What Traits of Character do Exemplary Scientists Value?:
Results from the Scientific Virtues Survey

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The Scientific Character Virtues

- Theoretical
  - Philosophical & historical account of the scientific disciplinary virtues
- Empirical
  - Formal study of scientists’ ethical perceptions and stories
- Practical
  - Creation of SV-based science and RCR training curriculum
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Aristotle’s Virtue Theory

• The Virtue Mindset: “[A] settled disposition of the mind that determines our choice of actions and emotions…”

• Human Telos: Purpose in relation to human nature

• Human Virtues
  • Classical “Cardinal” virtues
    • Prudence, Justice, Temperance, Courage
  • Moderation distinguishes virtue from vice
  • Increases human flourishing
Vocational Virtue Theory

- Vocational (e.g. Scientific) Mindset
- Vocational Telos: Purpose in relation to nature of vocation
  - E.g. Goal of science: To discover empirical truths of nature.
- Vocational Virtues
  - Scientific, engineering, medical, etc.
    - Characteristic virtues of the vocation
- Vocational vice results from imbalance
- Increases vocational flourishing
  - E.g. Scientific flourishing
  - Component of human flourishing
The Scientific Character

From Philosophy of Science
to Philosophy of the Scientist
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What Possible Scientific Virtues?

• Philosophical theory & historical background

• Informal interviews

• Open ended questions

• Pilot survey narrowed list to 25 possible virtues

How important are the following traits as descriptive of the character of the exemplary scientist?

<table>
<thead>
<tr>
<th>Trait</th>
<th>Irrelevant</th>
<th>Essential</th>
<th>Not Sure</th>
<th>Term too vague</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attentiveness</td>
<td>0 1 2 3 4 5 6 7 8 9 10</td>
<td>NS</td>
<td>V</td>
<td></td>
</tr>
<tr>
<td>Cleanliness</td>
<td>0 1 2 3 4 5 6 7 8 9 10</td>
<td>NS</td>
<td>V</td>
<td></td>
</tr>
<tr>
<td>Communal</td>
<td>0 1 2 3 4 5 6 7 8 9 10</td>
<td>NS</td>
<td>V</td>
<td></td>
</tr>
<tr>
<td>Cooperative</td>
<td>0 1 2 3 4 5 6 7 8 9 10</td>
<td>NS</td>
<td>V</td>
<td></td>
</tr>
<tr>
<td>Creativity</td>
<td>0 1 2 3 4 5 6 7 8 9 10</td>
<td>NS</td>
<td>V</td>
<td></td>
</tr>
</tbody>
</table>
Endorsement of Scientific Virtues by Exemplary Scientists

<table>
<thead>
<tr>
<th>Scientific Virtues</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Honesty</td>
<td>9.5</td>
</tr>
<tr>
<td>Curiosity</td>
<td>9.2</td>
</tr>
<tr>
<td>Attentiveness or observant</td>
<td>8.7</td>
</tr>
<tr>
<td>Objectivity</td>
<td>8.5</td>
</tr>
<tr>
<td>Humility to evidence</td>
<td>8.5</td>
</tr>
<tr>
<td>Perseverance or patience</td>
<td>8.4</td>
</tr>
<tr>
<td>Skepticism</td>
<td>7.9</td>
</tr>
<tr>
<td>Meticulousness</td>
<td>7.5</td>
</tr>
<tr>
<td>Courage</td>
<td>7.1</td>
</tr>
<tr>
<td>Collaborative</td>
<td>6.4</td>
</tr>
</tbody>
</table>

N = 605

(Pennock & Miller – preliminary data analysis)
In judging whether to take on some prospective graduate student or post-doc, do you look primarily at their academic record or do you also try to judge what scientific character traits they have, positive or negative, in making your decision?

12% - Academic record
88% - Character traits

(Pennock & Miller – preliminary data analysis)
Do you think that exemplary scientific values and virtues – the kinds of traits on our list – can be learned?

94% - Yes

(Pennock & Miller – preliminary data analysis)
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Responsible Conduct of Research

Traditional vs. Virtue-based Approach
Appreciation of the Scientific Virtues can contribute to the development of RCR.
<table>
<thead>
<tr>
<th>QUESTION</th>
<th>Voluntary BEACON Workshops</th>
<th>Mandatory Course Curriculum</th>
</tr>
</thead>
<tbody>
<tr>
<td># of Participants</td>
<td>88</td>
<td>40 (31*)</td>
</tr>
<tr>
<td># of Survey Respondents</td>
<td>43</td>
<td>36 (30*)</td>
</tr>
<tr>
<td>Response Rate</td>
<td>48.9%</td>
<td>90.0% (96.8%*)</td>
</tr>
<tr>
<td><strong>I enjoyed the Workshop</strong></td>
<td>93.0% 4.7% 2.3%</td>
<td>83.3% 16.7% 0%</td>
</tr>
<tr>
<td><strong>effective conversation starters</strong></td>
<td>95.3% 2.3% 2.3%</td>
<td>94.4% 5.6% 0%</td>
</tr>
<tr>
<td><strong>an open exchange of ideas</strong></td>
<td>88.4% 9.3% 2.3%</td>
<td>86.1% 8.3% 0%</td>
</tr>
<tr>
<td><strong>help my prof. development</strong></td>
<td>65.1% 30.2% 4.7%</td>
<td>44.4% 38.9% 13.9%</td>
</tr>
<tr>
<td><strong>I have thought about the topics</strong></td>
<td>60.5% 25.6% 14.0%</td>
<td>63.3%* 13.3%* 23.3%*</td>
</tr>
<tr>
<td><strong>I have discussed the topics</strong></td>
<td>48.8% 27.9% 23.3%</td>
<td>50.0% 22.2% 27.8%</td>
</tr>
<tr>
<td><strong>a change in my views</strong></td>
<td>30.2% 27.9% 41.9%</td>
<td>26.7%* 33.3%* 40.0%*</td>
</tr>
</tbody>
</table>
Acknowledgments

- Jon Miller
- Michael O’Rourke
- Chet McLeskey
- Eric Berling
- Karen Meagher
- Tony Givhan
- Wendy Johnson
- Zachary Piso
- Ike Iyioke
- Anna Malvisi
- Lori Hale
- Brittany Tucker
Publications


Pennock RT (2002) "Research Funding and the Virtue of Scientific Objectivity" *Academic Integrity* V:2, 3-6.