

How Do Scientists and Engineers View Philosophy of Science and Engage with Philosophers of Science?

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1 Background

Several eminent scientists (e.g., Richard Dawkins, Richard Feynman, Stephen Hawking, Lawrence Krauss, and Neil deGrasse Tyson) have expressed demonstrably negative views toward philosophy of science over the years. Many philosophers of science seem to accept the premise that negative views toward philosophy of science are common within science, before defending its relevance to science. Indeed, in a 2016-2017 survey administered to about 300 philosophers of science, “lack of interest from scientists” was the most frequently perceived barrier to collaborating with scientists (Plaisance et al. 2021, *Synthese*, 198:4603-4633).

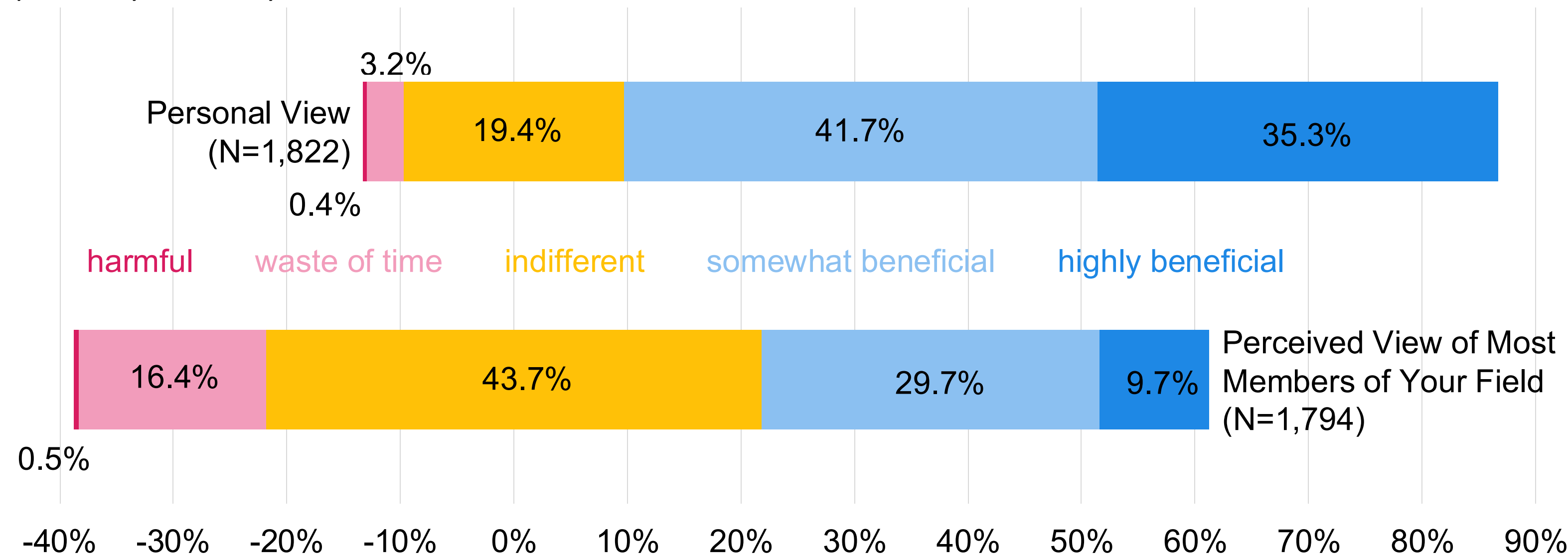
Given the benefits of increased engagement between philosophers and scientists/engineers, and because of the importance of understanding scientists’/engineers’ assessment of philosophy and philosophers of science, we contribute to the “empirical turn” in philosophy of science by investigating how the wider community of scientists and engineers *actually* views—and engages with—philosophy and philosophers of science.

Major Research Questions

- How do scientists and engineers assess the overall influence of philosophy of science on their own academic field? Further, how do scientists and engineers think most peers in their academic field assess this influence?
- How interested are scientists and engineers in research collaborations with philosophers of science? Further, how do scientists and engineers think most peers in their academic field perceive such research collaborations?
- What are the barriers stopping interested scientists and engineers from collaborating with philosophers of science on research?
- What kinds of actions do scientists and engineers support to promote engagement with philosophers of science in their departments and institutions?

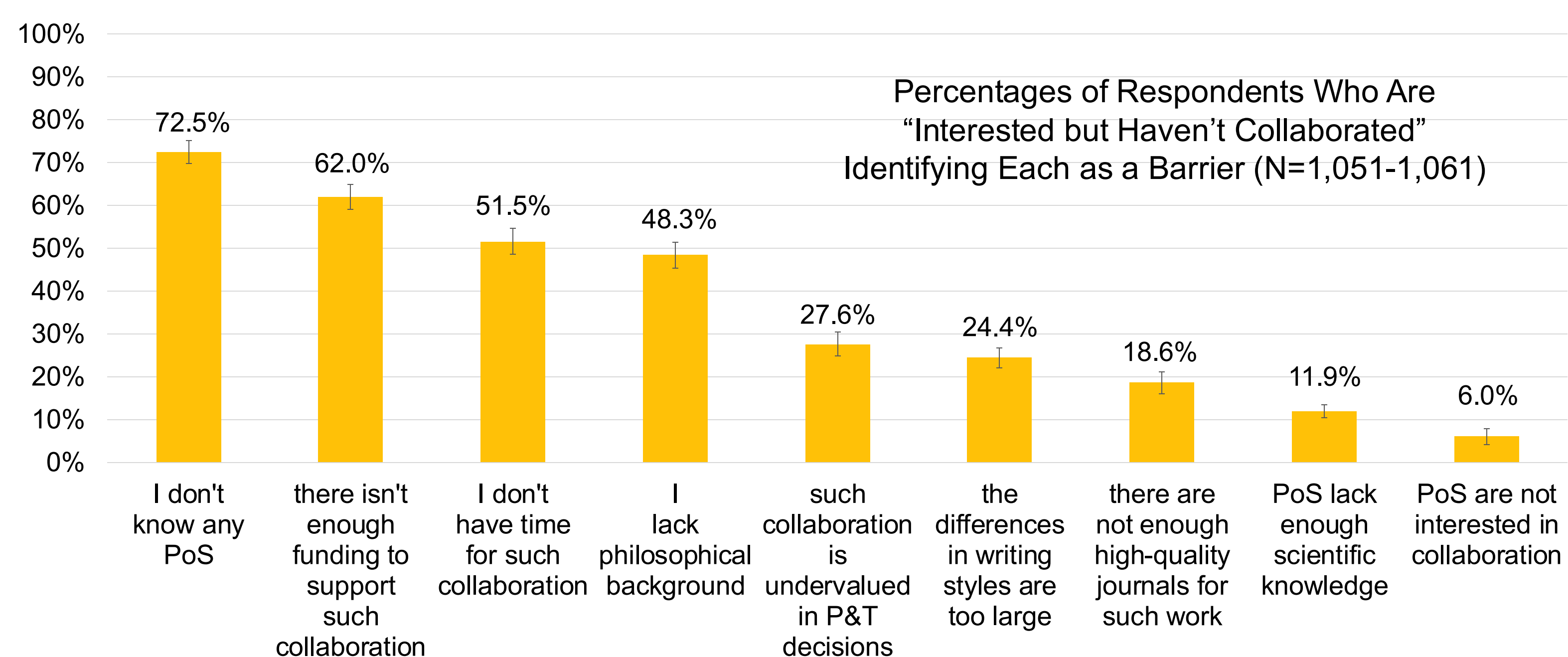
3 Personal Sentiment and Perceived Field Sentiment

Most scientists and engineers (76.0%) viewed philosophy of science as having a positive influence on their field (“somewhat beneficial” or “highly beneficial”), while only 3.6% characterized this influence negatively (as “a waste of time” or “harmful”). Respondents thought most other scholars in their field characterize this influence less positively than they do.



5 Barriers to Research Collaboration

Of those interested in collaborating, the most common barrier was not knowing any philosophers of science (72.5%). Respondents were more likely to cite their own lack of philosophical knowledge as a barrier (48.3%) compared with philosophers’ lack of scientific knowledge (6.0%) as a barrier to research collaboration.



7 Summary and Conclusions

Overall, our results are at odds with common perceptions of scientists’ views toward and interest in engaging with philosophers of science.

- The majority of scientists and engineers assessed that philosophy of science is beneficial to their field (76.0%).
- Respondents perceived their peers’ assessment of philosophy of science to be less positive than their own, yet even those perceptions were mostly neutral (43.7%) or positive (39.4%).
- Most respondents expressed an interest in collaborating with philosophers of science (69.4%), which is in tension with philosophers’ perceptions that scientists are not interested in collaborating with them.
- Not knowing any philosophers of science was more frequently cited as a barrier to collaboration than were institutional or disciplinary barriers, or barriers arising from philosophers themselves (e.g., lack of scientific knowledge).
- Respondents supported several potential actions for facilitating engagement between philosophy and STEM.

Ideas for Future Research

- Investigate *why* so many scientists and engineers are interested in collaborating with philosophers of science. What are their motivations and expected benefits?
- Develop interventions to reduce barriers to philosopher-STEM collaborations and examine their effectiveness. (Our future research will include a toolkit to foster such collaborations.)
- Explore similar research questions among scientists and engineers working in industry or government and/or in other countries. (Please contact us if you would like to discuss such a project!)

2 Methodology

Sample

- 3-stage probability-based sampling design in Canada and USA:
 - 54 institutions → 782 departments → 20,664 tenure-system science and engineering faculty
- sampling frame matches target population tenure-system science and engineering faculty at major research universities in Canada and USA
- 1,557 fully and 526 partially completed surveys for an AAPOR Response Rate #2 of 9.8%

Survey

- constructed using Tailored Design Method principles; informed by insights from prior survey and qualitative interview data; and refined via feedback from cognitive interviews
- administered online via Qualtrics between July 17 and October 12, 2023 through 4 contacts with potential respondents (1 invitation email and 3 reminders)
- median completion time of 13.95 minutes

Data

- data management, coding, and analyses performed with IBM SPSS 29.0
- novel instruments to measure views about philosophy of science and engagement with philosophers of science
- principal components analysis and reliability analysis will guide creation of composite scales
- whisker bars in column charts below represent an item's 95% confidence interval

4 Personal Interest in and Experience with Collaboration

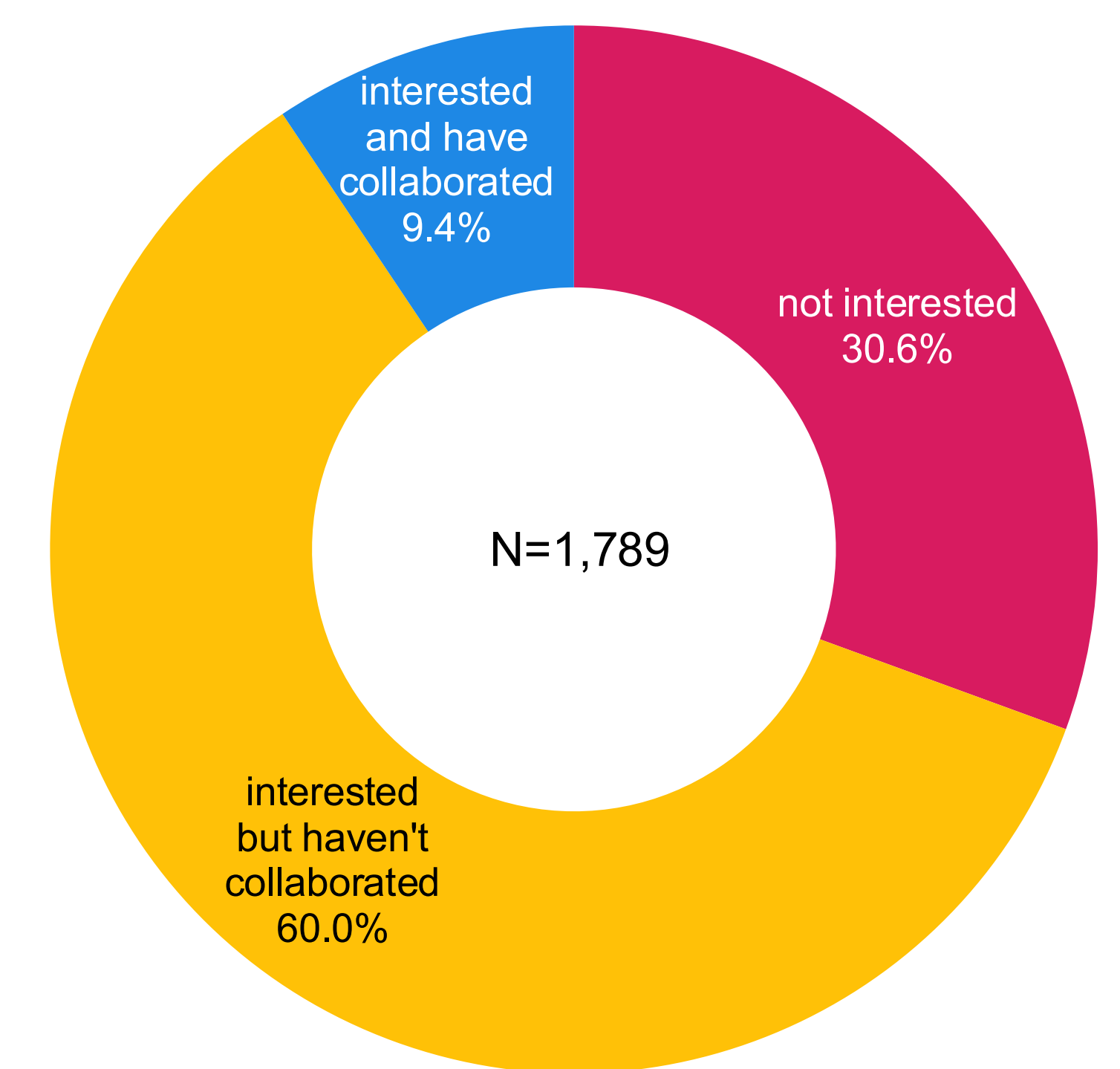
Almost 70% of scientists and engineers reported an interest in research collaborations with philosophers of science

The survey defined research collaboration as:

- “working together on scholarly activities, such as
 - securing grant funding,
 - collecting and analyzing data, and
 - publishing manuscripts.”

Such surprisingly high levels of interest in collaborating with philosophers of science suggests that many scientists and engineers are more enthusiastic about philosophy of science than is commonly assumed.

Scientists’ and engineers’ high levels of personal interest echo their higher-than-expected levels of positive sentiment towards philosophy of science.



6 Support for Actions to Facilitate Engagement

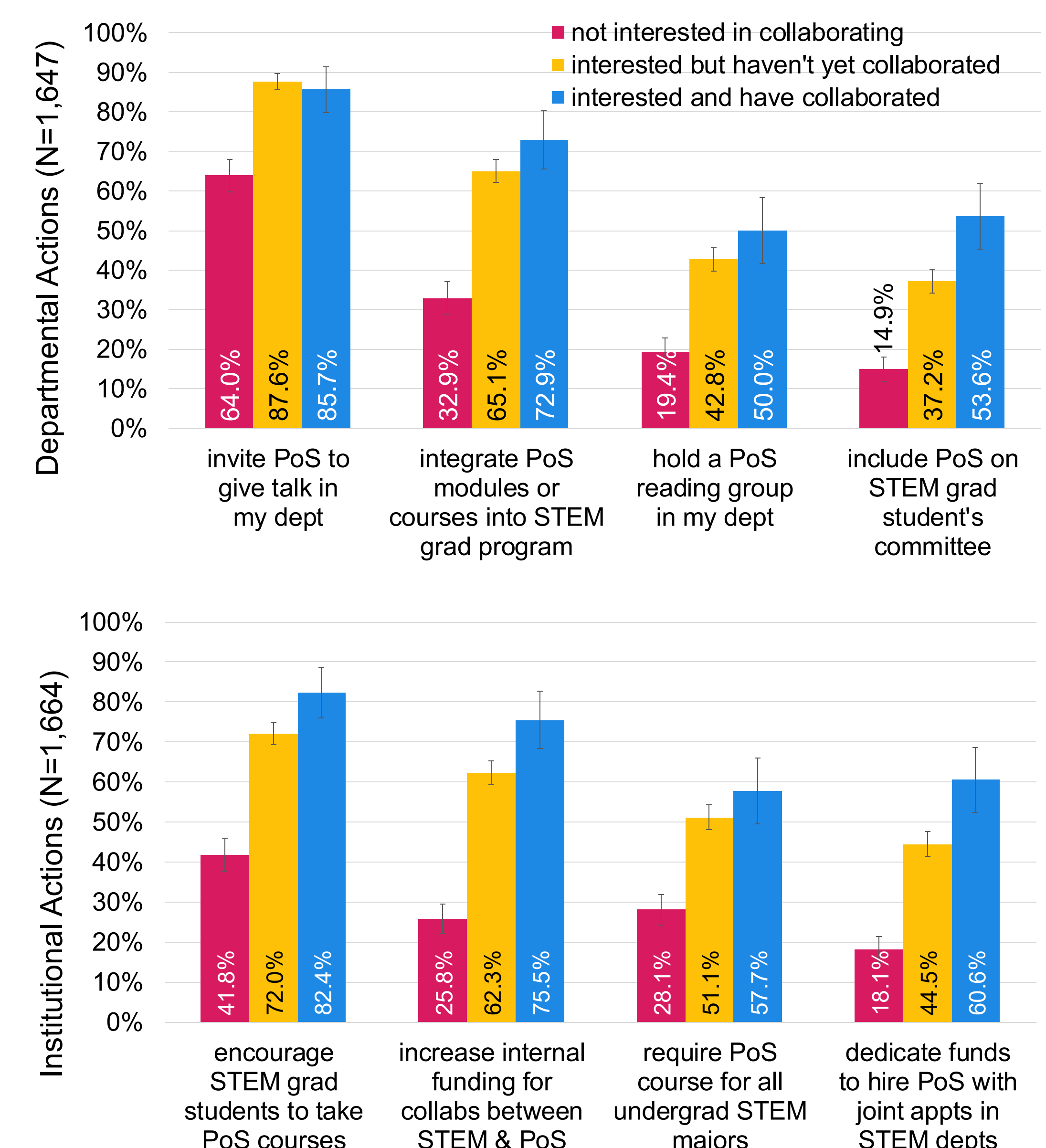
Scientists and engineers largely supported potential actions in their department (top figure) and in their home institution (bottom figure) to facilitate engagement between philosophy of science and their own academic field.

For each potential action, respondents interested in collaborating with a philosopher of science reported greater support than did those who were not interested.

highest level of support: invite a philosopher of science to give a talk in my department (80.0% support overall)

lowest level of support: include a philosopher of science on a STEM grad student’s committee (31.6% support overall).

In general, lower-stakes actions tended to have more widespread support than did higher-stakes actions.



8 Acknowledgements

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