Bias in Grant Review: The Fault in Our Metrics?

Linda F. Bisson
Associate Director
UC Davis ADVANCE
### Awards by Sponsor Category, FY 2005-06 to 2013-14

($ millions, inflation adjusted)

<table>
<thead>
<tr>
<th>SPONSOR</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
<th>2013</th>
<th>2014</th>
</tr>
</thead>
<tbody>
<tr>
<td>State</td>
<td>447</td>
<td>372</td>
<td>472</td>
<td>486</td>
<td>465</td>
<td>455</td>
<td>445</td>
<td>531</td>
<td>439</td>
</tr>
<tr>
<td>Other Gov’t*</td>
<td>118</td>
<td>181</td>
<td>141</td>
<td>156</td>
<td>169</td>
<td>110</td>
<td>131</td>
<td>149</td>
<td>183</td>
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<tr>
<td>Business</td>
<td>290</td>
<td>388</td>
<td>512</td>
<td>392</td>
<td>380</td>
<td>403</td>
<td>506</td>
<td>470</td>
<td>612</td>
</tr>
<tr>
<td>Non-Profit</td>
<td>477</td>
<td>533</td>
<td>674</td>
<td>608</td>
<td>565</td>
<td>561</td>
<td>541</td>
<td>666</td>
<td>644</td>
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<tr>
<td>Academia**</td>
<td>408</td>
<td>442</td>
<td>468</td>
<td>464</td>
<td>498</td>
<td>516</td>
<td>543</td>
<td>538</td>
<td>546</td>
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<tr>
<td><strong>TOTAL</strong></td>
<td>4,912</td>
<td>5,050</td>
<td>5,495</td>
<td>5,331</td>
<td>6,054</td>
<td>5,765</td>
<td>5,542</td>
<td>5,280</td>
<td>5,708</td>
</tr>
</tbody>
</table>

* Other Gov’t includes Agricultural Market Order Boards.
** Academia includes the categories of Higher Education, DOE Labs, Campuses and UCOP.
Awards by Sponsor Category, FY 2004-05 to 2013-14
$ millions, inflation adjusted

- Federal
- State
- Other Gov’t
- Business
- Non-Profit
- Academia

Contracts & Grants FY2013-14 Award Report (UCOP)
Contracts & Grants FY2013-14 Award Report (UCOP)
Contracts & Grants FY2013-14 Award Report (UCOP)
Rescuing US biomedical research from its systemic flaws

Bruce Alberts\textsuperscript{a}, Marc W. Kirschner\textsuperscript{b}, Shirley Tilghman\textsuperscript{c}, and Harold Varmus\textsuperscript{d}
\textsuperscript{a}Department of Biophysics and Biochemistry, University of California, San Francisco, CA 94158; \textsuperscript{b}Department of Systems Biology, Harvard Medical School, Boston, MA 02115; \textsuperscript{c}Department of Molecular Biology, Princeton University, Princeton, NJ 08540; and \textsuperscript{d}National Cancer Institute, Bethesda, MD 20892

The Aging of NIH Investigators

Congressman’s Provocative Op-Ed Bemoans Lack of Young Investigator Funding

by ERIC BERGER
Special Contributor to
Annals News & Perspective

The Economics of Science
Funding for Research
Paula E. Stephan
Georgia State University, NBER, and ICER, Turin, Italy
June 2010

A generation at risk: Young investigators and the future of the biomedical workforce

Ronald J. Daniels\textsuperscript{1}
President, Johns Hopkins University, Baltimore, MD 21287

Information, Bias, and Efficiency in Expert Evaluation: Evidence from the NIH

Danielle Li
Northwestern University\textsuperscript{†}
“Although proposals with strong priority scores were equally likely to be funded regardless of race, we find that Asians are 4 percentage points and black or African-American applicants are 13 percentage points less likely to receive NIH investigator-initiated research funding compared with whites.”

“Together, these data indicate that black and Asian investigators are less likely to be awarded an R01 on the first or second attempt, blacks and Hispanics are less likely to resubmit a revised application, and black investigators that do resubmit have to do so more often to receive an award.”
RACE, ETHNICITY, AND NIH RESEARCH AWARDS

Donna K. Ginther¹,*, Walter T. Schaffer², Joshua Schnell³, Beth Masimore³, Faye Liu³, Laurel L. Haak³, and Raynard Kington⁴

![Bar chart showing R01 award probability by race and ethnicity, FY 2000 to 2006 (N= 83,188). Based on data from NIH IMPAC II, DRF, and AAMC Faculty Roster. †, P < .001; **, P < .01; *, P < .05.]
“The conventional wisdom is that the market, if left to its own devices, would under-invest in research in terms of social benefits relative to social costs.”

Results from the previous grant (if there was one) play an important role in evaluation.

The presence of demonstrated expertise and strong preliminary data play an especially key role in the review process. A major reason that universities provide start up funds is to permit the newly hired faculty member time to continue the process of collecting preliminary data for an NIH proposal.

The “lineage” of the scientist is often noted, in terms of where the scientist trained and in whose lab the scientist did his or her postdoc work.

Researchers must also demonstrate that they have adequate space at their university in which to conduct the research.

Grants are often scored on their “doability.”
The Economics of Science Funding for Research
Paula E. Stephan
Georgia State University, NBER, and ICER, Turin, Italy
June 2010

NIH Competing R01 Equivalent Award

Fiscal Year

- 35 and Younger
- 36 - 40
- 41 - 45
- 46 - 50
- 51 - 55
- Over 55
First, the need for preliminary results biases funding decisions towards more established researchers and delays the submission of grants by investigators just starting out.

Second, more than 70% of new investigators must resubmit their proposals before receiving funding; thirty years ago over 85% of all new investigators received funding on their first submission. Resubmission can easily add an additional year to the process.

Third, people increasingly are older at the time that they get a tenure-track position.

Decisions at the margin become increasingly random when reviewers must choose among a limited number of top-quality proposals.
Age Distribution in 1980 (background) and 2010 (foreground)

National Institutes of Health (2012) Biomedical Workforce Working Group Report (National Institutes of Health, Bethesda, MD)
• Hypercompetitive funding system highly discouraging to potential outstanding students and faculty
• Crippling demands on faculty time
• Policies/practices/attitudes of academia based on the assumption of continued rapid growth of federal funding sources to match growth in costs and in people = perverse incentives for institutional funding
• Cost structure encourages oversupply of trained individuals for the positions available
• “. . . the system favors those who can guarantee results rather than those with potentially path-breaking ideas.”
• While reviewers are biased in favor of applications from their own subfield, they are also more informed about their quality.
• First holding quality constant, every additional permanent member an applicant is related to increases her chances of being funded by 2.9 percent.
• Second reviewers shape committee decisions by both increasing bias and improving information.
• Finally the gains associated with review by potentially biased experts dominate the losses.
“Treating related applicants as if they were unrelated thereby eliminating both bias and information would reduce the quality of the NIH-supported research portfolio by two to three percent, as measured by future citations and publications.”
Information, Bias, and Efficiency in Expert Evaluation: Evidence from the NIH

Danielle Li

Figure 3: Mean application quality by score: funded and unfunded grants
Conclusions

• Age and other bias in federal grant awards are documentable
• Basis for bias in part due to implicit bias (direct or indirect)
• Basis for bias in part due to metrics of quality that display implicit bias
• Reliance on grants as a proxy metric of excellence may compound implicit bias effects
• Potential junior faculty, and particularly URM faculty, are discouraged by the hyper-competitiveness of federal funding and the “crippling” demands on time