Getting to Research Integrity:
An Eco–Systemic Perspective

Brian C. Martinson, PhD
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%

“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 of 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.

Typical headline news...

A Conceptual State-Space of Research Related Behavior

Departure from Norm

Error  Negligent  Reckless  Intentional

5 - Defensible
3
1 - Indefensible
But what about this...

A Conceptual State-Space of Research Related Behavior

- Departure from Norm
- Error, Negligent, Reckless, Intentional
- 1 - Indefensible
- 3
- 5 - Defensible
Or this...

A Conceptual State-Space of Research Related Behavior

- Error
- Negligent
- Reckless
- Intentional

Departure from Norm

1 - Indefensible
3

5 - Defensible
Or this...?

A Conceptual State-Space of Research Related Behavior

Departure from Norm

Error Negligent Reckless Intentional

5 - Defensible
3
1 - Indefensible
Systemic Factors
Explore Worm Biology
facilitating insights into nematode biology
Sydney Brenner
Salk Institute for Biological Studies
10010 North Torrey Pines Road
La Jolla, CA 92037
United States of America

Institution: Institute of Molecular and Cell Biology, Singapore

Overview

Updates: Add or update your information in the lineage of C. elegans biologists and other nematologists.
Add or update your contact information.

Lab Affiliation

Previous affiliations: CB (Jonathan Hodgkin)

Lineage

Supervised:

<table>
<thead>
<tr>
<th>Name</th>
<th>Position</th>
<th>Period</th>
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<tbody>
<tr>
<td>Andreas Fodor</td>
<td>Lab_visitor</td>
<td>1976 - 1977</td>
</tr>
<tr>
<td>Andrew Fire</td>
<td>Unknown</td>
<td>-</td>
</tr>
<tr>
<td>Anthony Otsuka</td>
<td>Postdoc</td>
<td>1979 - 1981</td>
</tr>
<tr>
<td>Antony Stretton</td>
<td>Postdoc</td>
<td>1961 - 1971</td>
</tr>
<tr>
<td>Barbara Meyer</td>
<td>Postdoc</td>
<td>-</td>
</tr>
<tr>
<td>Bob Edgar</td>
<td>Unknown</td>
<td>-</td>
</tr>
<tr>
<td>Bob Horvitz</td>
<td>Postdoc</td>
<td>1974 - 1978</td>
</tr>
<tr>
<td>Cynthia Kenyon</td>
<td>Postdoc</td>
<td>1981 - 1986</td>
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Go to Prezi (6mins)

https://prezi.com/p75rojb0mt0z/goodwin_case_study/
Science, Engineering & Health - Early Career Populations - 1979-2011

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

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)
“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
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)


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

“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…”

“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

Institutional Factors
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

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

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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