbara Meyer	Postdoc	-
Bob Edgar	Unknown	-
Bob Horvitz	Postdoc	1974 - 1978
Cynthia Kenyon	Postdoc	1981 - 1986

[Questions, Feedback & Help +](#)

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»» https://prezi.com/p75rojb0mt0z/goodwin_case_study/

Science, Engineering & Health - Early Career Populations - 1979-2011

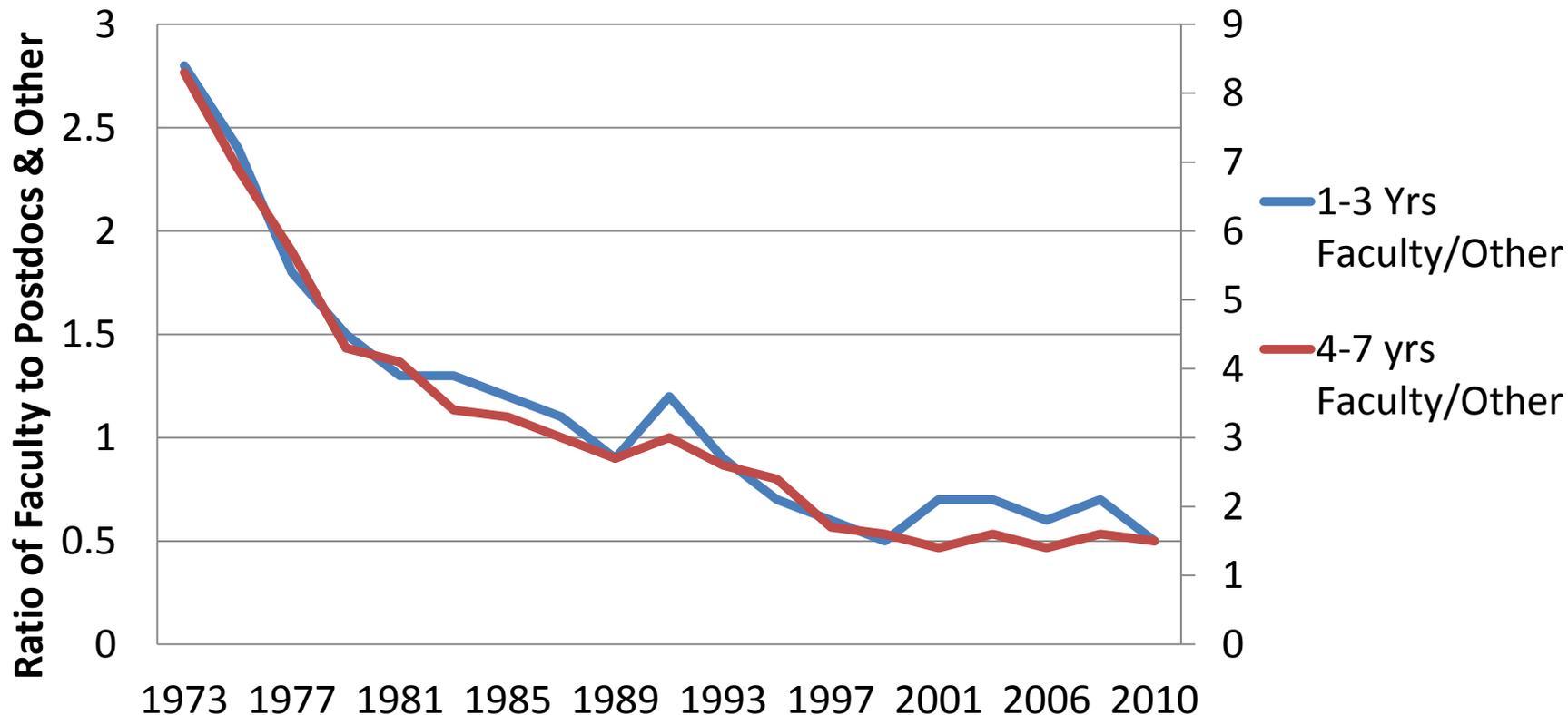


Sources:

National Science Board. 2014. *Science and Engineering Indicators 2014*. Arlington VA: National Science Foundation (NSB 14-01)

World Bank <http://data.worldbank.org/indicator/SP.POP.GROW?page=4>

Science, Engineering and Health Doctorates Employed in Academia - Ratio of Faculty to Postdocs & Others - 1973-2010



Source: National Science Board. 2014. Science and Engineering Indicators 2014. Arlington VA: National Science Foundation (NSB 14-01).

Career Prospects?

- ▶ “PhD programs have historically focused on training a workforce that would replicate the career of those doing the training.” (p. 159)
- ▶ “...job outcomes of recent graduates, has typically not been readily available from graduate programs.” (p. 161)
- ▶ “The culture of the university also stresses careers in academe, rather than in industry.” (p. 162)
- ▶ “...faculty know little about careers outside of academe...” (p. 162)



Hypercompetition & Perverse Incentives

- ▶ “The long-held but erroneous assumption of never-ending rapid growth in biomedical science has created an unsustainable **hypercompetitive** system... making it difficult for seasoned investigators to produce their best work.” (Alberts, Kirschner, Tilghman & Varmus, 2014)
- ▶ Hypercompetition: “a visceral state that leads a person to take actions he or she would normally deem to be unacceptable” (Rick & Loewenstein, 2008)
- ▶ Kahneman & Tversky’s (1979) work on loss aversion suggests that motivation to avoid a loss is typically much stronger than motivation to obtain a gain
- ▶ The competition of ideas has given way dangerously to a fierce competition for resources – at stake for many is their very career survival



“On the folly of hoping for ‘A’ while rewarding ‘B’” – Steven Kerr, 1995, Acad Mgmt Exec.

- ▶ As noted recently by Mary Devereaux:
 - “The predicament facing [ethics in the responsible conduct of research] is rather that we have failed to address the gap between the normative ideals of science and science’s institutional reward system.” (p. 167)
 - “The real threat to ethical conduct in science lies here—in the tension between the existing reward systems and the norms of science. (p. 168)

(Devereaux, M.L., 2014, Rethinking the Meaning of Ethics in RCR Education, *J Microbiol Biol Educ*, 15(2):165–8.)



“On the folly of hoping for ‘A’ while rewarding ‘B’” – Steven Kerr, 1995, Acad Mgmt Exec.

“A”	“B”
Collaboration & openness	Competition & “getting there first”
Objectivity of double-blind research	Peer review processes open to effects of reputation & established professional relationships
Open competition & meritocracy	Scientists typically not taught how to manage their own biases
Calls for increased entry & retention of women and underrepresented minorities in STEM fields	Assumptions about gender, ethnicity & race go unexamined

(Devereaux, M.L., 2014, Rethinking the Meaning of Ethics in RCR Education, *J Microbiol Biol Educ*, 15(2):165–8.)



“Soft-money” and Conflict of Interests

- ▶ “If we take seriously the implication of conflict of interest regulations that even a \$5,000 financial interest might bias the design, conduct, or reporting of research, then how much more risk of bias will be in play when what is at stake is ongoing funding of short-term research grants on which a researcher's salary and job depend?”

(Grinnell, F., 2014, The interrelationship between research integrity, conflict of interest, and the research environment, *J Microbiol Biol Educ*, 15(2):162-4.)



“Soft-money” and Conflict of Interests

- ▶ A doubling of the number of “academic centers of excellence” in the U.S. and
- ▶ Increased federal support to increase the size of university faculties
- ▶ BUT ALSO...
- ▶ A warning, of “...the need for avoiding situations in which a professor becomes partly or wholly responsible for raising his own salary...”

(Grinnell, F., 2014, The interrelationship between research integrity, conflict of interest, and the research environment, *J Microbiol Biol Educ*, 15(2):162-4.)



“Soft-money” and Conflict of Interests

- ▶ In a 2006–07 survey of biomedical and social science faculty at 50 top-tier research universities in the United States, my own research team documented that:
 - Being expected to obtain external funding AND receiving federal research funding were both associated with significantly higher self-reports of neglectful or careless research behaviors
 - Those with private industry involvement were significantly more likely than were those without to self-report having engaged in misconduct

(Martinson, Brian C., A. Lauren Crain, Melissa S. Anderson, and Raymond De Vries. “Institutions’ Expectations for Researchers’ Self-Funding, Federal Grant Holding and Private Industry Involvement: Manifold Drivers of Self-Interest and Researcher Behavior.” *Academic Medicine* 84 (2009): 1491–99.)



Institutional Factors



Context Influences Behavior

- ▶ Five contextual factors conducive to cheating
 - 1) a strong emphasis on performance
 - 2) very high stakes
 - 3) extrinsic motivation
 - 4) a low expectation of success, and
 - 5) a peer culture that accepts or endorses corner-cutting or cheating

Source: James *Lang Cheating Lessons*, Harvard University Press, 2013



Institutional Climates Matter

- 2002 IOM report, *Integrity in Scientific Research: Creating an Environment That Promotes Responsible Conduct*
- Explicitly recognized the role of the local environment – the lab, the department, the university – in shaping the behavior of scientists
 - “The extent to which the organization is highly competitive, along with the extent to which its rewards...are based on extramural funding and short-term research production, may have negative impacts on integrity in research.”



2002 IOM Report

- ▶ Promoted a performance-based, self-regulatory approach to fostering research integrity
- ▶ Recommended institutions seeking to create environments promoting responsible research conduct and fostering integrity should:
 - (1) establish and continuously measure their structures, processes, policies, and procedures,
 - (2) evaluate the institutional environment supporting integrity in the conduct of research and
 - (3) use this knowledge for ongoing improvement



Survey of Organizational Climates (SOuRCE)

- ▶ No gold-standard climate measures in 2002
- ▶ In 2006 – Carol Thrush began development, using IOM’s conceptual framework
- ▶ Led to the **Survey of Organizational Research Climate (SOuRCe)**, which measures key **institutional-level factors** related to research integrity – as perceived by organizational members
- ▶ Provides organizational leaders with metrics to assess aspects of climates which should be **mutable and subject to change** in response to organizational change initiatives aimed at promoting research integrity



What is organizational climate?

- ▶ “the **shared meaning** organizational members attach to the events, policies, practices, and procedures they experience and the **behaviors they see being rewarded**, supported, and expected.”(p. 115)

(Ehrhart, Schneider & Macey, 2014)



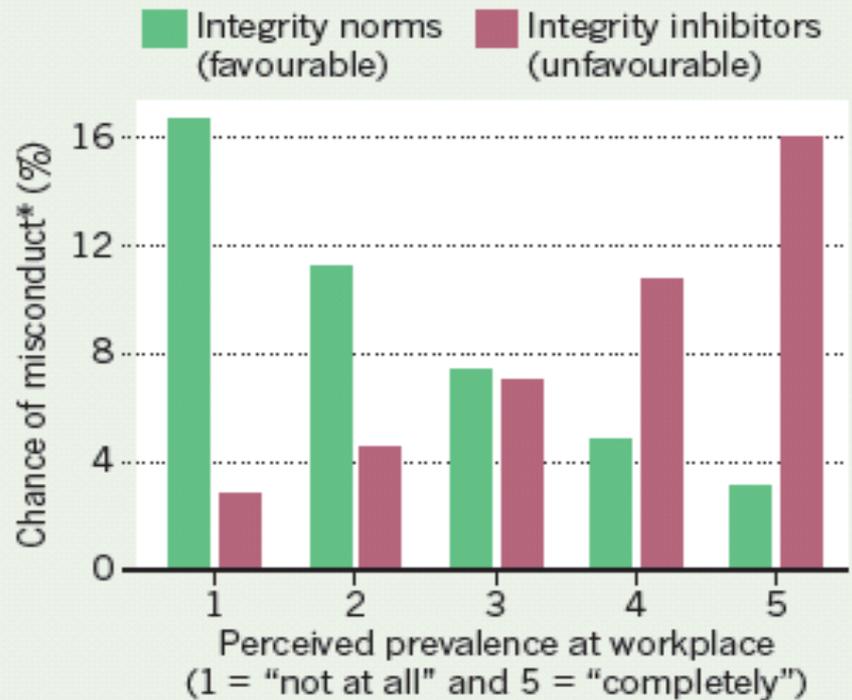
Survey of Organizational Climate

- ▶ Yields seven content domain scales:
 - reasonableness of departmental expectations for research productivity
 - extent to which research integrity norms exist
 - extent to which activities take place to socialize researchers into these norms
 - extent to which factors in the local environment may inhibit research integrity
 - quality and availability of resources pertaining to the responsible conduct of research (RCR)
 - quality of regulatory oversight activities by IRBs, IACUCs
 - quality of advisor/advisee relations



ETHICS IN THE ENVIRONMENT

The level of self-reported fraud, fabrication and plagiarism increases as perceptions of 'integrity norms' fall and of 'integrity inhibitors' rise.



*Predicted likelihood that an individual would report engaging in fraud, fabrication or plagiarism, according to regression analysis of a large survey on research behaviour and workplace climate during the past three years.

Figure: Baker, Monya. 2015. "Workplace Climate: Metrics for Ethics." *Nature* 520 (7549): 713–713.

Data from: Crain, A. Lauren, Brian C. Martinson, and Carol R. Thrush. 2013. "Relationships Between the Survey of Organizational Research Climate (SORC) and Self-Reported Research Practices." *Science and Engineering Ethics* 19 (3): 835–50.

Summing Up...

- ▶ Misbehavior in science has typically been seen as a failing of the individual
- ▶ Scientists' don't behave in a void
- ▶ Influenced by the situational imperatives of their positions within the structures of the science enterprise
- ▶ Incentives and disincentives to quality research exist at both systemic and institutional levels
- ▶ Structural & Institutional reforms needed
- ▶ We've got plenty of work to do



Thank you!

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