

**Evaluation of the  
Mathematical Sciences Research Institute's  
Postdoctoral Fellowship Program  
2009-2016**

**Mathematical Sciences Research Institute**  
**Postdoctoral Fellowship Program Report, 2009-2016**

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# Executive Summary

Postdoctoral training has been at the center of the Mathematical Sciences Research Institute's activities from the beginning. Each year, MSRI invites 35-40 postdoctoral researchers (who are typically 0-5 years beyond their Ph.D.) to participate in its scientific programs. MSRI works closely with the program organizers to ensure that talented women and minority applicants are not overlooked during the selection process. These postdoctoral fellowships are highly prized: even though the applicants are self-selected by field, there are about 10 times as many applicants as positions available and nearly all of those to whom MSRI offers a fellowship actually attend the program.

The goals of the program are:

- Allow early career mathematicians to expand and develop their research programs and encourage collaboration with their peers and more senior researchers.
- Introduce them to the top researchers in their fields and allow them to integrate into that cohort of researchers.
- Provide mentorship by the leaders in these areas to develop fellows' professional and research skills, enabling them to become future leaders as well.

**Goals.** The goal of this evaluation is to quantify the impact of the MSRI postdoctoral fellowship program on its participants during the years 2009-16 and to examine how they have contributed to the mathematical community at large. In particular, the evaluation describes:

- the population of fellows with regard to gender, race, ethnicity, Ph.D. institution, and years since Ph.D.;
- post-fellowship outcomes such as whether fellows now hold academic or non-academic positions, tenure status, whether or not they currently engage in research activities, research output, grants, invited talks, awards and honors;
- perception of the impact of the fellowship on fellows' research, including how it contributed to new research directions, new collaborations, and expansion of knowledge and skills;
- the quality and usefulness of the mentoring during the fellowship;
- how these data compare both with the population of U.S. postdoctoral researchers during the years 2009-16 and with the previous MSRI fellowship cohorts from the years 2004-09.

**Design.** Data collected during the fellows' residences at MSRI (such as affiliation prior to being a fellow, etc.) was tabulated. In addition, Deputy Director H el ene Barcelo designed a survey in collaboration with independent consultant Amelia Taylor and MSRI staff member Alaina Drake-Moore, which asked about the current occupation of the fellows, the impact of the fellowship on fellows' careers, mentoring success, and research outcomes based on the work fellows conducted at MSRI. This survey was modeled after the one administered during a similar study conducted by MSRI for the years 2004-09. In turn, this earlier survey was constructed based on several examples of postdoctoral evaluations found in the literature.

The most difficult issue in evaluating impact is data on the counterfactual; that is, determining what would have happened to postdoctoral fellows had they not received the award. The best possible approach to this is to find appropriate comparison groups and obtain data on them. Given the inherent

difficulty in both determining who such a group is and finding data on them, it was only feasible (and only in certain cases) to compare data on MSRI fellows with data on the general population of cohort U.S. Ph.D.'s. Such data were obtained from the Annual Surveys of the Mathematical Sciences published by the AMS.

## Overall Conclusions

- Ph.D. Institution: Of the 204 postdoctoral fellows hosted at MSRI from 2009-16, 64.7% received their Ph.D. at a U.S. institution.
- Gender: Of MSRI's U.S. based fellows from 2009-16, 26.8% identified as women. In contrast, women held only 20.5% of non-tenured postdoctoral positions at U.S. institutions granting a Ph.D. in mathematics from 2009-16.
- Race and Ethnicity: Among MSRI's US/PR<sup>1</sup> fellows from 2009-16, 62.7% were White, 9% were Asian, 9% were Hispanic, 7.5% were Black, and 1.5% were Pacific Islander. This compares to the population of new US/PR Ph.D. recipients in the U.S.<sup>2</sup> where 79.4% were White, 8.1% were Asian, 4.3% were Hispanic, 3% were Black, and 0.5% were Pacific Islander.
- Quality of the Program: Among fellows from the years 2009-16, 89.9% of respondents rated their experience in the fellowship program as "excellent" (63.3%) or "very good" (26.6%), compared to only 83.7% of respondents from the 2004-09 cohorts, 54.1% of whom responded "excellent" and 29.6% of whom responded "very good."
- Quality of Mentoring: Among fellows from the years 2009-16, 69.8% of respondents rated the overall quality of mentoring they received as "excellent" or "very good," compared to only 60.2% of respondents from the 2004-09 cohorts.
- Impact on Career: When asked to what extent the fellowship helped them secure a new or better position, 66.2% of the respondents from the 2009-16 period answered either "significantly" or "a great deal" while only 56.1% of the respondents from the 2004-09 period answered in the same manner. Among fellows from the years 2009-16, 94.2% of respondents report still working in the mathematical sciences, compared to only 87.8% of respondents from the 2004-09 cohorts. Further, 87.8% of 2009-16 respondents report continuing in the same field of research they were pursuing at MSRI, compared to only 59.2% of 2004-09 respondents.
- Research: From the survey, we learn that 49% of respondents have submitted a research grant proposal of some kind and 58% of those who submitted a proposal were successful in obtaining funding. The average dollar amount received was \$136,000. Further, MSRI's postdoctoral fellows obtained on average 11 new professional contacts resulting from their fellowship and produced an average of 2.5 papers and 6.8 presentations resulting directly from research conducted at MSRI. The average number of total peer reviewed publications per postdoctoral fellow is 7.3.

<sup>1</sup> We use US/PR to abbreviate the phrase "US citizen and permanent resident"

<sup>2</sup> Race/ethnicity data was not available for non-tenured postdoctoral fellows so the same comparison done for women could not be made for race/ethnicity.

### **Recommendations for improving the fellowship program.**

- Recommendation 1: Continue and expand efforts to recruit applications from well-qualified women and underrepresented minority populations.
- Recommendation 2: Refine and develop methods to ensure that postdoctoral fellows are integrated into the MSRI programs and receive excellent mentoring. In particular, offer more training in grant proposal preparation and skills for effective collaboration, improve attention to compatibility between mentor and mentee research areas and ensure that the mentor/mentee interactions are of greater benefit to the mentee.
- Recommendation 3: Increase the percentage of US Citizens/Permanent Residents who are fellows. The further success of efforts along the lines of Recommendation 1 will aid in this.

### **Recommendations for future evaluations.**

- Recommendation 4: Work with the AMS and NSF to develop better data on URM researchers in mathematics.
- Recommendation 5: Identify a comparison population, perhaps those candidates who were on a waiting list for acceptance into the MSRI postdoctoral program, and collect data from this population. Both recommendations 4 and 5 are aimed to better reflect the counterfactual for assessing the effectiveness of the programs.
- Recommendation 6: Ask additional questions of fellows who left academia and no longer engage in research activities in order to gain insight into the reasons for their decisions.
- Recommendation 7: Communicate with fellows at more frequent intervals after their completion of the program in order to measure the long-term impact of the fellowship on their careers.

# Evaluating MSRI's Postdoctoral Fellowship Program

*A Survey of 2009 – 2016 Postdoctoral Fellows including some comparison to a report on the 2004-2009 Fellows*

## Introduction

### Background

The Mathematical Sciences Research Institute (MSRI)'s Postdoctoral Fellows are associated with MSRI's scientific programs, which last for one or two semesters. These fellowships are intended for recent recipients of a Ph.D. in mathematics (typically within five years of the program) and are carefully structured to incorporate supervision by and collaboration with a research mentor. In addition to their assigned research mentor, at MSRI the fellows have the opportunity to interact with a broad swath of the mathematics community, from other postdocs to some of the foremost researchers in their field, allowing them to grow their professional network and fostering collaborations that could continue throughout their careers. Fellows are expected to be in residence at MSRI for the duration of the program and spend their time on research activities including writing papers, preparing grant proposals, and giving presentations at MSRI and other U.S. universities, as well as at national conferences.

Since Fall 2004, MSRI has granted 349 postdoctoral fellowship awards associated with its scientific programs. Additionally, through a supplement to its core grant, from 2009 until 2011 MSRI supported a small number of external postdoctoral fellows spending one or two years at a host institution outside MSRI; five such postdoctoral fellows were supported in both 2009-10 and 2010-11 and five more were supported in 2010-11 only. This report addresses only the postdoctoral fellows associated with MSRI's scientific programs and does not assess the impact of the external postdoctoral fellowships during those two years.

The MSRI directorate is dedicated to evaluating the impact of its postdoctoral fellowship programs and to improving these programs where possible. To this end, MSRI conducted a survey of fellows during the five program years from Fall 2004 to Spring 2009 and compiled a report on that survey, including related demographic data available from program records. That report was completed in the Fall of 2009 and presented to the NSF. A copy of that report is included as Appendix B.

MSRI recently conducted a similar survey of fellows who received their awards during the seven program years from Fall 2009 to Spring 2016. The findings are summarized in the present report, which is written in two parts. The first part is an analysis of the recent survey results and related demographic data in a format very similar to the previous report. The second part is a comparative analysis of the two survey cohorts with some additional comparison to data available from the Annual Surveys of the Mathematical Sciences published by the American Mathematical Society (AMS) [1-14].

A glossary of frequently used terms is included as Appendix G to this report and a list of programs is included as Appendix H.

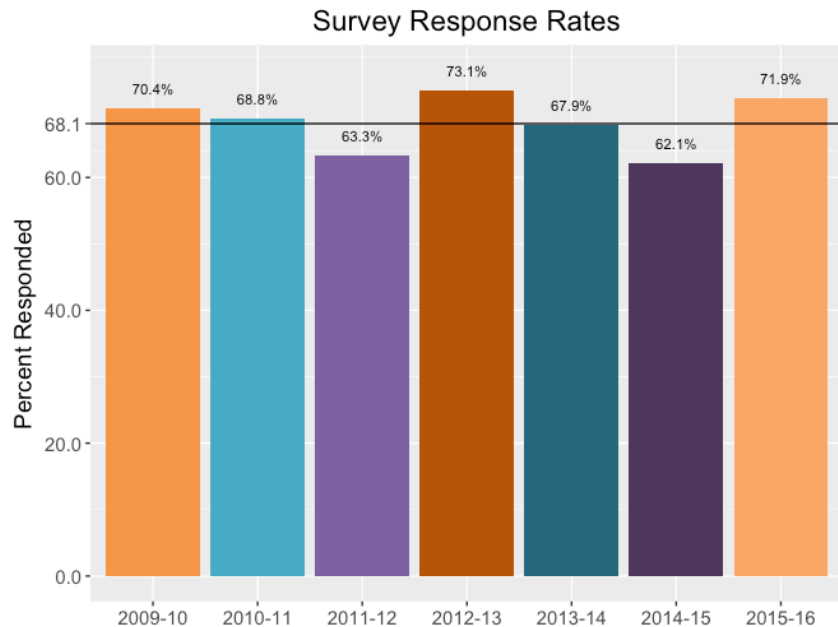
## **Methods**

MSRI's Deputy Director Hélène Barcelo designed a survey in collaboration with independent consultant Amelia Taylor and MSRI staff member Alaina Drake-Moore, which asked about the current occupation of the fellows, the impact of the fellowship on fellows' careers, mentoring success, and research outcomes based on the work fellows conducted at MSRI. These questions were formulated for multiple choice or numeric responses. The full survey can be found in Appendix A to this report. Four scaled-answer questions and two open-ended questions allowed respondents to offer general feedback on the program and a variety of short answer questions solicited specific information about their current professional status depending on previous multiple-choice selections. This survey was modeled after the one administered during a similar study conducted by MSRI for the years 2004-09. In turn, this earlier survey was constructed based on several examples of postdoctoral evaluations found in the literature.

We implemented this survey as an anonymous online survey through Survey Monkey. All 204 postdoctoral fellows from academic years 2009-10 through 2015-16 were contacted by email and asked to complete the survey. We included some new questions and attempted to correct for ambiguities that existed in the previous study, but unfortunately also introduced new ones. These differences and ambiguities are explicitly stated in the report. To preserve anonymity and to encourage responses by keeping the survey short, demographic data was not collected as part of the survey. That data comes from information gathered from fellows before and after starting the fellowship. Thus, demographic analysis includes all 204 fellows and other analysis includes only the respondents. We are explicit about this in the report.

The survey was open for just over two months. During that time, three reminder emails were sent with the final reminder being issued seven days before closing the survey. Of the 204 fellows surveyed, 139 submitted responses for an overall response rate of 68.1%. The response rate is fairly consistent across the cohorts, with the lowest (62.1%) for the 2014-15 cohort and highest (73.1%) for the 2012-13 cohort (Figure 1).

**FIGURE 1**



The most difficult issue in evaluating impact is data on the counterfactual; that is, determining what would have happened to MSRI’s postdoctoral fellows had they not received the award. The best possible approach to this is to find appropriate comparison groups and obtain data on them. Given the inherent difficulty in both determining who such a group is and finding data on them, it was only feasible (and only in certain cases) to compare data on MSRI fellows with data on the general population of cohort U.S. Ph.D.’s. Such data were obtained from the Annual Surveys of the Mathematical Sciences published by the AMS [1-14]. Comparisons with previous cohorts of MSRI postdoctoral fellows, as well as with other appropriate comparison groups, are in Part 2 of this report.

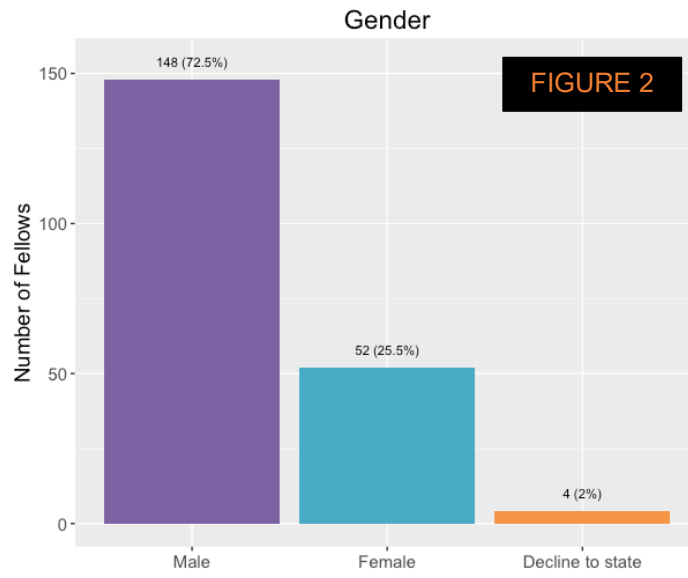
## Part 1: Findings

### I. Description of the Population of Fellows

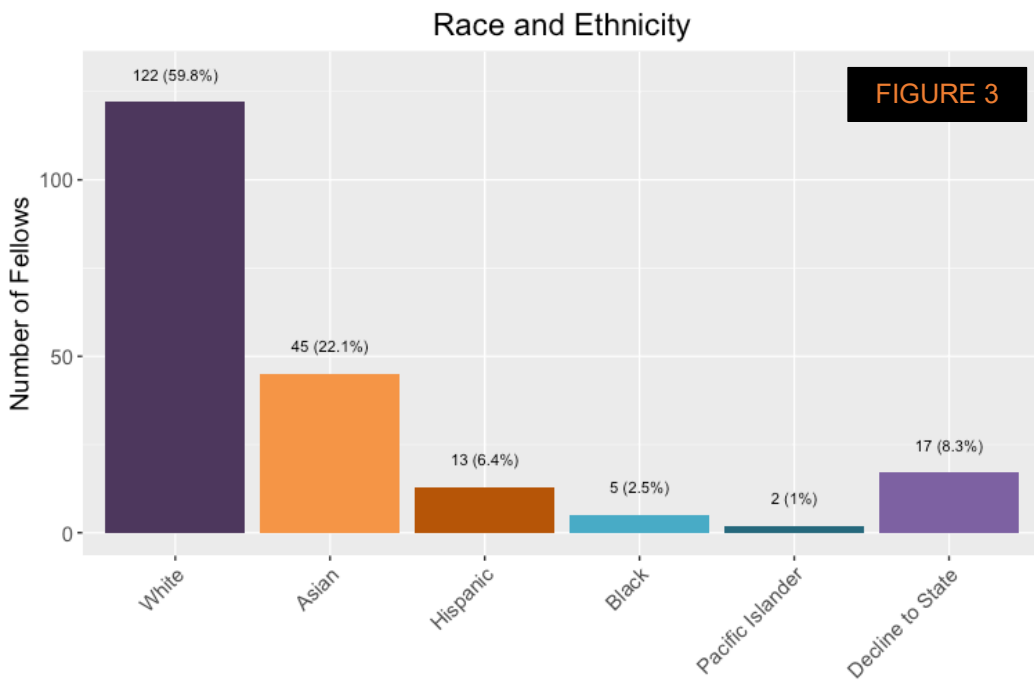
During the period covered by this survey, Fall 2009 through Spring 2016, MSRI granted 204 postdoctoral fellowship awards with cohorts ranging from 26 fellows in 2012-13 to 32 fellows in 2010-11 and in 2015-16. The Institute collected demographic data on these fellows from their fellowship applications, a check-in form that all fellows complete upon arrival, and a check-out form they complete upon departure.

Here we detail the **demographic data** of the various cohorts. Of the present 204 fellows, 52 (25.5%) were women (Figure 2). Further, 122 (59.8%) identified themselves as White, 20 (9.9%) identified themselves as members of non-Asian minority groups, and 17 fellows (8.3%) explicitly declined to specify their race or ethnicity (Figure 3). Of the 67 fellows who are U.S. Citizens or Permanent Residents (US/PR), 11 (16.4%) are from underrepresented minority groups (URM), defined by the NSF as U.S. citizens and Permanent Residents who are Black, Hispanic/Latino, Native American, or Pacific Islander (Figure 4).

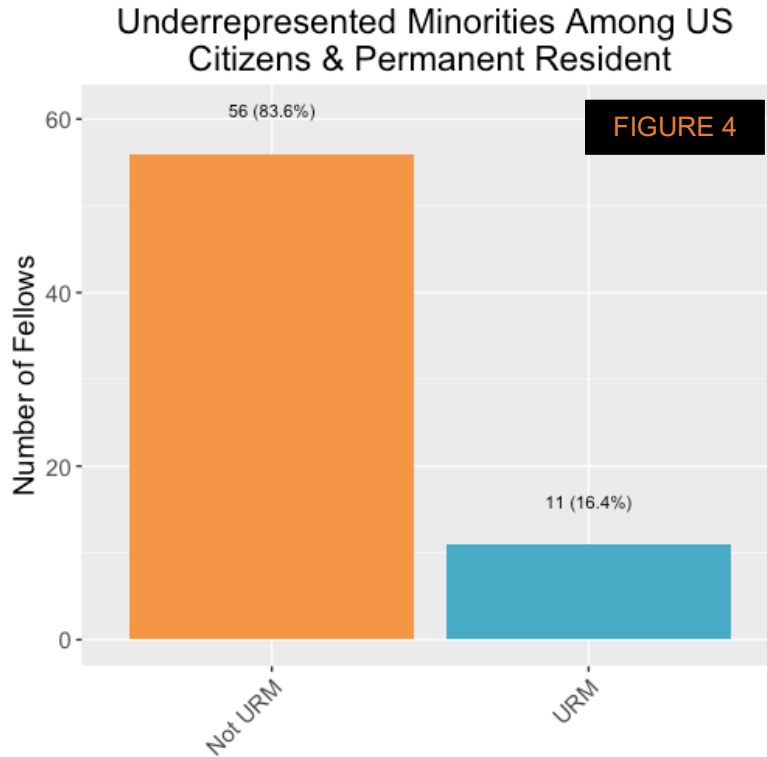




**FIGURE 2**

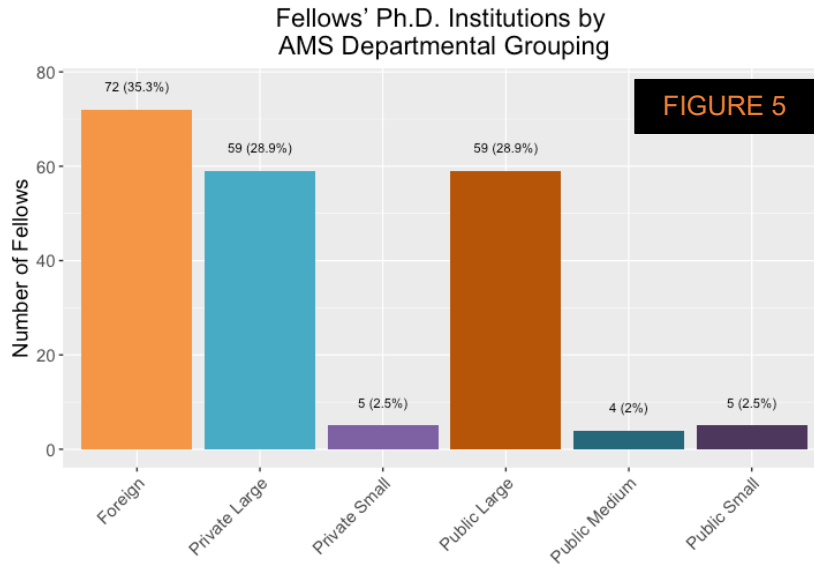


**FIGURE 3**

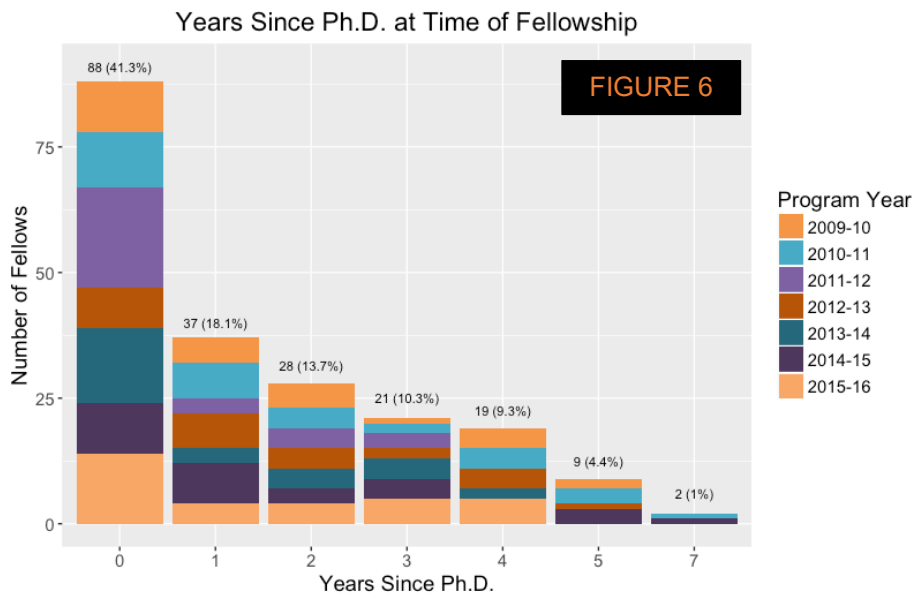


Later, we compare the fellow’s prior institution to their employment institution at the time of the survey. Here we look only at the **institutions where fellows received their Ph.D.** as classified by the current AMS departmental groupings [17]. The AMS first groups institutions by those that are public and those that are private, then subdivides those groups based on the size of their doctoral programs. Institutions with no doctoral program in mathematics are grouped by their highest degree offered; Master’s degree (Group M) or Bachelor’s degree (Group B). See the glossary of terms in Appendix G for more information.

We observe that 118 (57.8%) fellows earned their Ph.D. from a Large Public or Large Private institution and 72 (35.3%) earned their Ph.D. at a foreign institution (Figure 5).



Of the fellows, 41.3% came to MSRI directly from graduate school and, on average, fellows began their fellowships 1.4 years after receiving their Ph.D. (Figure 6).



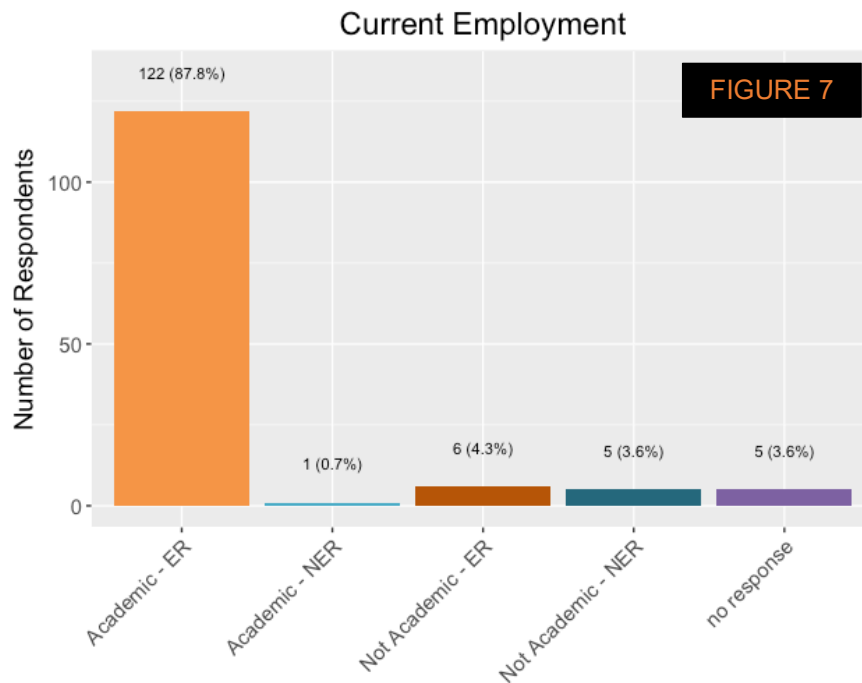
## II. Current Occupation of Respondents

The previous survey had two questions addressing the current occupation of the fellows, with the goal of determining to what extent fellows tend to persist in mathematical research and in academics in general. In this most recent survey, we used a series of questions with different paths depending on initial answers to try to get a more fine-grained picture of the career paths of fellows. These changes were made based on responses from the previous survey and a desire to further explore the impact of the program.

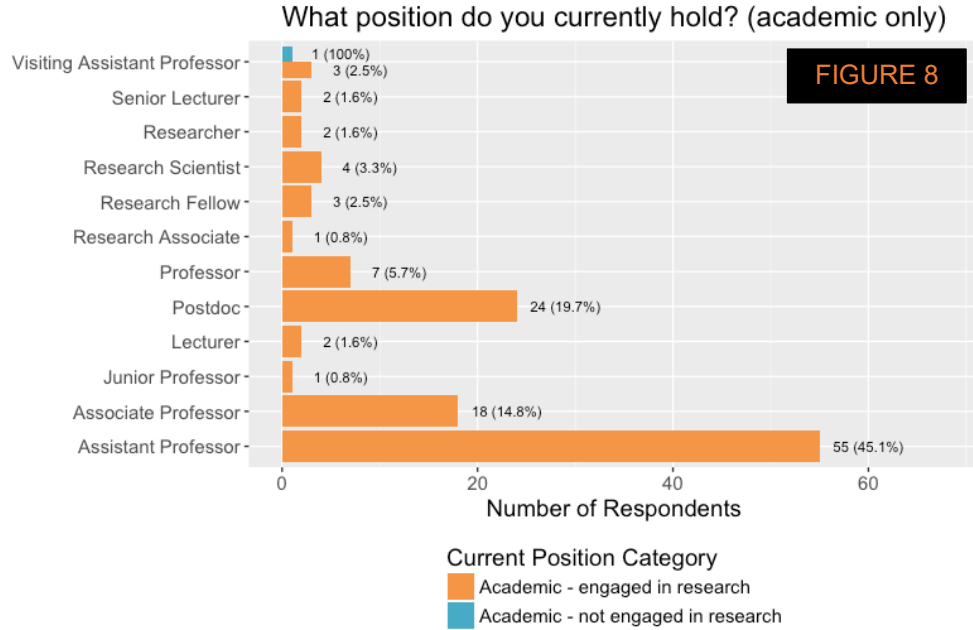
At the top level we asked respondents to identify **whether they are currently employed in academia, government, or neither and whether or not they engage in research activities in**

their current position. None of the respondents classified their current employment as being in government; thus, in Figure 7 we have shortened “non-government, non-academic” to “not academic” to facilitate the plot. We have also abbreviated “engaged in research” as “ER” and “not engaged in research” as “NER” for the same reason.

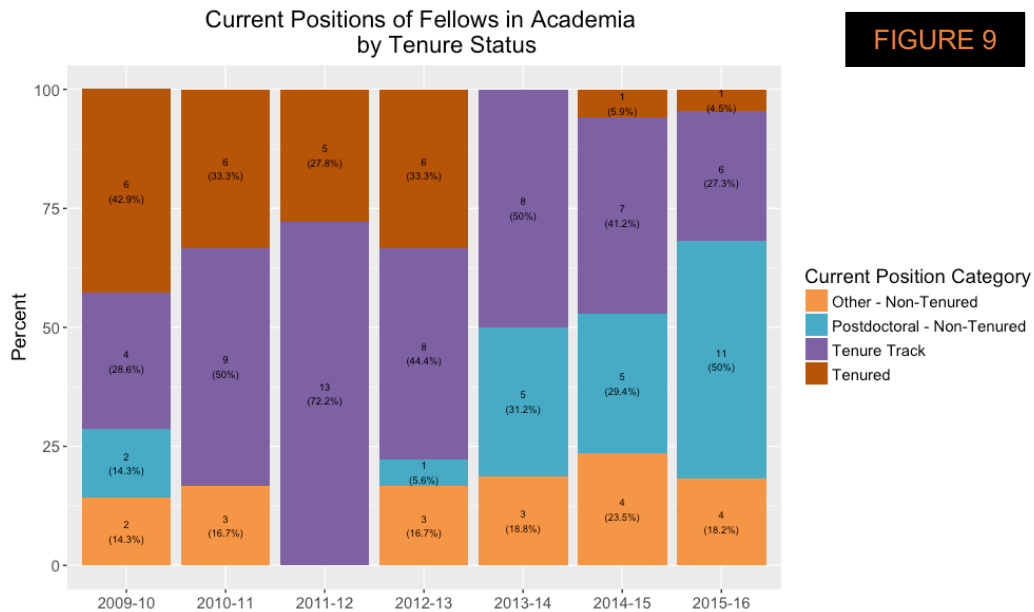
Of the 139 respondents, 88.5% are still in academia while 7.9% are in jobs they classified as neither governmental nor academic and 3.6% did not answer this question (Figure 7). 92.1% of respondents from all employment categories engage in research activities in their current positions, while 4.3% do not and 3.6% did not answer this question (Figure 7).



We used the question, “**What position do you currently hold? (E.g. Instructor, Postdoc, Assistant Professor, Research Scientist, Consultant, Software Engineer, etc.)**” to get a picture of the jobs fellows obtain both in academia and for those who shifted away from academic jobs. This was a free form question and we did some cleaning of the data to reach the categories in Figure 8 (e.g. “Full Professor” was changed to “Professor”). Of those reporting being in academia, just under half report being in assistant professor positions (Figure 8).



The previous report included a graphic of respondents who report currently holding **tenured or tenure-track positions** by cohort. However, this survey did not formally ask about tenure status. We used the position titles above along with knowledge of mathematics departments around the world to infer tenure status and acknowledge that we should ask this question explicitly in the future. We break the positions out by cohort as this illustrates that, as expected, the number of respondents in the inferred non-tenure positions generally decreases and those in tenure-track and tenured positions generally increase as the cohorts age (Figure 9).



The 11 fellows who are currently in non-academic jobs occupy a wide range of positions, from software engineer, to CEO, to trader. Since this is such a comparatively small group, we leave details on this group to Part 2, Section II.

Another snapshot of the participants in the postdoctoral program is given by **comparing the type of fellows' Ph.D.-granting institutions with that of their current home institution** (Table 1).

**Table 1: AMS Grouping of Ph.D.-Granting Institution vs. Current Institution**

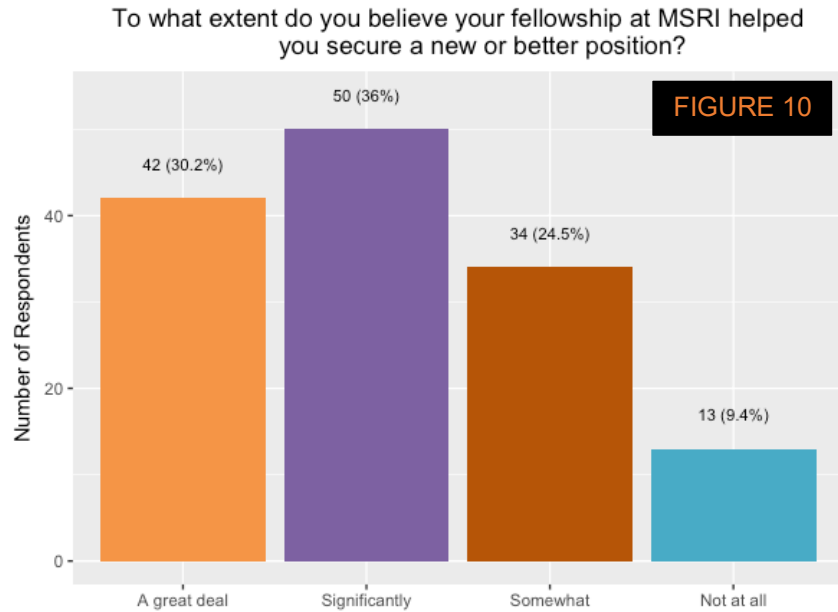
Current Position	Ph.D. Granting Institution						Totals
	Public Large	Public Medium	Public Small	Private Large	Private Small	Foreign	
Public Large	11	0	0	15	2	9	37
Public Medium	3	0	1	5	1	3	13
Public Small	4	1	0	1	0	0	6
Private Large	8	1	0	14	0	4	27
Private Small	6	1	0	3	0	1	11
Group M	2	0	1	0	1	1	5
Group B	0	0	0	1	0	0	1
Foreign	15	0	3	11	1	50	80
Non-group	1	0	0	1	0	0	2
Gov't or Nonprofit	2	1	0	0	0	0	3
Industry	3	1	0	5	0	2	10
Unknown	4	0	0	3	0	2	9
Totals	59	4	5	59	5	72	204

Table 1 comes from demographic data collected by MSRI and so has all 204 fellows in it. We see that 63 of 204 (30.9%) fellows are currently employed at a Large Public or Private institution and of those fellows, 48 also received their Ph.D. from such an institution. Eighty of 204 (39.2%) fellows are currently employed at a foreign institution, with 50 of those fellows also receiving their Ph.D. from a foreign school.

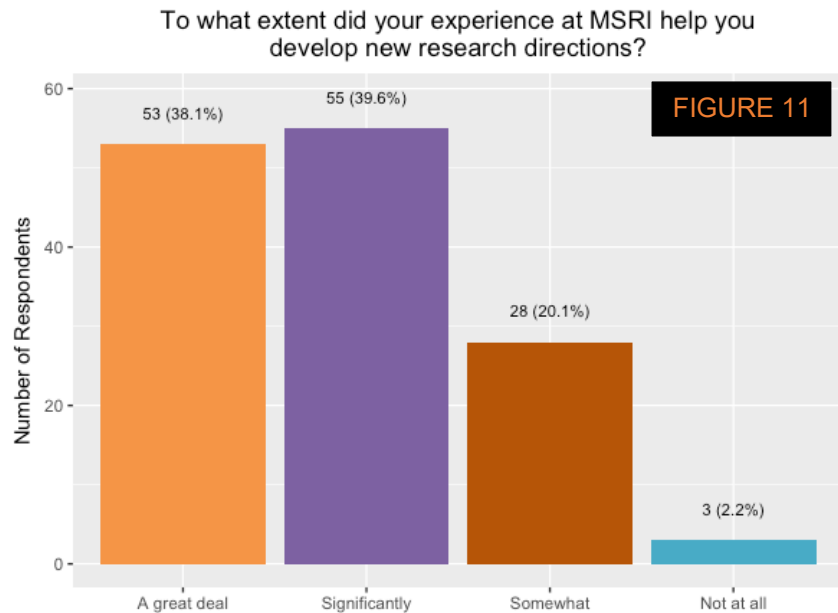
In the next sections, we take an in-depth look at the success of the mentoring aspects of the program, as well as the overall impact of the MSRI fellowship on fellows' careers. We then examine the outcomes from research conducted by the fellows while at MSRI and subsequent research produced throughout their careers.

### III. Impact of Fellowship Awards on Fellows' Careers

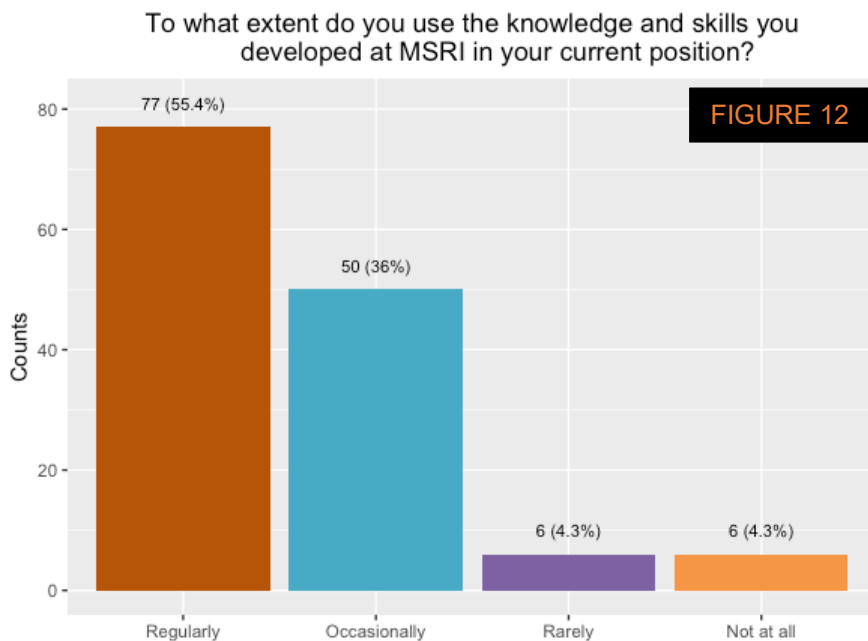
Three survey questions solicited subjective evaluations of the impact the fellowship had on respondents' subsequent careers. When asked **to what extent their fellowship helped them secure a new or better position**, 66.2% of respondents answered either “significantly” or “a great deal” (Figure 10).



To assess **the degree to which the postdoctoral experience aided in the development of new research**, fellows were asked to what extent their experience at MSRI helped them develop new research directions; 77.7% of respondents answered either “significantly” or “a great deal” (Figure 11).



In order to gauge the effect of the postdoctoral fellowship on fellows’ research capability, the survey asked about **the extent to which fellows use knowledge and skills obtained during their fellowship in their current position**. We observe that 55.4% of respondents answered “regularly” and another 36% answered “occasionally,” with only 8.6% answering “rarely” or “not at all” (Figure 12).



#### **IV. Research Outcomes**

The survey solicited data on standard measures of research productivity such as the fellows’ **number of publications, the number of presentations given, and the amount of funding obtained**. For some of the results that follow (Tables 2-5), fellows were asked to limit their responses to outcomes based at least partly on work done during their time at MSRI. We further asked questions about total papers, funding obtained since the fellowship, and if they applied for any patents (Tables 6-8).

In each table (Tables 2-8), we provide the data by cohort. As we might expect, older cohorts typically have higher numbers, particularly for papers (Tables 2, 7) and presentations (Table 3).

We generally expect all postdocs to have papers and presentations that result from their work at MSRI, so we investigated respondents who indicated they had zero papers or zero presentations (Tables 2, 3). Further, the median number of papers resulting from work done at MSRI was one to three across all cohorts, so we looked at respondents with more than five papers (Table 2). The median number of presentations resulting from work done at MSRI was three to seven for the current report and the high for the previous report was 15, so we looked at respondents with more than 15 presentations as well (Table 3). We also investigate other extremes, like fellows who obtained \$500,000 or more in total funding (Table 6). These analyses can be found in Part 2, Section IV.



**Table 2: Estimate the number of papers you have published which resulted from your work at MSRI.**

Program Year	Published papers MSRI Work	Number of Respondents	Mean per Respondent	Median per Respondent	Range per Respondent
2009-2010	56	18	3.111	2.500	1-10
2010-2011	58	20	2.900	2.500	1-6
2011-2012	46	19	2.421	2.000	0-10
2012-2013	65	18	3.611	3.000	1-8
2013-2014	36	18	2.000	2.000	0-5
2014-2015	26	17	1.529	1.000	0-3
2015-2016	41	23	1.783	2.000	0-5

**Table 3: Estimate the number of presentations you have given based on your work at MSRI.**

Program Year	Total Number of Presentations	Number of Respondents	Mean per Respondent	Median per Respondent	Range per Respondent
2009-2010	181	18	10.056	6.500	1-50
2010-2011	98	20	4.900	5.000	0-10
2011-2012	129	19	6.789	4.000	0-30
2012-2013	136	18	7.556	8.000	1-15
2013-2014	130	18	7.222	7.000	0-20
2014-2015	110	17	6.471	6.000	0-15
2015-2016	121	23	5.261	3.000	0-20

**Table 4: Estimate the number of new coauthors you have gained as a result of your experiences at MSRI.**

Program Year	Total Number of New Co-authors	Number of Respondents	Mean per Respondent	Median per Respondent	Range per Respondent
2009-2010	29	18	1.611	1.500	0-5
2010-2011	33	20	1.650	1.000	0-5
2011-2012	34	19	1.789	1.000	0-10
2012-2013	44	18	2.444	2.000	0-8
2013-2014	33	18	1.833	2.000	0-5
2014-2015	22	17	1.294	1.000	0-5
2015-2016	33	23	1.435	1.000	0-5

Table 5: Estimate the number of professional contacts you have gained as a result of your experience at MSRI.

Program Year	New Professional Contacts	Number of Respondents	Mean per Respondent	Median per Respondent	Range per Respondent
2009-2010	197	18	10.944	10.000	3-50
2010-2011	180	20	9.000	6.500	0-30
2011-2012	168	19	8.842	7.000	1-50
2012-2013	265	18	14.722	12.500	3-40
2013-2014	174	18	9.667	8.000	0-40
2014-2015	276	17	16.235	10.000	1-100
2015-2016	201	23	8.739	6.000	0-50

When looking at **funding obtained** (Table 6), nine fellows reported successful grant proposals but that these grants received \$0 in funding and one fellow reported only \$1 in funding. In Table 6, these fellows are included in the grant quantity columns (Grant Proposals Submitted, Grant Proposals Funded, Number of Individuals Funded) but are excluded from the funding amount columns (Total Funds, Median per Funded Individual, Range per Funded Individual).

Table 6: Funding Obtained Post Fellowship

Program Year	Total Funds	Grant Proposals Submitted	Grant Proposals Funded	Number of Individuals Funded	% of Submitted Proposals that were Funded	Median \$ per Funded Individual	Range per Funded Individual
2009-2010	\$2,741,667	54	30	14	55.6%	\$130,000	\$10,000 - \$600,000
2010-2011	\$2,210,250	76	24	14	31.6%	\$75,000	\$250 - \$1,000,000
2011-2012	\$6,882,000	65	33	15	50.8%	\$140,000	\$30,000 - \$2,000,000
2012-2013	\$1,724,376	53	28	15	52.8%	\$140,000	\$3,000 - \$339,000
2013-2014	\$2,090,000	32	23	12	71.9%	\$200,000	\$60,000 - \$600,000
2014-2015	\$1,532,000	25	13	10	52.0%	\$150,000	\$4,000 - \$300,000
2015-2016	\$1,061,000	26	11	9	42.3%	\$120,000	\$3,000 - \$600,000

We further asked for fellows' **total number of peer-reviewed publications**, regardless of whether the work was done at MSRI (Table 7).

**Table 7: How many accepted, peer reviewed articles have you authored or co-authored?**

Program Year	Total Peer Reviewed Papers	Number of Respondents	Mean per Respondent	Median per Respondent	Range per Respondent
2009-2010	257	18	14.278	11.000	1-40
2010-2011	328	20	16.400	14.500	4-33
2011-2012	375	19	19.737	22.000	1-40
2012-2013	220	18	12.222	13.500	3-20
2013-2014	131	18	7.278	6.500	1-15
2014-2015	75	17	4.412	4.000	0-13
2015-2016	127	23	5.522	5.000	0-12

Another way we might assess success is the **number of patents for which fellows applied**, so we included a question about patents in this survey. One key observation is that only older fellows reported a positive number of patents (Table 8).

**Table 8: Estimate the number of patents (accepted or not) that you have applied for since your postdoctoral fellowship at MSRI.**

Program Year	Total Number of Patents	Number of Respondents	Average per Respondent
2009-2010	4	2	2.000
2010-2011	2	1	2.000
2011-2012	5	1	5.000

Further investigation revealed that two of these fellows list their current position as Assistant Professor, one as CEO and one as Software Engineer. We note that three out of four of these fellows indicated they both received funding after the fellowship and applied for patents.

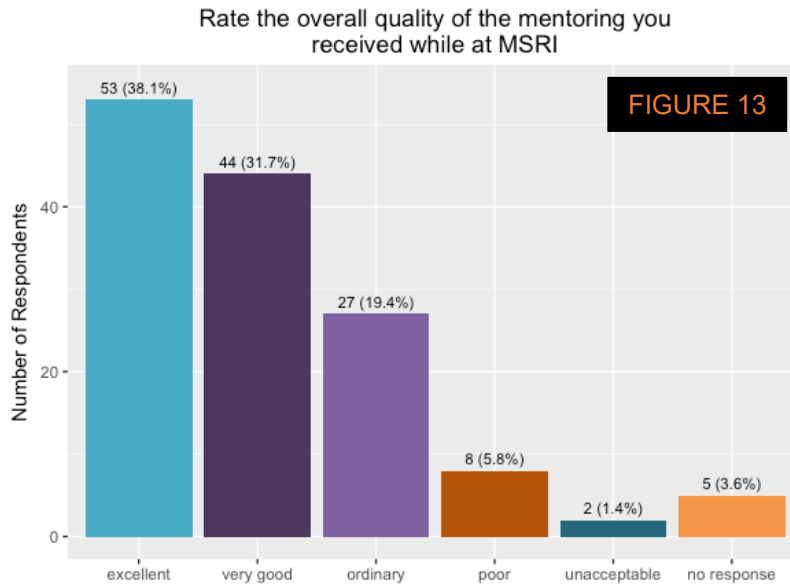
A qualitative indicator of the fellowships’ impact is provided by the **number and quality of research awards won by fellows** (Table 9). MSRI fellows also go on to receive other prestigious postdoctoral fellowships. Of the 139 respondents, 27 (19.4%) reported getting some sort of professional award and 11 of those reported multiple awards.

**Table 9: Summary of professional awards received.**

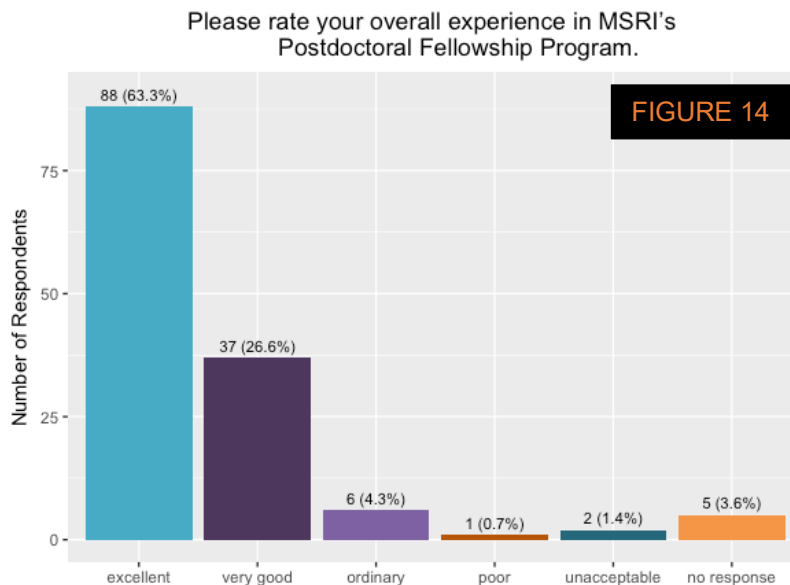
Selected Post-MSRI Awards:	AWM-Birman Research Prize in Geometry & Topology
	AWM-Microsoft Prize
	Hellman Faculty Award
	Mary Ellen Rudin Young Researcher Award
	Presidential Early Career Award for Scientists and Engineers (PECASE)
	Rollo Davidson Prize in Probability
	Wallenberg Prize
Selected Post-MSRI Fellowships:	Emmy Noether Fellowship, Perimeter Institute
	Humboldt Fellowship
	Sloan Fellowship (5 fellows)
Selected Post-MSRI Grants:	AMS Simons Travel
	AWM Travel
	NSF Career Award (5 fellows)
	ONR Director of Research Early Career Grant
	Prime d’Excellence Scientifique (3 year grant of the CNRS)
	SIAM Travel
Simons Sabbatical	

## V. Mentoring Feedback

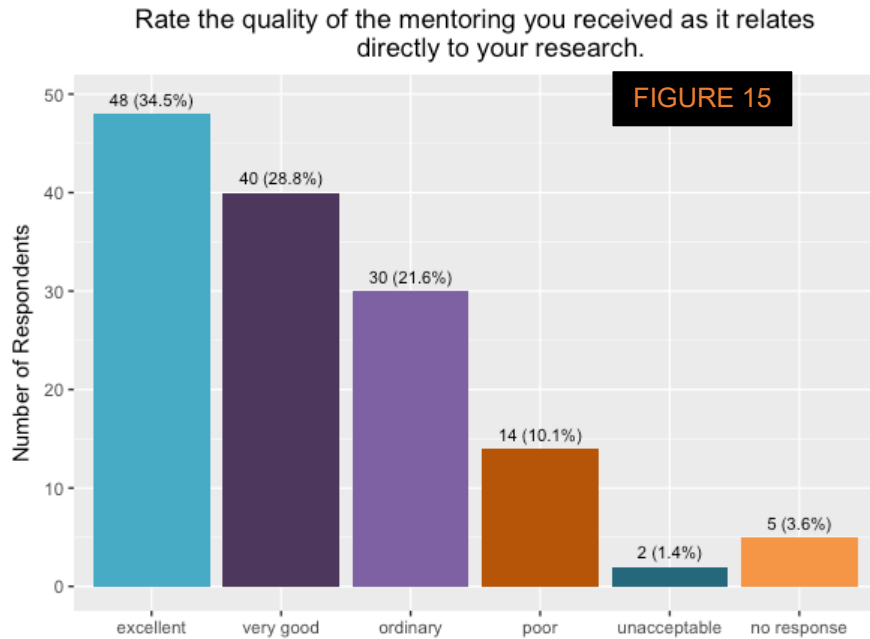
The survey asked fellows for feedback on the mentoring aspects of MSRI's postdoctoral fellowship program. Fellows were asked to rank, on a five-point scale from "unacceptable" to "excellent," certain specific aspects of the program as well as their overall experience. When asked to rate the **overall quality of the mentoring they received while at MSRI**, 69.8% of respondents chose "very good" or "excellent" (Figure 13).



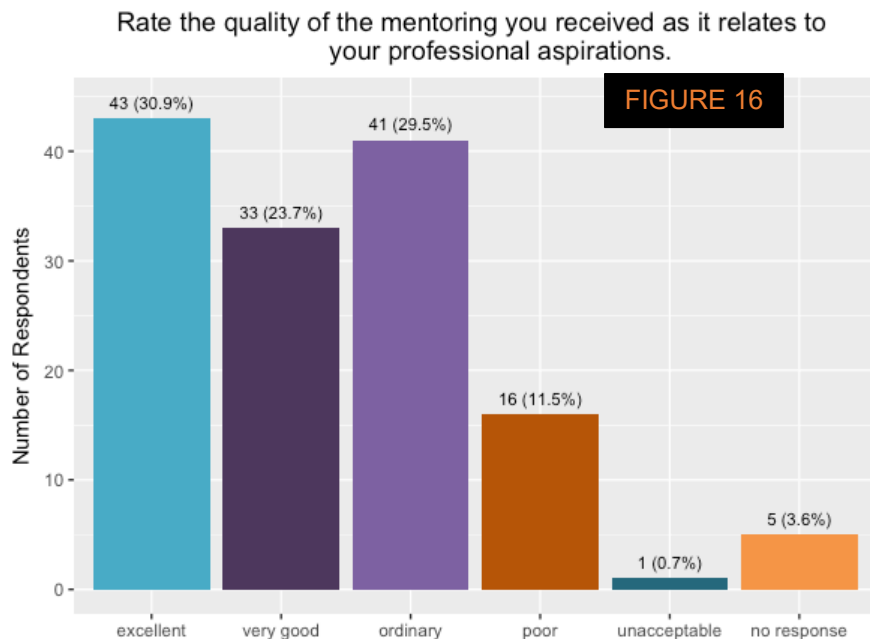
When asked to rate their **overall experience in MSRI's postdoctoral fellowship program**, 89.9% of respondents chose one of the top two categories ("very good" or "excellent") with 63.3% choosing "excellent" (Figure 14). This is the highest ratio of "excellent" responses across all questions asked about the quality of the program.



When asked specifically about **mentoring as it related to their research**, “e.g. mentor acting as a collaborator, inspirer, or connector to other collaborators,” 63.3% of respondents ranked the quality as “excellent” or “very good” with 21.6% rating this mentoring as “ordinary” (Figure 15).

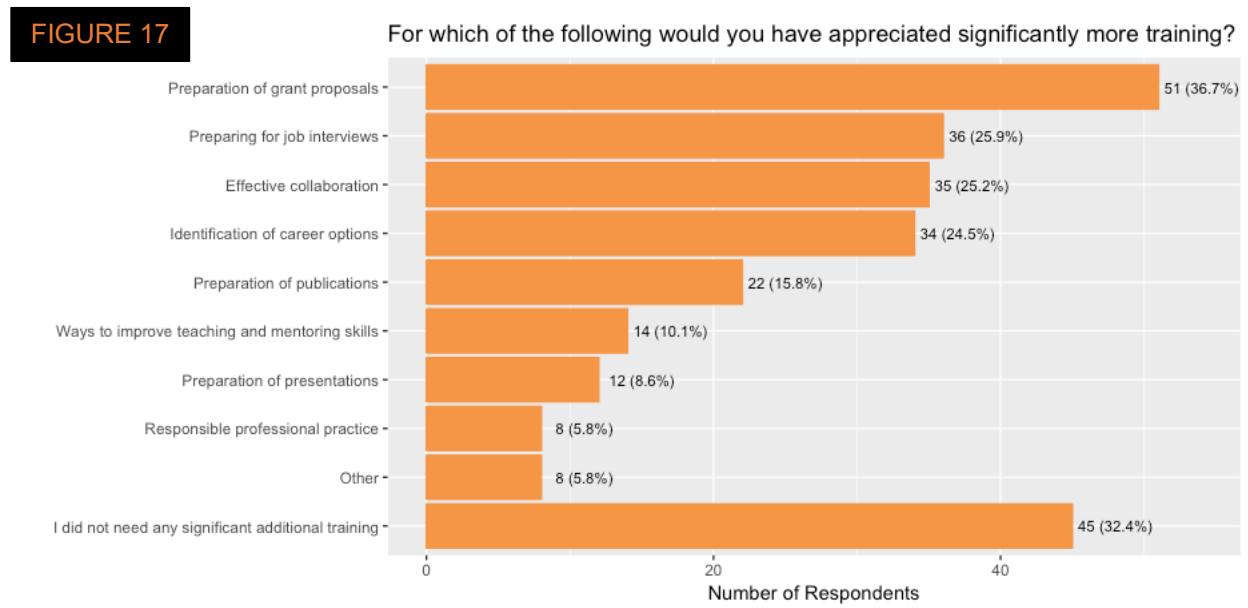


When asked specifically about **mentoring as it related to their professional goals**, “e.g. preparing for job interviews, organizing conferences, writing grants, thinking about alternate paths in mathematics,” 54.6% ranked the quality as “excellent” or “very good” and 29.5% ranked it as “ordinary” (Figure 16).



It would be interesting to understand these responses in a larger context. It seems that fellows get more from the program than just mentoring, and that fellows who may have felt that the mentoring they received in these areas was “ordinary” still felt that the postdoctoral fellowship was useful and found the overall mentoring they received to be at least “very good.” These questions were not asked as part of the previous study and we think these are useful questions for future studies. We asked fellows in what **areas they would have “appreciated significantly more training.”** They were able to select multiple areas (e.g. “Choose all that apply”) including “I did not need significant additional training” and “Other” and were also given a free-form answer option where they could specify any areas that were not among those listed. Free form responses to this question are included as Appendix D.

Nearly one third of fellows indicated they “did not need any significant additional training” and just over one third wanted more preparation on grant proposals. Further, around one quarter wanted more preparation for job interviews, effective collaboration, and identifying career options (Figure 17).



For those fellows who indicated at least one area of additional training besides “Other,” we counted the **total number of additional training areas selected per respondent**. Note, two fellows indicated they “did not need significant additional training” but also selected “preparing for job interviews.” In Figure 18 below, these fellows are considered to have selected one area of additional training.

We see that 88 fellows (63.3%) indicated that they would have liked additional training in at least one area and 62 fellows (44.6%) indicated they would have liked additional training in at least two areas (Figure 18).

The three fellows who indicated the most need for additional training were all women who came from foreign institutions. Interestingly, one rated the mentoring they received as “excellent” on all metrics but the other two gave less enthusiastic responses, including “poor” ratings for their mentoring as it applied to research. All three rated their overall experience in the fellowship program as either “very good” or “excellent.” The areas where at least one of these fellows felt they did NOT need additional training were “responsible professional practice,” “preparation of grant proposals” and “ways to improve teaching and mentoring skills.”





## VI. Open Ended Responses

We asked two open ended questions soliciting general feedback:

“Is there anything else you can say about your experience at MSRI that may help us make our case to the NSF?”

and

Do you have any further suggestions for ways to improve MSRI’s Postdoctoral Fellowship Program? Remember that being specific is most helpful (e.g. specifically address support for research, or professional development).

The complete set of answers can be found in Appendix C. In some cases, we have corrected spelling errors to facilitate ease of reading.

In answer to these questions, many fellows indicated they found the mathematical atmosphere stimulating and the opportunity to make new colleagues critical to their future success.

*My research collaborations formed at MSRI helped me to develop new ideas because of which I was able to successfully supervise two Ph.D. students afterwards. They have also benefitted from the connections I formed at MSRI.*

*The day-to-day experience, and regular interactions, facilitated through a semester at MSRI was the most potent means for me to develop professionally and acquire a taste for which research questions to pursue.*

Another theme that emerges is the number and diversity of interactions. One fellow noted,

*It was very important to my experience that I was among other postdoctoral fellows from groups underrepresented in mathematics.*

This comment seems particularly helpful to MSRI and supports further hard work to maintain diversity among cohorts.

This qualitative response from a computer scientist is especially noteworthy:

*My “scores” for some earlier questions in the survey were low, but that’s misleading. Really I should have ticked “N/A”. These questions asked about the quality of my mentorship, but I didn’t make active use of any mentor. Some questions also asked me about my MSRI experience helping me to secure a job after the postdoc, but again that should have been an “N/A” answer since I already had a faculty position secured before attending MSRI.*

*Making the case to the NSF:*

*I was at MSRI as a computer scientist to expand my knowledge, learning from the geometers and functional analysts around me. As a computer scientist, MSRI provided a unique opportunity for me to immerse myself in a different academic community and provide an opportunity for technology transfer between computer science and pure mathematics. ...*

*Although no publications came directly out of my time at MSRI, I learned a lot in a new field which allowed me to write papers in the future that I might not have been able to have written otherwise...*

MSRI is presently bringing in other researchers from diverse fields neighboring mathematics. Although by his/her own admission the program was successful for this fellow, MSRI may need to consider alternate measures of success for others in similar positions.

Many fellows left detailed constructive comments that MSRI should find useful. When looking at the open answers we noticed many had to do with mentoring, so we looked at those who answered both the mentoring question and the overall experience question with either “poor” or “unacceptable.” Only three people stated their overall experience was poor or unacceptable.

Of these three, one left no additional comments and one stated that he/she does not believe in the postdoctoral system in general. The third fellow in this group expressed their frustration that mentors seemed to “spend way too much time traveling...thus completely neglecting their mentees.” They commented further on difficulties with housing assistance and that they found the salary to be insufficient, which may be helpful items for MSRI to consider. All other respondents who marked one of the mentoring questions as “poor” or “unacceptable” found their overall experience with the program to be at least “ordinary.”

Some comments from fellows who rated their mentoring experience more generously follow, and include insights into existing positive aspects of the program as well as areas for improvement.

MSRI takes these comments very seriously and has taken steps to identify and correct any issues early in a fellows' stay. MSRI continues to use comments such as these to refine the mentorship program in the long term.

*I would suggest having some structure to the mentoring. It appeared that some mentors were not even aware that they had this position.*

*During my postdoc, all the senior professors did research with each other and the postdocs seemed somewhat left out to dry.*

*My tutor helped me a lot for what concerned job applications and gave me a lot of good advices about journals. But we were working in two fields not so close. I would suggest to give mentors that are more mathematically close.*

One fellow who marked all of the mentorship questions with “excellent” gave particularly cogent summary:

*Finally, a suggestion of what NOT to change: as mentioned above, the mentorship scheme benefits from its flexibility. While mentors should be chosen who will really engage with the idea of postdoctoral mentoring (not all program organizers understand this, for example...), and those mentors should be given directed prompting and suggestion at the start of the program (as happens now), the relationship between mentor and mentee should not be forced and should be allowed to develop in a way that benefits the postdoctoral fellow as much as possible, whatever that means, without too much monitoring or box-ticking required.*

## Part 2: Comparisons

In Part 2 we compare the results of the 2009-2016 survey to the 2004-2009 survey and, in some cases, to AMS annual survey results. When performing comparisons we use a chi-squared test without continuity correction to test for the difference of proportions between two populations that we can reasonably expect to be independent. If the expected counts are too small, we use a Fisher exact test instead [16]. For brevity we only include results where the p-value in a two-sided test of differences in proportions is less than or equal to 0.1, meaning the probability of the difference being due to chance alone is no more than 10%. Further, if the p-value is between 0.05 and 0.1 we call it *marginally significant*, between 0.01 and 0.05 *significant* and less than 0.01 *highly significant*.

Data used in this report from the AMS annual surveys [1-14] includes only information on doctoral-granting mathematics departments in the United States and we have excluded data on Applied Math, Statistics, and Biostatistics departments as these disciplines are not closely related to MSRI's research areas. Because much of the population of MSRI's postdoctoral fellows can be considered a subset of the population examined by the AMS (i.e. mathematicians who received their Ph.D. from or are employed at a U.S. doctoral math department) and because we have no way of removing this subset from the AMS data, the two populations cannot be considered independent; therefore a test of differences in proportions cannot be performed. Instead, when comparing data from this study to data from the annual AMS surveys we restrict the MSRI population to *only* those who can be considered a subset of the AMS population (i.e. only U.S. based fellows), enabling us to do a direct comparison. Otherwise, comparisons are observational studies we feel are interesting to consider.

We also include some deeper dives into the 2009-16 data where we felt there might be useful insights. We reference rather than repeat graphs and tables from the previous section when this will be useful.

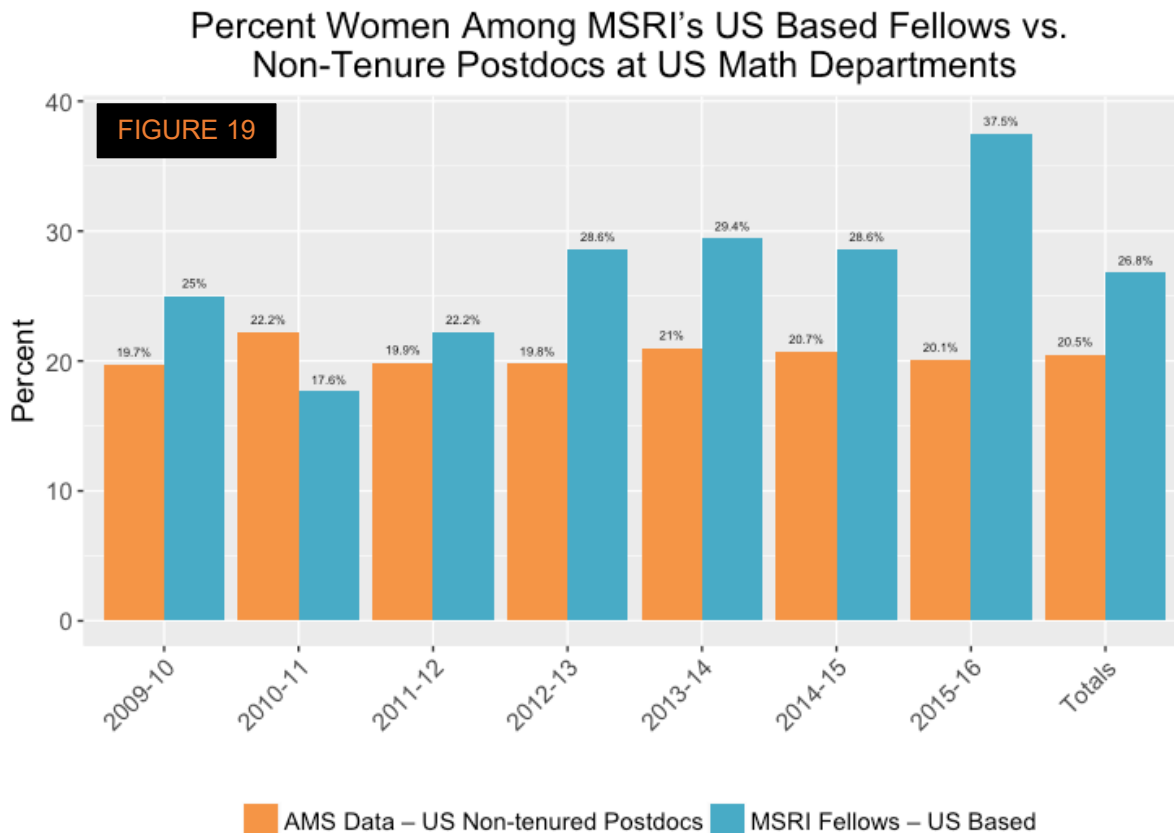
### I. Demographics

In this section, we compare the gender ratios of the fellows in the current study to data from the annual AMS reports and the race/ethnicity of the fellows to both the AMS data and to the 2004-09 study.

While there was no significant difference in **gender ratio** between the two studies, we found interesting differences when comparing MSRI's 2009-16 cohorts of fellows to AMS data on non-tenured postdoctoral faculty over the same time period [8-14]. Since AMS data includes only U.S. based individuals, we restricted the population of MSRI fellows to only those with U.S. home institutions at the time of their fellowship (Figure 19).

The percentage of women is higher among MSRI's U.S. based fellows than the AMS postdoc population in all years except 2010-11 (Figure 19). Further, in years where the representation of women at MSRI exceeds that of the AMS postdoc population we see a difference of at least 5% in all years except 2011-12, where it was a more modest 2.3%. The largest difference observed is in

2015-16 when the percentage of women among MSRI's U.S. based fellows was nearly double that of the AMS postdoc population (37.5% compared to 20.1%).



With respect to **race and ethnicity comparisons**, it is important to note that the previous study was missing this information for 21 fellows (14.5%) and another 35 fellows (24.2%) declined to state their race/ethnicity (Figure 2 in Appendix B). In the current study, only 17 fellows (8.3%) declined to state their race/ethnicity (Figure 3). This is a highly significant change where there is only a 0.00004 probability that the observed difference is due to chance alone.

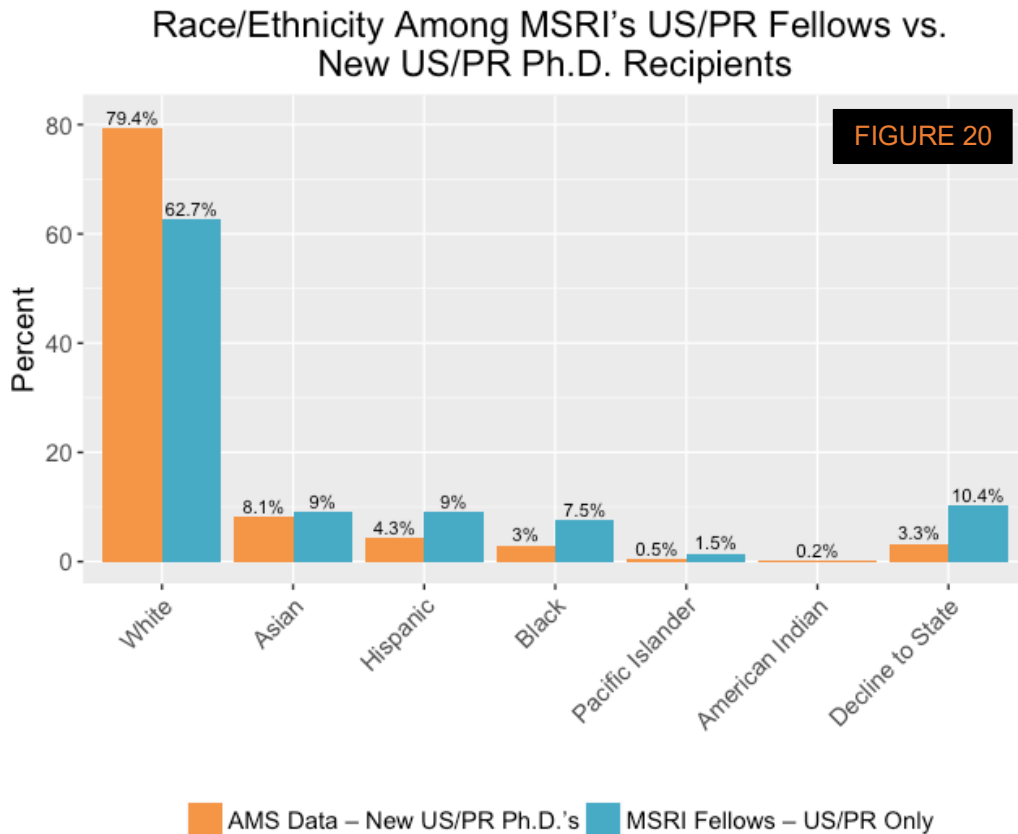
The proportion of fellows identified as Asian increased from 9.0% to 22.1% between the two studies, a highly significant increase ( $p=0.0012$ ). The number of fellows identified as White increased from 45.5% to 59.8%, another highly significant change ( $p = 0.008$ ). No significant difference was found in any other category. (Figure 2 in Appendix B; Figure 3)

In order to assess the **proportion of underrepresented minorities**, or URM, we restrict MSRI's 2009-2016 cohort of fellows to only U.S. citizens and Permanent Residents (US/PR). We do not have citizenship data for the previous 2004-2009 cohort and so do not make comparisons between the two studies. Instead, we use data from the AMS annual surveys for comparison.

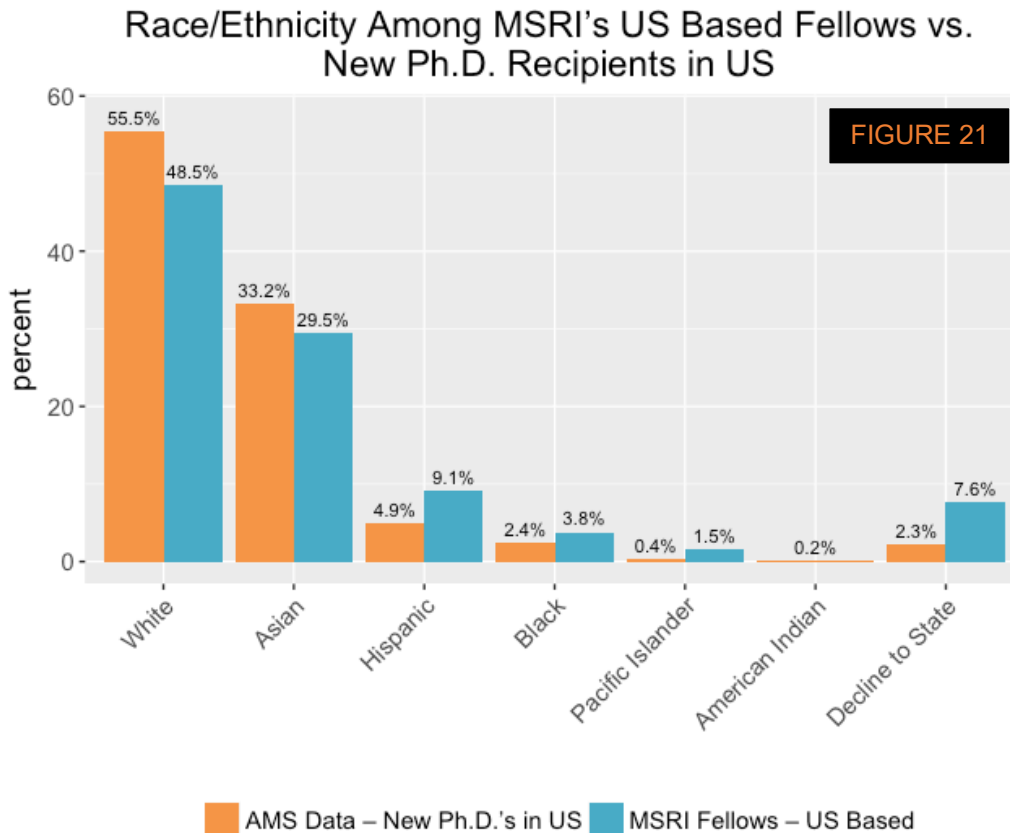
Ideally, we would compare the race/ethnicity of MSRI's fellows to non-tenured postdoctoral faculty like we did for the gender comparisons above, but unfortunately this data is not available

from the AMS or other sources. Therefore, in Figure 20 below, we compare the representation of each race/ethnicity among MSRI’s US/PR fellows to the population of new US/PR Ph.D. recipients reported by the AMS over the same time period [1-7]. Since only two of MSRI’s US/PR fellows received a Ph.D. from a foreign institution, we might reasonably consider the MSRI population to be a subset of the population reported by the AMS. For brevity, we have shortened the AMS categories of “Black or African American” to “Black,” “American Indian or Alaskan Native” to “American Indian,” and “Native Hawaiian or Other Pacific Islander” to “Pacific Islander”[15].

We observe that all URM groups are better represented among MSRI’s US/PR fellows than among the general population of new US/PR Ph.D. recipients, with the exception of American Indians. Strikingly, among MSRI fellows we find that Black and Hispanic/Latino groups are represented at a rate more than double that of the new Ph.D. population (Figure 20).



We also examined the representation of each **race/ethnicity among U.S. based fellows**, regardless of citizenship status, and compared that to the full population of new Ph.D.'s reported by the AMS. The representation of Black and especially Hispanic/Latino groups among MSRI's fellows is still greater than that of the new Ph.D. population, although to a lesser degree than is observed among only U.S. citizens and Permanent Residents (Figure 21).



## **II. Jobs**

Next we compare the types of positions (academic vs. not) held by the fellows at the time of the survey between the two studies. For those in academic positions, we also compare fellows' tenure status (tenured/tenure-track vs. not) and for all fellows, we examine the classifications of their Ph.D. institution compared to that of their current employment institution. We note that among the 2009-16 respondents, there are no statistically significant differences in employment status between men and women.

We found that the percentage of fellows who were **still working in academia** at the time of the respective surveys dropped from 96.9% for the 2004-09 cohorts to 88.5% for the 2009-16 cohorts (Figure 6 in Appendix B, Figure 7). This is a significant change with a 0.018 probability that the difference is due to chance alone. Interestingly, despite this change we observed a marginally significant increase between the two studies in the percentage of fellows still working in the

mathematical sciences (87.8% to 94.2%;  $p=0.077$ ) and a highly significant increase in the percentage of fellows still in the same field of research (59.2% to 87.8%,  $p=4*10^{-7}$ ). Note, we inferred that those who are still in academia are also still in the mathematical sciences as this was only explicitly asked of those fellows who indicated they had left academia.

When we compare the ratio of fellows in **tenured or tenure-track positions** among those still in academia we see that the proportion dropped from 74.7% for the 2004-09 cohorts to 64.5% for the 2009-16 cohorts ( $p=0.1052$ ), which is borderline for our criteria for “marginally significant.” (Figure 7 in Appendix B, Figure 9)

The differences observed between the two studies for those holding **postdoctoral positions** at the time of the respective surveys and for those in academic positions outside of the tenured/tenure-track or postdoctoral categories are not statistically significant (Figure 7 in Appendix B, Figure 9).

The number of fellows holding **non-academic positions** went from two of 97 (2.1%) to 11 of 134 (8.2%) between the two studies, a significant increase where  $p=0.045$  (Figure 6 in Appendix B, Figure 7). We note that this comparison does not include those fellows for whom we do not know if they are still in academia.

Because the current study revealed a significant increase in the ratio of fellows who ultimately left academia, we found it interesting to look more closely at those 11 individuals specifically (Tables 10 and 11). Each entry in the next two tables is a single individual. Six of these fellows left academia at least one year after they completed their fellowship and one did not report when they left academia. Six of the fellows are still engaged in research, of whom two are still active in the same research area they were in at MSRI. Interestingly, all four fellows who changed research directions are now involved in machine learning research.

**Table 10: Non-Academic Fellows Engaged in Research**

Current Position	MSRI Year	Year Left Academia	Same Research as at MSRI?	Year first changed research field	Current Research Area (if different from MSRI)	MSRI Program
Quantitative researcher at hedge fund	15-16	2016	No	2016	Machine learning related	Differential Geometry
Research Fellow	10-11	2013	No	2017	machine learning	Arithmetic Statistics
Software Engineer	10-11	2011	No	2011	NLP, Information Retrieval, Machine Learning	Arithmetic Statistics
CEO	09-10	2017	Yes	N/A	N/A	Complementary Program
Software Engineer	09-10	2012	No	2011	Information retrieval, machine learning	Complementary Program
Postdoc	09-10	Not Provided	Yes	N/A	N/A	Tropical Geometry



Since MSRI’s emphasis is on continuing research, in future surveys it may be beneficial to ask additional questions of those fellows who left academia and no longer engage in research activities to gain insight into the reasons for their decision. This might illuminate potential program features that could enhance the likelihood of MSRI fellows continuing a career in mathematics research.

**Table 11: Non-Academic Fellows Not Engaged in Research**

Current Position	MSRI Year	Year Left Academia	Year Stopped Research	Still in the Mathematical Sciences?	Year Left Math Sciences (if applicable)	MSRI Program
Software Engineer	13-14	2016	2016	No	2016	Algebraic Topology
Data Scientist	13-14	2014	2014	No	2014	Optimal Transport: Geometry and Dynamics
Software Engineer	12-13	2015	2015	Yes	NA	Cluster Algebras
Trader	11-12	2012	2012	No	2012	Random Spatial Processes
Part-time lecturer and part-time production editor	09-10	2012	2015	Yes	NA	Symplectic and Contact Geometry and Topology

We wanted to **compare the types of institutions from which fellows got their Ph.D. and the types of institutions at which they are currently employed** between the 2004-09 study (Table 1 in Appendix B) and the current study (Table 1). Since the AMS changed their institutional classifications in 2012 and since we do not know the fellows’ specific institutions for the 2004-09 cohorts, in order to compare the two studies we mapped the 2009-16 cohorts’ institutions to the older AMS classifications used in the previous study (Table 12).

**Table 12: Ph.D. Granting Institution vs. Current Institution Using Old AMS Categories**

Current Position	Ph.D. Granting Institution					Totals
	Group I Public	Group I Private	Group II	Group III	Foreign	
Group I Public	10	16	2	2	10	40
Group I Private	9	14	0	0	4	27
Group II	7	7	2	1	3	20
Group III	3	1	2	1	0	7
Group M	1	0	2	1	1	5
Group B	0	1	0	0	0	1
Foreign	14	11	3	2	51	80
Non-group	1	1	0	0	0	2
Gov’t or Nonprofit	2	0	1	0	0	3
Industry	2	5	1	0	1	10
Unknown	4	3	0	0	2	9
Totals	53	59	13	7	72	204

When we compare the **Ph.D. institutions** of the fellows, the number of fellows coming from Group I Private schools dropped from 44.8% (65) to 28.9% (59), which is a highly significant difference in proportions ( $p = 0.002$ ). Further, the percentage of foreign fellows increased from 23.4% (34) to 35.3% (72), another highly significant change ( $p=0.018$ ). Other differences were either not significant or the number of fellows too small to do a statistical test.

Comparing the types of **institutions where fellows were employed** at the time of the respective surveys, we again observe a highly significant drop in the percentage employed at Group I Private schools (from 25.5% to 13.2%,  $p=0.003$ ) and a highly significant increase in the percentage of fellows employed at foreign institutions (24.8% to 39.7%,  $p=0.001$ ). Interestingly, we observe a highly significant drop in the ratio of fellows employed at ungrouped institutions (from 7.6% to 0.98%,  $p=0.001$ ) and a significant increase in the combined percentage of fellows employed in business/industry, government, and non-profit (from 0.7% to 5.9%,  $p=0.012$ ).

### **III. Impact of Fellowship Awards on Fellows' Careers**

In this section, we compare the results of the three subjective questions about the impact of the MSRI fellowship on respondents' careers.

When asked **to what extent their fellowship helped them secure a new or better position**, 66.2% of the current study's respondents answered either "significantly" or "a great deal" (Figure 10). In contrast, only 56.1% of respondents from the previous study chose these categories (Figure 8 in Appendix B), a marginally significant difference ( $p=0.1$ ). This suggests there is some evidence that the MSRI fellowship has increased its influence on career advancement of the fellows, but there is still a 10% probability that the observed difference can be attributed to chance. We note that this is also the case when we look only at the top category.

In order to gauge the effect of the postdoctoral fellowships on fellows' research capability, the survey asked **if their MSRI experience helped them develop new research directions** (Figure 11, Figure 9 in Appendix B). We found no significant difference in responses to this question between the two studies.

We also asked about **the extent to which fellows use the knowledge and skills developed at MSRI in their current position** (Figure 12). In the previous survey, the answer selections for this question were similar to the previous questions: "a great deal," "significantly," "somewhat," and "not at all" (Figure 10 in Appendix B). For the present survey, we changed the selections to more accurately reflect frequency of use over time: "regularly," "occasionally," "rarely," and "not at all." Mapping between the categories is not obvious. The language and responses suggest that the previous categories "a great deal" and "significantly" likely collectively map to the new category, "regularly." The previous category "somewhat" likely maps to the current categories "occasionally" and "rarely". Regardless of these mappings, we do not see significant differences in responses between the two surveys.

## IV. Research Outcomes

We have divided this section into three subsections. We first compare the outcomes of this survey to those of the 2004-09 survey. Next, we do a deeper investigation comparing outcomes by gender for the 2009-16 respondents. Finally, we examine fellows from the 2009-16 cohorts who reported particularly low or high outcomes.

In order to streamline the narrative, we have omitted analysis of the number of new professional contacts fellows gained as a result of their fellowship since those values strongly correlate with the number of new co-authors gained.

### Comparing 2004-09 and 2009-16 Outcomes

In order to compare the numbers of papers, presentations, and funding obtained by fellows between the two reports **we must consider how much time elapsed between their fellowships and the administration of the respective surveys**. For example, an individual who takes the survey five years after their fellowship is likely to have more peer reviewed papers than someone who is only one or two years post-fellowship.

With this in mind, we feel the most appropriate comparisons between cohorts are as follows:

Table 13: 2004-09 and 2009-16 Cohort Comparisons

Previous Survey Cohort	Current Survey Cohort	Years between Start of Fellowship & Survey
2004-05	2012-13	5
2005-06	2013-14	4
2006-07	2014-15	3
2007-08	2015-16	2

The current study's 2009-10, 2010-11, and 2011-12 cohorts were older at the time of the survey than any cohort from the previous study. Similarly, the previous study's 2008-09 cohort was younger at the time of the survey than any cohort from the current study. Therefore, these cohorts are not comparatively examined in this section.

To ensure an accurate comparison of means in this section, we omit any respondent who did not submit answers to these questions from the analyses that follow. There were three such fellows in the 2004-09 study and six such fellows in the current study of 2009-16. Supporting graphs for this analysis are in Appendix E.

- When comparing **mean papers per respondent based on work done at MSRI** (Figure 22 in Appendix E), we see a statistically significant difference in only the oldest and youngest comparison groups.
  - Among those surveyed **five years post-fellowship**, we see a highly significant difference in means ( $p=0.007$ ) where the 2012-13 cohort has a mean of 3.61 papers

and the 2004-05 cohort has a mean of only 1.88 papers (Figure 22 in Appendix E). This difference might be attributed to 12.5% of 2004-05 fellows reporting zero papers whereas all 2012-13 fellows reported at least one paper. Further, 22.3% of the 2012-13 fellows reported at least five papers while none of the 2004-05 fellows reported more than four papers (Figure 23 in Appendix E).

- Among those surveyed **two years post-fellowship**, we see a marginally significant difference in means ( $p=0.084$ ) where the 2007-08 cohort has a mean of 2.38 papers and the 2015-16 cohort has a mean of only 1.78 papers (Figure 22 in Appendix E). We note that 8.7% of the 2015-16 fellows reported zero papers while all 2007-08 fellows reported at least one paper, and only 4.3% of 2015-16 fellows reported four or more papers compared to 14.3% of 2007-08 fellows (Figure 24 in Appendix E).
- When we look at the **mean number of presentations given per respondent based on work done at MSRI** (Figure 25 in Appendix E), we see a statistically meaningful difference only among those surveyed three years post-fellowship. The 2014-15 cohort from the present study reported a mean of 6.47 presentations whereas the 2006-07 cohort has a mean of only 4.17 presentations. This difference is only marginally significant ( $p=0.1$ ). The variation in these values is quite large—in all cases, at least half of the mean—which is why we detect no statistically meaningful differences in any other comparison group.
- Looking at **new co-authors gained as a result of their fellowship** (Figure 26 in Appendix E), we observe a statistically meaningful difference only among those surveyed five years post-fellowship. The 2012-13 cohort from the present study reported a mean of 2.44 new co-authors compared to the 1.12 mean new co-authors reported by the 2004-05 cohort, a significant difference with a p-value of 0.04. This difference might be attributed to 16.6% of the 2012-13 fellows reporting more than five new co-authors while no one in the 2004-05 cohort reported more than four (Figure 27 in Appendix E).
- The **mean number of grant proposals submitted** (Figure 28 in Appendix E), **mean number funded** (Figure 29 in Appendix E), and **mean dollar amount funded** (Figure 30 in Appendix E) are not statistically different for any of the cohorts between the two studies. We note that the mean number of funded proposals was computed only among fellows who reported submitting at least one proposal and the mean dollar amount funded was computed only among those who reported more than \$1 of funding. Twenty-two fellows in the 2004-09 cohorts and 10 fellows in the 2009-16 cohorts reported a successful grant proposal but \$1 or less in funding.

### **Comparing 2009-16 Outcomes by Gender**

MSRI has a strong commitment to diversity and to advancing the careers of women mathematicians. To that end, we examined the research outcomes of the 2009-16 cohorts by gender to see if the MSRI fellowship affects men and women differently. As with the section above which draws comparisons between the two surveys, numbers reported in this section exclude those

fellows who did not answer the outcomes questions. There are six such fellows; five of whom were women, and one man. Four fellows declined to state their gender and they are excluded from the analysis as well, though we note that their outcomes were near to the median for their cohorts across all metrics.

We performed the following analyses between the **research outcomes of men and women** and aside from a few isolated cases, we found no statistically meaningful differences. Supporting Figures are in Appendix F.

- When looking at **publications based on work done at MSRI**, four out of the seven cohorts showed no statistically meaningful differences (Figure 31 in Appendix F). In the remaining three cohorts, two showed higher outcomes for men and one showed higher outcomes for women.
  - In **2009-10**, men reported an average of 3.67 papers based on work done at MSRI, while women reported only 2 papers on average. This is a marginally significant difference ( $p=0.067$ ) that may be attributed to 24.9% of men publishing six or more papers based on their work at MSRI, while no women published more than three (Figure 32 in Appendix F).
  - In **2010-11**, men reported 2.93 papers on average compared to an average of 1.33 papers for women. This is a significant difference ( $p=0.016$ ) that may be attributed to 20% of men publishing six papers based on the work at MSRI, while no women published more than two (Figure 33 in Appendix F).
  - In **2014-15**, women reported a higher number of papers based on work done at MSRI with an average of 2.29 papers compared to only 1 paper on average for men. This is a highly significant difference ( $p=0.003$ ) that may be attributed to 85.8% of women publishing at least two papers based on their work at MSRI, while 80% of men published only one paper (Figure 34 in Appendix F).
- When we look at **total peer reviewed papers**, the standard deviations are large and show no statistically significant differences between men and women (Figure 35 in Appendix F).
- When comparing the **number of presentations given based on work done at MSRI**, despite visual disparities in the graph, the standard deviations are so large that no statistically meaningful differences can be observed between men and women (Figure 36 in Appendix F).
- When examining the **number of new co-authors gained as a result of their fellowship**, the only cohort showing a meaningful difference is 2009-10 where men reported an average of 2 new co-authors and women reported only 0.83 on average, a marginally significant difference ( $p=0.066$ ). We see no significant difference in any other year (Figure 37 in Appendix F).

- Looking at **grant proposal outcomes**, in six out of seven cohorts we see no significant difference in proposal submissions (Figure 38 in Appendix F), proposals funded (Figure 39 in Appendix F), or dollar amount funded (Figure 40 in Appendix F) between men and women.
  - The only cohort showing a statistically meaningful difference is **2011-12** where men reported 4.23 proposal submissions on average and women only 1.8 ( $p=0.031$ ) and a marginally higher funded dollar amount ( $p=0.088$ ) where men reported an average of \$637,200 in funding and women only \$127,500. However, the difference in dollar amount is likely due to three male outliers who each reported receiving more than \$1,000,000 in funding.

### *Examining Fellows with Low or High Outcomes*

We did further examination of fellows whose responses were especially low or high compared to the mean to get an idea of what may have affected their outcomes.

Seven fellows reported **zero papers based on work done at MSRI** (Table 2).

- One of these fellows is the computer scientist featured in Part 1, Section VI who states “Although no publications came directly out of my time at MSRI, I learned a lot in a new field which allowed me to write papers in the future that I might not have been able to have written otherwise.”
- Two of the seven fellows reported holding non-government, non-academic positions where they do not engage in research. These two also indicated that they left academia within a year of their fellowship, which may explain their lack of MSRI related research papers.
- Five of the seven fellows reported holding academic positions engaged in research in the same area in which they were working while at MSRI. Two of these fellows (including the aforementioned computer scientist) indicated they were satisfied with the program and mentorship and that they needed no additional preparation from their mentors, while the remaining three rated their research mentoring as “poor” and indicated a need for more training in preparation of publications and grant proposals, as well as how to collaborate effectively.

In contrast, 11 respondents report **more than five papers resulting from their work at MSRI** (Table 2).

- These respondents are generally from older cohorts: three from 2009-10, four from 2010-11, one from 2011-12, and three from 2012-13.
- All 11 rated their overall experience as “very good” or “excellent” and nine rated their research mentoring as either “very good” or “excellent.” Six of these fellows indicated

needing no additional training from their mentors and of the remaining five, only one of them indicated needing additional training in preparing publications.

- All 11 of these fellows report still engaging in research in the same area in which they were working while at MSRI and all but one report holding an academic position.

We note that three fellows reported authoring zero accepted, peer-reviewed articles but gave non-zero responses to the question “Estimate the number of papers you have published which resulted from your work at MSRI” (Table 7). Our best guess is that the papers indicated by these fellows were not accepted by the time of the survey—all three such fellows are relatively young (one from 2014-2015 and two from 2015-2016) and otherwise have median answers.

There are eight fellows who report **never having given a presentation based on their work at MSRI** (Table 3), five of whom are also among those who have not published any papers based on their work at MSRI.

- Of the three remaining fellows, two are from the most recent 2015-16 cohort.
- The oldest of the three fellows is from the 2010-11 cohort and is one of only two fellows who indicated an “unacceptable” overall experience (see Part 1, Section V).
- None of the three fellows left any additional comments, but all three indicated needing additional training in identifying career options.

Seven fellows reported having given **more than 15 presentations based on their work at MSRI** (Table 3). Only two of the seven are among those with more than five publications.

- With a few exceptions, these fellows are generally from older cohorts: three from 2009-10, one from 2011-12 and another who held a postdoctoral fellowship in both 2010-11 and 2011-12, one from 2013-14, and one from 2015-16.
- Six fellows rated their overall experience at MSRI as “excellent” and the seventh rated it “very good,” but the group gave mixed responses to the question on research mentoring.
- These fellows also gave mixed responses regarding areas in which they needed more training, but it is noteworthy that none of the seven indicated a desire for more training in preparing presentations or publications.

We also looked at fellows who reported **total funding of \$500,000 or more**; there are 10 such fellows (Table 6).

- These fellows are generally from older cohorts, with only two fellowships taking place after 2011-12 (one in 2013-14 and one in 2015-16).
- They generally report high outcomes in other metrics as well. They report especially high numbers of accepted, peer-reviewed articles with the youngest fellow (2015-16) reporting

the lowest number at five and the remaining fellows reporting anywhere from 11 to 40 accepted papers.

- All 10 fellows rated their overall experience as “very good” or “excellent” and eight fellows rated their research mentoring as “very good” or “excellent.”
- Eight out of the 10 fellows reported needing no additional training from their mentors. The remaining two indicated a desire for more training in responsible professional practice, ways to improve teaching and mentoring, and effective collaboration.
- Six of the 10 fellows reported receiving at least one professional award, and five of those six received two or more professional awards.

## **V. Mentoring Feedback**

Both the previous and present studies asked fellows about their overall experience in the program and the overall quality of the mentoring they received. In this section, we compare the responses to these questions between the two studies. The present study also asked two additional questions about mentoring as it relates to fellows’ research and professional aspirations; see Figures 15 and 16 for analysis of those responses.

It is important to note that the previous study allowed responses on a six-point scale: “excellent,” “very good,” “good,” “average,” “poor,” and “terrible” (Figures 11, 12 in Appendix B). We agreed that there was some ambiguity in these possible responses and we therefore introduced a five-point scale for these questions in the present study: “excellent,” “very good,” “ordinary,” “poor,” and “unacceptable” (Figures 13, 14).

This **change in possible responses** makes direct comparison of the results between the two studies challenging. It seems reasonable that the three unchanged categories would map to one another (“excellent,” “very good,” and “poor”) and that the previous selection “terrible” would map to the new “unacceptable” option. This leaves the previous selections “good” and “average” to map with the new category “ordinary,” and we acknowledge the possibility that some respondents who previously chose “good” may have chosen “very good” on the new five-point scale, which may confound the following results.

When asked about the **overall quality of the mentoring they received while at MSRI**, 69.8% of 2009-16 respondents chose either “excellent” or “very good” (Figure 13) while only 60.2% of 2004-09 respondents selected one of those options (Figure 11 in Appendix B). This illustrates a moderately significant improvement in mentoring between the two studies with a p-value of 0.063. Due to the possibility of confounded results, we also tested the difference between the two studies in only the top category, “excellent,” which was selected by 38.1% of 2009-16 respondents and 30.6% of 2004-09 respondents. In this case, we see a p-value of 0.12, which does not meet our stated criteria for statistical significance.



When asked about their **overall experience in the MSRI postdoctoral fellowship**, 89.9% of 2009-16 respondents chose either “excellent” or “very good” (Figure 14) and 83.7% of 2004-09 respondents chose one of those categories (Figure 12 in Appendix B). Again, we see a marginally significant improvement in responses with a p-value of 0.077. When examining only the top category, we see that 63.3% of 2009-16 respondents chose “excellent” compared to only 54.1% of 2004-09 respondents. In this case, we still see a marginally significant difference as the p-value remains unchanged at 0.077.

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# Appendix A: 2009-16 Full Survey

## MSRI Postdoctoral Fellows 2009-16 Impact Assessment

\* 1. To what extent do you believe your fellowship at MSRI helped you secure a new or better position?

- Not at all
- Somewhat
- Significantly
- A great deal

\* 2. To what extent did your experience at MSRI help you develop new research directions?

- Not at all
- Somewhat
- Significantly
- A great deal

\* 3. To what extent do you use the knowledge and skills you developed at MSRI in your current position?

- Not at all
- Rarely
- Occasionally
- Regularly

\* 4. Rate the overall quality of the mentoring you received while at MSRI.

unacceptable	poor	ordinary	very good	excellent
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

\* 5. Rate the quality of the mentoring you received as it relates directly to your research (e.g. mentor acting as a collaborator, inspirer, or connector to other collaborators).

unacceptable	poor	ordinary	very good	excellent
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

\* 6. Rate the quality of the mentoring you received as it relates to your professional aspirations (e.g. preparing for job interviews, organizing conferences, writing grants, thinking about alternate paths in mathematics).

unacceptable	poor	ordinary	very good	excellent
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

\* 7. Please rate your overall experience in MSRI's Postdoctoral Fellowship Program.

unacceptable	poor	ordinary	very good	excellent
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

\* 8. For which of the following would you have appreciated significantly more training? Choose all that apply.

- Preparation of grant proposals
- Preparation of publications
- Preparation of presentations
- Responsible professional practice
- Effective collaboration
- Preparing for job interviews
- Identification of career options
- Ways to improve teaching and mentoring skills
- I did not need any significant additional training
- Other

Please specify:

\* 9. Which of the following best describes your current primary source of employment?

- Academic - engaged in research **go to Q16**
- Academic - not engaged in research **go to Q15**
- Government, non-academic - engaged in research **go to Q11**
- Government, non-academic - not engaged in research **go to Q13**
- Non-government, non-academic - engaged in research **go to Q11**
- Non-government, non-academic - not engaged in research **go to Q13**

\* 10. What position do you currently hold? (E.g. Instructor, Postdoc, Assistant Professor, Research Scientist, Consultant, Software Engineer, etc.)

11. In which year(s) would you estimate you made your transition out of academia?

\* 12. Is your research area the same as the one you were pursuing while at MSRI?

Yes **go to Q22**

No **go to Q17**

13. In which year(s) would you estimate you made your transition out of academia?

14. In which year(s) would you estimate you made your transition away from research?

**go to Q19**



15. In which year(s) would you estimate you made your transition away from research?

**go to Q19**

\* 16. Is your research area the same as the one you were pursuing while at MSRI?

Yes **go to Q22**

No **go to Q17**

17. In which year(s) would you estimate you made your transition away from the area in which you were working while at MSRI?

\* 18. What is/are your current area(s) of research?

**go to Q22**

\* 19. Are you still working in the mathematical sciences?

Yes [go to Q22](#)

No [go to Q20](#)

20. In which year(s) would you estimate you made your transition out of the mathematical sciences?

\* 21. What is your current discipline?

**go to Q22**

While many of you are still in academia, some of you have chosen non-academic professions. Either way, some of the following questions may feel more or less relevant to you. We would appreciate it if you answer all of the questions, even if your answer is "0."

\* 22. Estimate how many new professional contacts you have made because of your experience at MSRI.

\* 23. Estimate the number of new co-authors you have gained because of your experience at MSRI.

\* 24. Estimate the number of papers you have published which resulted from your work at MSRI.

\* 25. Estimate the number of presentations you have given based on your work at MSRI.

\* 26. Estimate the number of grant proposals (funded or not) you have written since your postdoctoral fellowship at MSRI.

\* 27. Estimate the number of grant proposals which were funded since your postdoctoral fellowship at MSRI.

\* 28. Estimate the amount of funding that you have received based at least partly on work or ideas generated during your time at MSRI. Please enter a whole number with no monetary symbols ( \$ ) or commas ( , ).

\* 29. Estimate the number of patents (accepted or not) that you have applied for since your postdoctoral fellowship at MSRI.

\* 30. How many accepted, peer-reviewed articles have you authored or co-authored?

31. Please list any professional awards that you have received during or after your time at MSRI.

32. Is there anything else you can say about your experience at MSRI that may help us make our case to the NSF?

33. Do you have any further suggestions for ways to improve MSRI's Postdoctoral Fellowship Program? Remember that being specific is most helpful (e.g. specifically address support for research, or professional development).



## **Appendix B:**

### **Evaluating MSRI's Postdoctoral Fellowship Program**

*A Survey of 2004-2009 Postdoctoral Fellows*

#### **Background**

MSRI's Postdoctoral Fellowship Program encompasses two distinct types of fellowships. The programmatic fellows are associated to MSRI's scientific programs, which last one to two semesters; these positions have existed as long as MSRI has. In addition, a new program supports external fellows for one to two years at a host institution (not MSRI). Both types of postdoctoral fellowship are intended for recent recipients of a Ph.D. in mathematics, and are carefully structured to incorporate the supervision of a research mentor. Fellows of both types are expected to spend their time on research activities, including paper writing, giving presentations at national conferences, and preparing an NSF grant proposal. External fellows may also teach one course per year and mentor students, with the assistance of their own mentors. Since Fall 2004, MSRI has granted 145 postdoctoral fellowship awards.

The MSRI directorate is in the process of formulating a plan for evaluating the impact of its postdoctoral fellowship programs. In order to have a preliminary indication of the impact of the programs, and to gain critical insight into the process of measuring that impact, MSRI has surveyed the postdoctoral fellows who received their awards during the five program years from Fall 2004 to Spring 2009. This report presents an analysis of the responses to that survey and related demographic data which were independently available from program records.

#### **Methods**

Deputy Director Barcelo designed a survey which addressed the current occupation of the fellows, the impact of the fellowship on fellows' careers, and research outcomes based on the work fellows conducted at MSRI. These questions were formulated mostly for multiple choice or numeric responses. Two scaled-answer questions and two open-ended questions allowed respondents to offer general feedback on the program. (A printed version of the survey is provided in Appendix A to this report.)

The survey was implemented as an anonymous online survey in Google docs. All postdoctoral fellows from academic years 2004-05 to 2008-09 were contacted by email and requested to complete the survey. The request was repeated once (by email) during the three weeks the survey was open. To preserve anonymity and to encourage responses by keeping the survey short, demographic data was not collected as part of the survey.

The most difficult issue in evaluating impact is to determine what would have happened to postdoctoral fellows had they not received the award. Critical here is finding appropriate comparison groups and obtaining data on them. Given the limited time and

other resources available for this study, it was only feasible (and only in certain cases) to compare data on MSRI fellows with data on the general population of cohort U.S. Ph.D.'s. Such data were obtained from the Annual Surveys of the Mathematical Sciences published by the AMS ([1]).

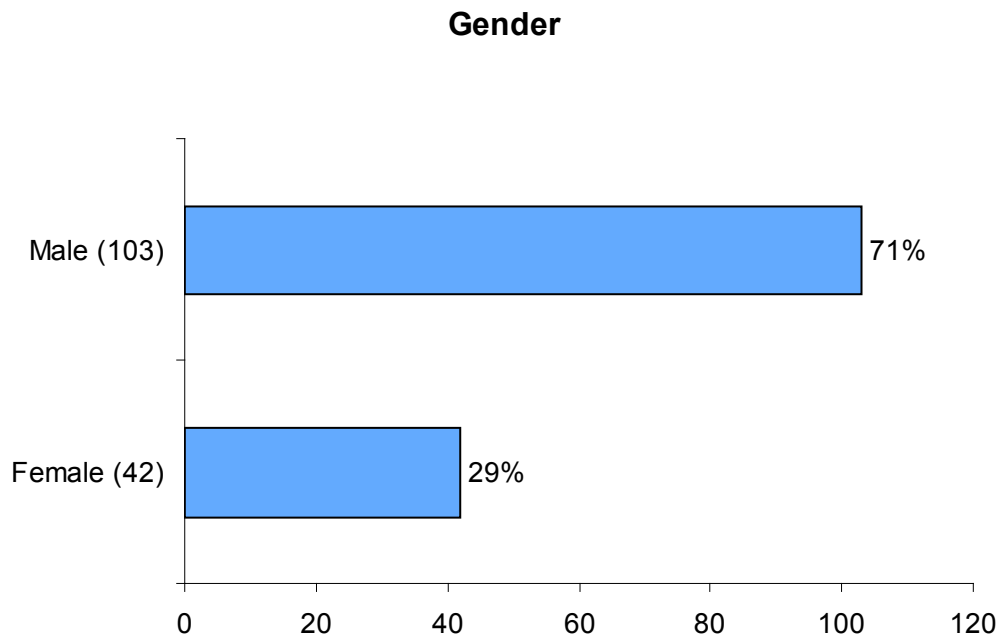
## Findings

### I. Description of the Population of Fellows

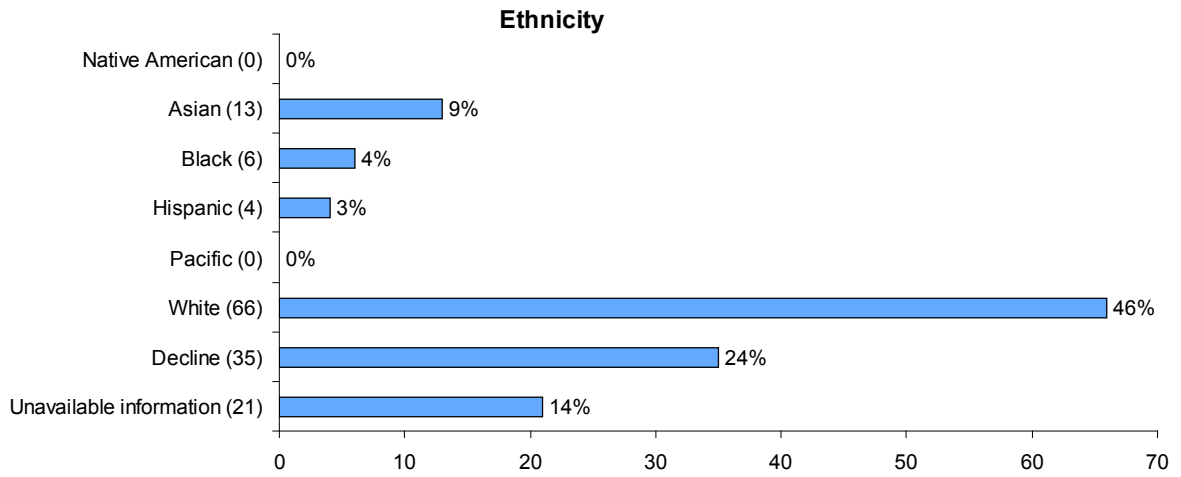
Since the Fall semester of 2004, MSRI has granted 145 postdoctoral fellowship awards, with cohorts ranging from 26 fellows in 2004-05 and 2006-07 to 34 fellows in 2008-09. The Institute has collected data on these fellows from both their fellowship applications, from a check-in form that all fellows complete upon arrival, and from a check-out form they complete upon departure.

Of these 145 fellows, 42 (29%) were women (Figure 1). Sixty-six (46%) identified themselves as White, and 10 (7%) identified themselves as members of non-Asian minority groups. Thirty-five fellows (24%) explicitly declined to specify their race or ethnicity; 21 (14%) did not specify race or ethnicity and also did not select the "decline to specify" option (Figure 2). One hundred and three (71%) fellows received their Ph.D. from a Group I public or private US institution; 34 (23%) received their Ph.D. from a foreign institution (Figure 3).

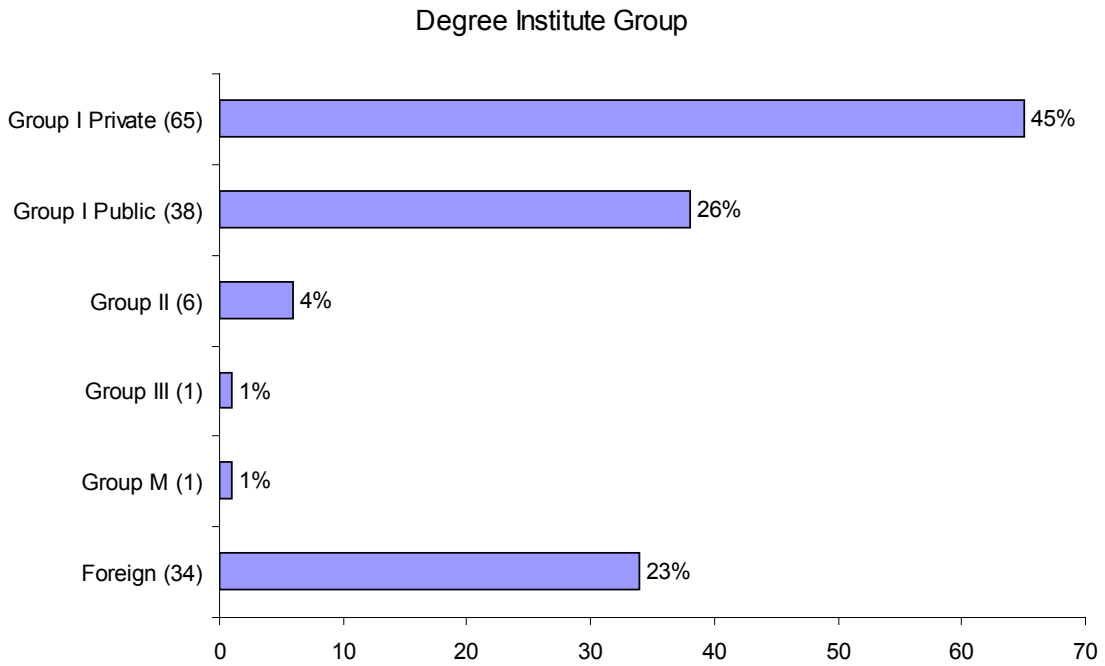
**FIGURE 1**



**FIGURE 2**



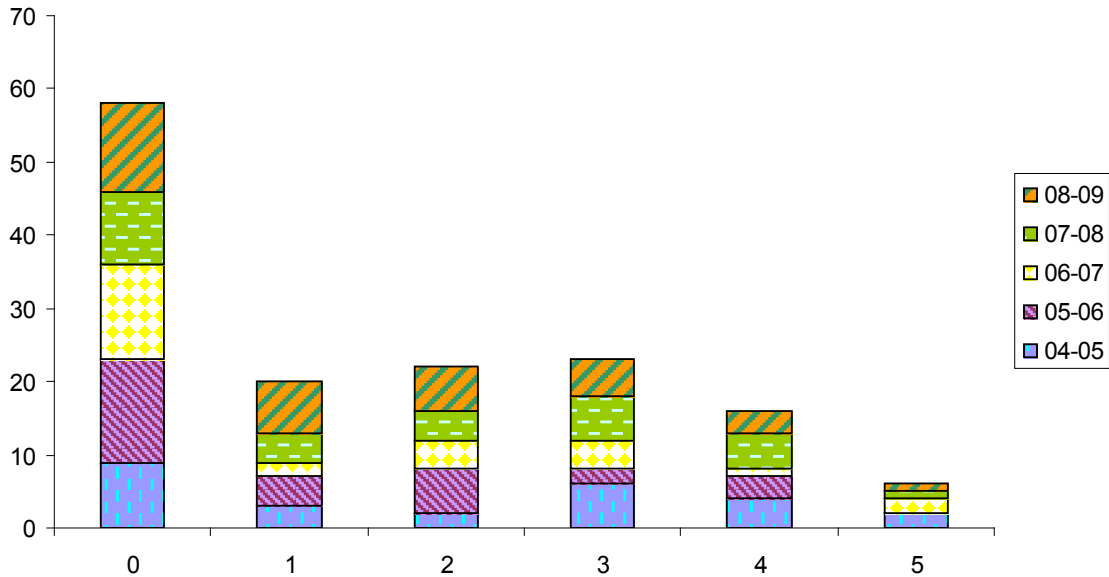
**FIGURE 3**



Fully 40% of fellows come to MSRI directly from graduate school; on average, fellows begin their fellowships 1.6 years after receiving their Ph.D (Figure 4).

**FIGURE 4**

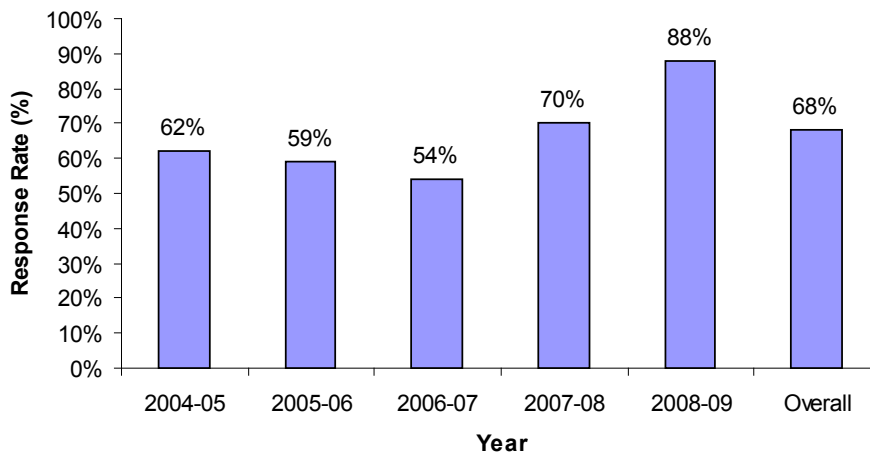
### Postdoctoral Fellows 2004-2009 Years Since Ph.D. at Time of Arrival



Of the 145 fellows surveyed, 98 submitted responses during the three weeks the survey was open, for an overall response rate of 68%. Instructively, the response rate was highest (88%) for the most recent cohort, with rates dropping below 60% after two years (Figure 5).

**FIGURE 5**

### Survey Response Rates

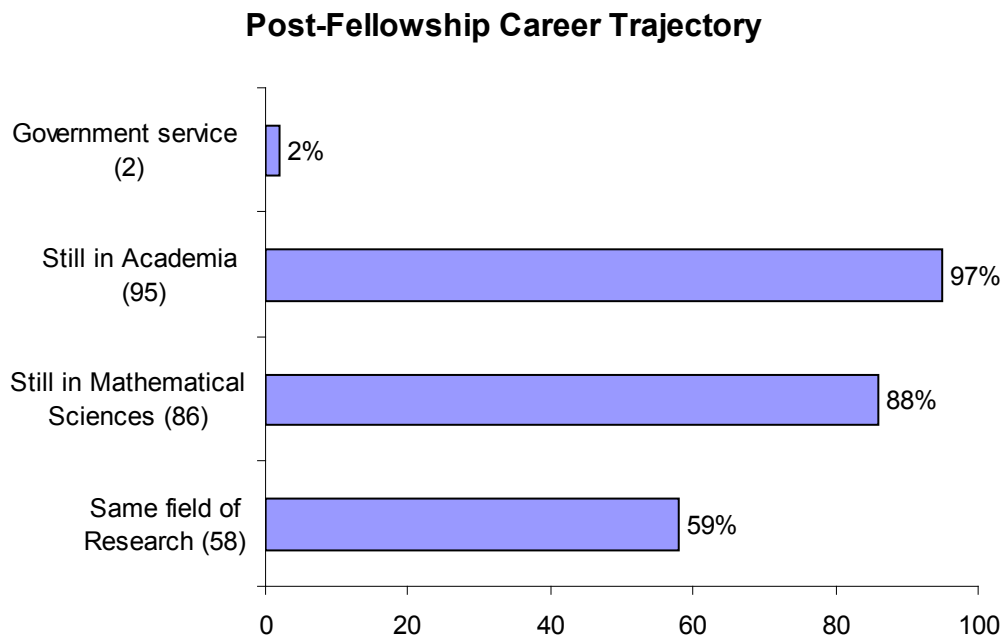


## II. Current Occupations of Respondents

Two survey questions addressed the current occupation of the fellows, with the goal of determining to what extent fellows tend to persist in mathematical research and in academics in general. To some extent these questions can also gauge the time it takes fellows who remain in academia to find permanent employment.

Of the 98 respondents, 95 (97%) are still in academia, and 86 of those (91%) are still in the mathematical sciences (Figure 6). By contrast, the percentage of employed new doctoral recipients whose immediate post-degree job was in academia (including research institutes and other non-profits, and institutions outside the U.S.) for the years 2004-2008 ranges from 84% for 2004 degree recipients to 75% for 2008 degree recipients ([1, Table 2D]).

**FIGURE 6**

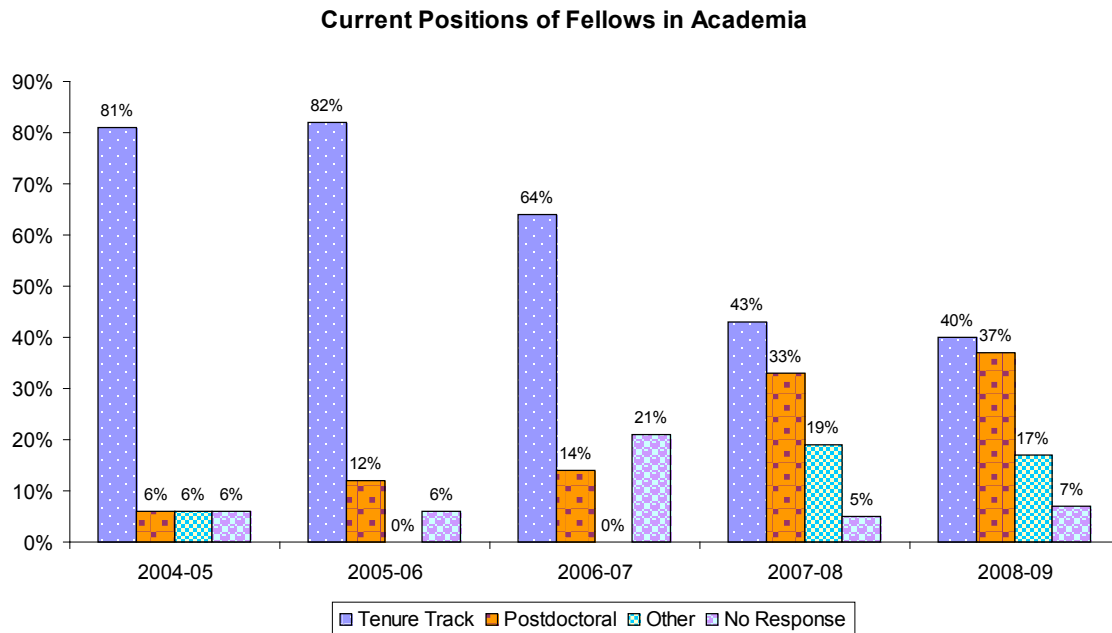


(Note: there appears to have been some difficulty in the interpretation of the survey questions, as several respondents identified themselves as assistant professors without indicating that they are still in academia, or gave their current position as a member of a mathematics department without indicating that they are still in the mathematical sciences, or indicated that they are still in the same field of research but not still in the mathematical sciences. The numbers in Figure 6 were obtained by inferring that respondents with academic positions are still in academia, etc.)

The percentage of respondents who report currently holding tenured or tenure-track positions varies by cohort, increasing from 40% for 2008-09 (the youngest cohort) to

over 80% for the 2005-06 and 2004-05 cohort (Figure 7). Over 30% of recent fellows (from program years 2007-08 and 2008-09) described their current employment as “postdoctoral”. (The “Other” category contains responses such as “lecturer”, “instructor”, “visiting assistant professor”, and “adjunct”.)

**FIGURE 7**



Another way to assess the impact of the fellowship program is to compare the type of fellows' PhD-granting institution with the type of their immediate post-MSRI or current institution. (These figures come from MSRI's database of members.)

**TABLE 1**

**Post Fellowship Employment 2004-2008**

Type of Employer	Type of Doctoral Degree-Granting Institution					
	Group I Private	Group I Public	Group II	Group III	Group M	Foreign
Group I Private	22	8	1			6
Group I Public	16	12		1	1	3
Group II	8	4	2			2
Group III		2	1			
Group IV						1
Group M	2	2	1			
Industry						1
Non Group	8	3				
Foreign	8	6	1			21
Unknown	1	1				
<b>Total</b>	<b>65</b>	<b>38</b>	<b>6</b>	<b>1</b>	<b>1</b>	<b>34</b>

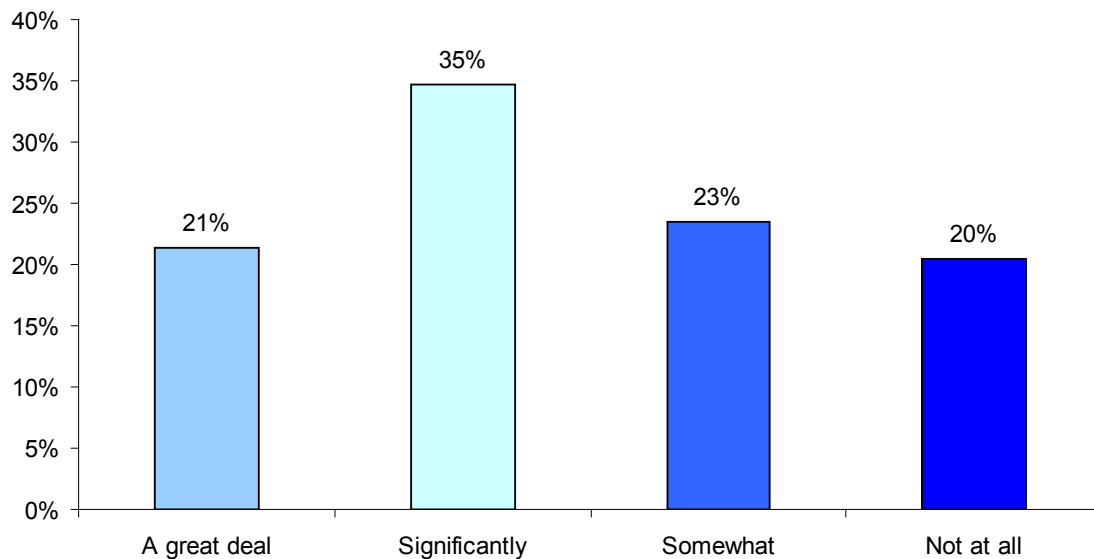
So, for example, 61 of the 111 fellows (55%) found post-Fellowship employment at Group I institutions, including 3 of the 8 fellows (38%) whose degree came from a US non-Group I institution. By comparison, only 12% of new (US) doctoral recipients in 2007-08 found immediate employment at Group I institutions, and only 5% of those whose degree came from a non-Group I institution did ([1, Table 2B]).

### III. Impact of Fellowship Awards on Fellows' Careers

Four survey questions solicited subjective evaluations of the impact fellowship awards had on fellows' subsequent careers. When asked to what extent their fellowship helped them secure a new or better position, 56% of respondents answered either 'significantly' or 'a great deal' (Figure 8).

**FIGURE 8**

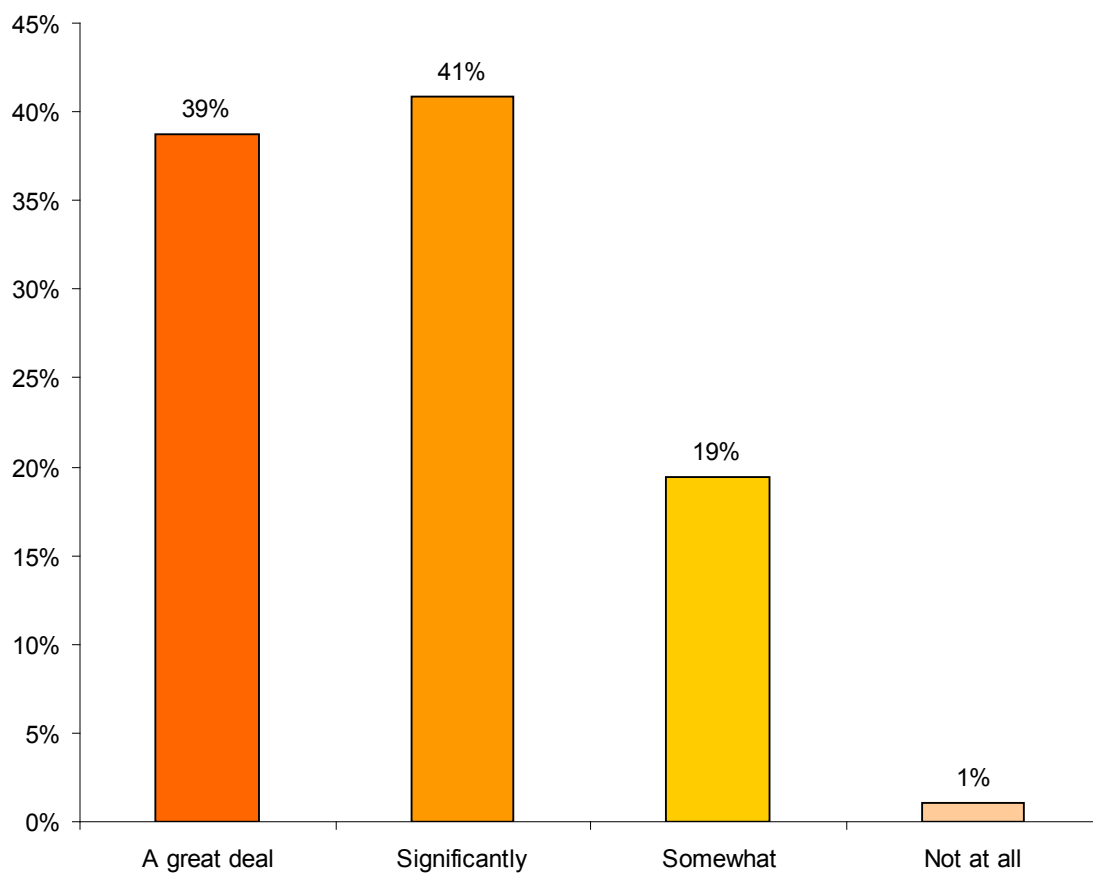
**To what extent do you believe your fellowship at MSRI helped you secure a new or better position?**



To assess the degree to which the postdoctoral experience aided in the development of new research, fellows were asked to what extent their experience at MSRI helped them develop new research directions. 80% of respondents answered either 'significantly' or 'a great deal' (Figure 9).

**FIGURE 9**

**To what extent did your experience at MSRI help you develop new research directions?**

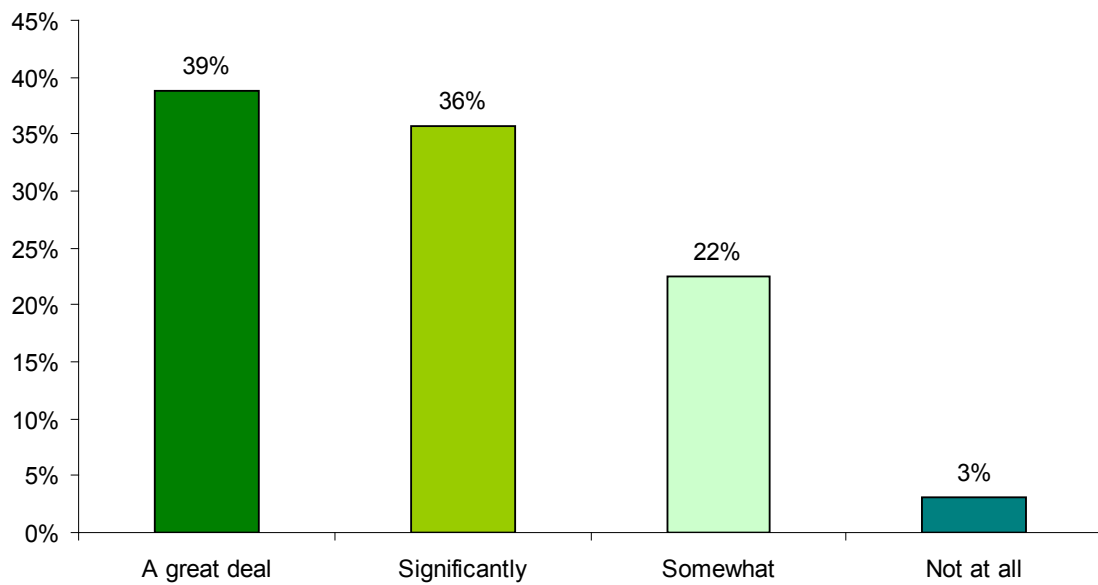


In order to gauge the effect of the postdoctoral fellowships on fellows' research capability, the survey asked about the extent to which fellows use knowledge and skills developed at MSRI in their current position. 75% of respondents answered either 'significantly' or 'a great deal' (Figure 10).



**FIGURE10**

**To what extent do you use the knowledge and skills you developed at MSRI in your current position?**



#### **IV. Outcomes from Research Conducted as Fellows**

The survey solicited data on standard measures of research productivity such as the number of publications, the number of presentations given, and the amount of funding obtained. Fellows were asked to limit their responses to outcomes based at least partly on work done during their time at MSRI.

**TABLE 2** Survey Responses for the question *"Estimate the number of papers you have published which resulted from your work at MSRI?"*

Year	Number of Respondents	Published papers related to the work at MSRI	Range Per Respondent	Average Per Respondent
2004-05	16	30	0 - 4	1.88
2005-06	17	44	0 - 7	2.59
2006-07	14	21	0 - 3	1.50
2007-08	21	50	1 - 5	2.38
2008-09	30	49	0 - 4	1.63

**TABLE 3** Survey Responses for the question *"Estimate the number of presentations you have given based on your work at MSRI."*

Year	Number of Respondents	Total Number of Presentations	Range Per Respondent	Average Per Respondent
2004-05	16	102	0 - 15	6.38
2005-06	15	101	1 - 20	6.73
2006-07	12	50	0 - 10	4.17
2007-08	21	135	2 - 15	6.43
2008-09	29	70	0 - 10	2.41

**TABLE 4** *Funding Obtained Post - Fellowship*

Year	Total Funds	Numbers of Grants	Number of Funded Individuals
2004-05	\$1,033,000	29	13
2005-06	\$1,936,000	17	14
2006-07	\$598,000	6	5
2007-08	\$666,563	17	11
2008-09	\$80,200	8	8

A MathSciNet search was also performed to count, for each fellow, the number of peer-reviewed articles that have been published to date. Although not all publications listed will have been directly relevant to the fellows' postdoctoral work, these data provide an independent means of assessing fellows' research productivity during and after their time at MSRI. If similar data were available for a comparison population, the figures could give an indication as to the effect the postdoctoral experience has on fellows' research productivity.

<b>Selected Post-Fellowship Research Grants</b>
<i>NSF CAREER Award (2 fellows)</i>
<i>Mathematical Association of America Tensor-SUMMA Grant</i>
<i>NSERC Discovery Grant</i>

**TABLE 5** Number of Publications in MathSciNet

Year	Total Number of Publications in MathSciNet	Range Per Respondent	Average Per Postdoc
2005-06	221	0 - 20	6.50
2006-07	128	0 - 13	4.27
2007-08	136	1 - 13	5.23
2008-09	152	1-19	5.24

Due to delays in publication time, the MathSciNet counts may not accurately represent the productivity of fellows less than a few years out of their postdoctoral position. To get an idea of the possible discrepancy, a comparison of arXiv.org preprint postings to MathSciNet listings was performed for a random sample of ten fellows from the 2005-06 cohort. However, it is difficult to draw any firm conclusions from the results.

<b>TABLE 6</b> ArXiv vs. MathSciNet										
<i>10 Fellows from 2005-06</i>										
# of Arxiv postings	13	0	16	2	1	7	4	2	9	11
# MathSciNet postings	11	19	11	17	7	12	3	6	8	9

From this sample, it is evident that use of MathSciNet is more appropriate than the arXiv for evaluation of long-term productivity: people do not consistently post to the arXiv, and those that do often post non-publishable materials (such as lecture notes) or multiple versions of the same manuscript (as separate postings). More detailed study is called for, as it is possible that careful examination of arXiv postings may provide a useful metric of productivity for the one or two years following a postdoctoral position, when work performed has not yet had time to appear in the published record.

In order to evaluate the extent to which the MSRI postdoctoral fellowships have enhanced fellows' professional networking, the survey asked fellows to estimate the number of new professional contacts and the number of new coauthors they gained as a result of their experience at MSRI.

**TABLE 7** Survey Responses for the question *"Estimate the number of professional contacts you have gained as a result of your experience at MSRI."*

Year	Number of Respondents	Total Number of Professional Contacts	Range Per Respondent	Average Per Respondent
2004-05	16	177	0 - 50	11.06
2005-06	17	131	3 - 10	7.71
2006-07	14	118	1 - 30	8.43
2007-08	21	263	2 - 30	12.52
2008-09	30	254	2 - 25	8.47

**TABLE 8** Survey Responses for the question *"Estimate the number of new coauthors you have gained as a result of your experience at MSRI."*

Year	Number of Respondents	Total Number of New Coauthors	Range Per Respondent	Average Per Respondent
2004-05	16	18	0 - 4	1.13
2005-06	15	27	0 - 4	1.80
2006-07	13	20	0 - 3	1.54
2007-08	21	37	0 - 4	1.76
2008-09	29	41	0 - 4	1.41

A qualitative indicator of the fellowships' impact is provided by the number and quality of research awards won by fellows. MSRI fellows also go on to receive other prestigious postdoctoral fellowships.

<i><b>Selected Post-Fellowship Awards</b></i>
<i>University of Washington Faculty Fellowship Award</i>
<i>Rollo Davidson Prize, 2008</i>
<i>Krill Prize for Excellence in Scientific Research</i>
<i>Prix Joliot-Curie</i>
<i>California Mathematics Council Student Activity Trust Award, 2007</i>
<i>Best Technical Paper, Sisters in Science: A One-Day Symposium of African American Women Architects, Engineers, Mathematicians, and Scientists, Museum of African American Technology Science Village, 2007</i>

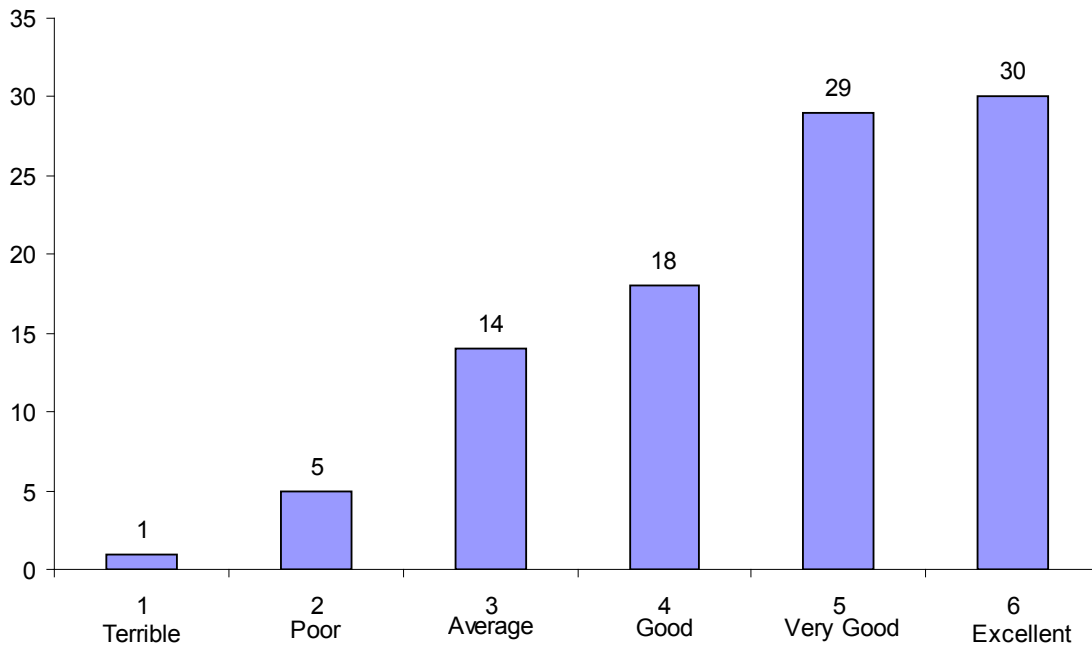
<i><b>Selected Post-MSRI Fellowships</b></i>
<i>SAMSI New Researcher Fellowship</i>
<i>Hellman Fellowship</i>
<i>NSERC Postdoctoral Fellowship</i>
<i>Marie Curie Incoming International Fellowship</i>
<i>EPSRC Research Fellowship</i>
<i>Sloan Research Fellowship</i>

## V. Feedback

The survey asked fellows for feedback on MSRI's postdoctoral fellowship program. Two questions solicited ratings on a scale of 1 (terrible) to 6 (excellent), with 3 representing 'average'; these questions addressed the quality of the mentoring received and the quality of the fellows' overall experience in MSRI's postdoctoral fellowship program. When asked to rate the quality of the mentoring they received while at MSRI, 61% of respondents chose 'very good' or 'excellent' (Figure 11). When asked to rate their overall experience in MSRI's postdoctoral fellowship program, 84% of respondents chose 'very good' or 'excellent' (Figure 12).

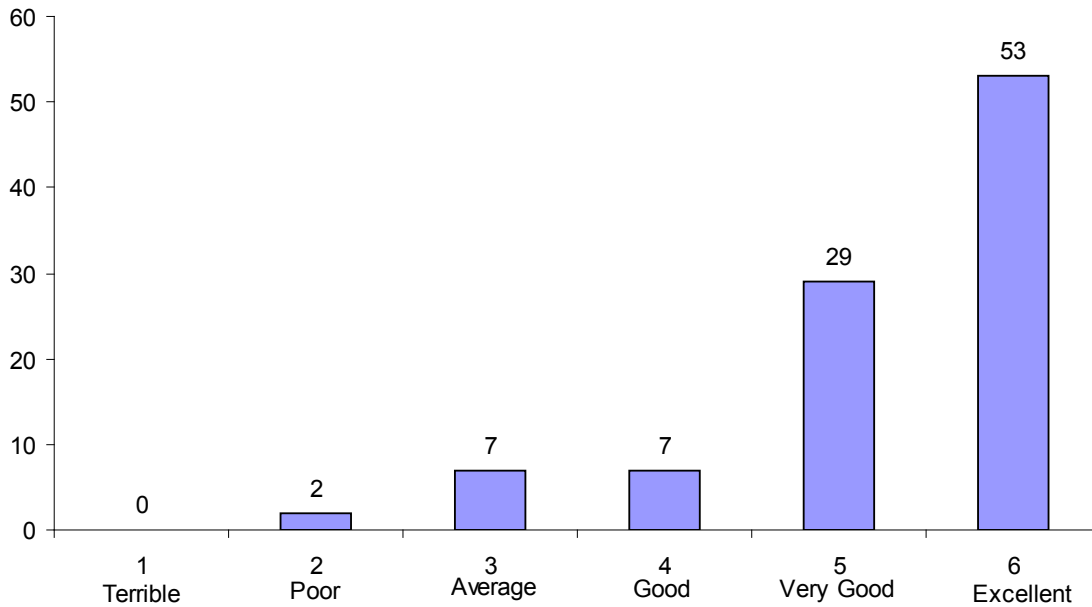
**FIGURE 11**

**Rate the quality of the mentoring you received while at MSRI**



**FIGURE 12**

**Please rate your overall experience in MSRI's Postdoctoral Fellowship Program**



In addition, two open-ended questions were posed: the first asked for feedback on the strengths of the program, and the second asked for suggestions for improvement. (The complete set of responses can be found in Appendix B below.)

The most commonly-cited strength of the program was the presence of leading experts for extended periods. As one respondent put it: "My experience there was transformative. Being in the room as 5 of the most brilliant senior mathematicians in my field argued about fundamental ideas was worth at least as much as my graduate work. In fact, it provided big picture context of the challenges of the field that would have been impossible to provide in graduate school." Other respondents emphasized that not only are the experts present, they are accessible; and that this is due to the open format of the scientific programs and the collaborative atmosphere at the Institute.

Another widely praised strength of the program was the opportunity it provides for forming collaborations and making professional contacts. Such connections are especially vital to building the careers of postdoctoral fellows.

Suggestions for improvement centered mostly around the length of the program (too short) and the implementation of mentoring (somewhat sporadic). One respondent pointed out the difficulty of meshing a half-year appointment with prior and subsequent employment, and suggested somehow integrating the MSRI fellowships with postdoctoral appointments at associated institutions to create one- or two-year positions. (This fellow's term at MSRI pre-dated the program for external fellows.)

Feedback about the mentoring of postdocs was less specific. Some respondents reported interacting very little with, or even being unaware of, their mentors; others found their mentors to be a poor match mathematically or personally.

<b>Commonly-Cited Strengths of the Program</b>
<i>Provides extended exposure to leading experts in a field</i>
<i>Greatly aids formation of collaborations and professional networking</i>
<i>Broadens participants' knowledge and perspective</i>
<i>Provides access to cutting-edge research in a field</i>
<i>Increases interdisciplinary connections and awareness</i>
<i>Facilitates uninterrupted periods of research for maximum productivity</i>

## References

[1] Polly Phipps, James W. Maxwell, and Colleen A. Rose, 2008 Annual Survey of the Mathematical Sciences in the United States (Second Report), Notices of the AMS (56) no. 7, August 2008.



## Appendix C: Answers to Open Questions

Some fellows only answered one or the other of the two open questions, but when they answered both we feel it is helpful to see the two answers together. Thus, each number below represents an individual fellow's responses with the letters (a.) and (b.) indicating the question being answered:

- a. Is there anything else you can say about your experience at MSRI that may help us make our case to the NSF?
- b. Do you have any further suggestions for ways to improve MSRI's Postdoctoral Fellowship Program? Remember that being specific is most helpful (e.g. specifically address support for research, or professional development).

### Responses from Individual Fellows

1.
  - a. I had [a] child during my postdoctoral fellowship in the MSRI. I'm very grateful for all the support I received in that important moment, including the health insurance that cover all the expenses...
  - b. No response
2.
  - a. It is wonderful for bringing together experts in the field!
  - b. No response
3.
  - a. To be a successful researcher, it is critical that a postdoc branch out from what they worked on in grad school, meet and integrate with a new community, and find out what new research directions they can contribute to I (like many others) came from a postdoctoral position where the research group in my area was small and distant, and it was almost exclusively at MSRI that I made these important connections that gave me direction for my research. The formal structure and mentoring at MSRI were immensely helpful, but equally so was the opportunity to spend a semester together with a group of the leading researchers in my field, and interact with them daily, informally over lunch, etc.
  - b. The postdoc seminar was good practice, but I would like to see an opportunity for postdocs to workshop talks with each other and give specific one-on-one feedback with guidance and experiment with different talk structures. Maybe even do a half-day focused workshop on communicating mathematics?
4.
  - a. My "scores" were some earlier questions in the survey were low, but that's misleading. Really I should have ticked "N/A". These questions asked about the quality of my mentorship, but I didn't make active use of any mentor. Some questions also asked me about my MSRI experience helping me to secure a job after the postdoc, but again that

- should have been an "N/A" answer since I already had a faculty position secured before attending MSRI. Making the case to the NSF: \* I was at MSRI as a computer scientist to expand my knowledge, learning from the geometers and functional analysts around me. As a computer scientist, MSRI provided a unique opportunity for me to immerse myself in a different academic community and provide an opportunity for technology transfer between computer science and pure mathematics. \* MSRI I believe has a good history of having its visitors and postdocs give talks to K-12 students at the "Berkeley Math Circle", which is a good form of outreach. I gave such a lecture ...as a postdoc. \* Although no publications came directly out of my time at MSRI, I learned a lot in a new field which allowed me to write papers in the future that I might not have been able to have written otherwise...
- b. There was one aspect of the reimbursement policy that I found strange: rental cars cannot be reimbursed. For people with friends and family in the area, it could potentially save MSRI money if we could stay with those relatives rent-free and only have to be reimbursed for a rental car. I was told though that MSRI policy is to not reimburse rental cars, even if it saves MSRI money. I think if someone spending time at MSRI can make the case that some living arrangement they have in mind is cheaper than the recommended alternative, MSRI should allow it.
- 5.
- a. I literally owe my research career to my MSRI postdoc. It's where I made the vast majority of my professional contacts, including meeting the first person from my current institution, and it's where I learned to be a good collaborator; beforehand, I thought I was supposed to sit in my office alone all day and try to be clever, which isn't at all the way that I work now! This didn't really come from the actual hands-on mentoring, but rather from the excellent research atmosphere that MSRI provided. And in fact I started unofficially mentoring a grad student for the first time at MSRI too... I ended up giving [the graduate student] his Ph.D. project during [the program], and collaborating with him on several papers in the following years.
  - b. I said I'd appreciate more training in how to be a good mentor - but only really because I've never had such training, and now that I'm starting to have my own Ph.D. students it'd be handy. Actually I think that the only real way you could improve the experience would be to just get more early-career people into the building during the programs, and get us all to collaborate with each other. Maybe you could try running an AIM style workshop at some point. Or, maybe pair postdocs up with grad students for projects; one of my valuable MSRI connections was with a grad student.
- 6.
- a. The experience was wonderful. I was paired with a mentor whom I had never before met, and we ended up collaborating on a project which I now consider my best work, and which will be the linchpin of my applications for tenure-track positions. It also gave me a large network of more senior colleagues to whom I feel close -- much closer than I usually would to people that I have just met at conferences. I have had a lot of conference invitations over the last year that have come from these senior colleagues, and they have also been the people to whom I have turned for informal career-related questions.

- b. No response
- 7.
- a. My experience was excellent. Really helped get my post-Ph.D career going.
  - b. No response
- 8.
- a. By inviting leading mathematicians and brilliant minds from all over the world, MSRI provide a unique opportunity for young researchers to deeply understand mathematics and start new successful collaborations. No other mathematical Institute in the world organization can compete with MSRI in this.
  - b. No response
- 9.
- a. The experience of being at MSRI, meeting all the people in my field and interacting with them and watching them present their research was fantastic. It meant that, as a young postdoc, I was updated on all new developments in the field and I had the opportunity to discuss these latest development with the experts. This has been very useful for me.
  - b. No response
- 10.
- a. It provided a stimulating working environment sort of at the beginning of my tenure-track position.
  - b. No response
- 11.
- a. MSRI provides a very nice environment to do research. People are very friendly.
  - b. No response
- 12.
- a. It is just an amazing setup. I found MSRI a better working environment than IAS for example and got a lot more done in Berkeley than at IAS where I was also a postdoc.... It was also great to have a small group of women postdocs which made me feel more like I really belonged. The support that Jacky Blue provided with housing was fantastic.
  - b. Grant writing bootcamp would be useful. See <https://services.math.duke.edu/~pierce/Reboot2016.shtml> for a model.
- 13.
- a. MSRI postdoc program is a great one, extensively exposing fresh PhDs to wider research areas. Were it not the job-hunting pressure at that moment, I would have benefitted even more from my postdoc experience at MSRI.
  - b. No response

- 14.
- a. MSRI provided great working conditions. The full immersion in a rapidly developing area and the possibility of meeting peers from
  - b. In June I attended [a workshop], that was good - with personalized feedback on research statements, job talks etc. I think these issues are best addressed in a (possibly optional, as not all postdocs have the same short term goals) but organized moment, rather than left to the vagaries of the one-on-one relation with a specific mentor. (My mentor was wonderful, but neither of us felt the need to meet nearly as much as the guidelines suggested: I was doing ok with my research and job applications were not on my mind then, so I didn't ask him about those. But I still might have attended say two focused afternoons during the semester on those.) [Some of my answers about mentorship which say "ordinary/very good" are not insincere, but really closer to "not applicable".]
- 15.
- a. It was by far the most productive time, mathematically speaking, I've had during my post-doc.
  - b. No response
- 16.
- a. Best place to do research
  - b. No
- 17.
- a. MSRI is widely known to be a stimulating research environment; I have learned first-hand why this was the case. As a postdoc at the MSRI, I was particularly impressed with the quality of the mentoring program and the many opportunities to interact with established and highly-esteemed researchers in a meaningful way.
  - b. No response
- 18.
- a. No response
  - b. Perhaps some talks by senior professors on how to advise students would be helpful.
- 19.
- a. It was truly inspiring to be around so many (in fact nearly all) of the leaders of my field.
  - b. I regret that I did not attempt in any serious way to collaborate with anyone while at MSRI. I was a fresh Ph.D who had only ever worked individually, and perhaps I was a bit intimidated and felt as though everyone else already had ideas and people to work with. I realize a big part of this is I should have been less shy, but it may have helped if someone (I'm not exactly sure who) had given me a push in that direction. On an unrelated note, thank you for offering chocolate in exchange for completing the survey. I do not know when I will return to MSRI, but I now look forward to it even more

- 20.
- a. It was great. It opened my area of research to new avenues which I am still pursuing over a year later. Furthermore, I've made a new collaborator with whom I work with very closely.
  - b. Mentors should be given guideline topics to cover, for example, interview preparation, grant preparation, teaching, things aside from research with which the mentee doesn't have experience.
- 21.
- a. No response
  - b. MSRI was fine, but overall I have lots of frustrations with academia. When I was at MSRI I presented my work and was also working on getting it published. Ultimately I was told my results were not publishable since they were known (an assessment I understood, but disagreed with; they were "known," but no one had worked out the details in my opinion). Later after I left academia I saw that (using different techniques) one of the people I explained my research to at MSRI was publishing what appeared to be essentially my results (the way they were doing it was different and of interest). This was frustrating for a number of reasons. While I was cited, I don't think properly. I would chalk this up to no one including reviewers bothering to actually read the details of my work (but when a bigger name tries to publish it they are successful), but in a perfect world the big name researchers at MSRI would help me get my work published rather than later publishing the same things themselves. While I don't think this was necessarily nefarious (although multiple emails about this went unanswered) I think it summarizes pretty well my frustrations with academia and one of the reasons I left.
- 22.
- a. MSRI is an excellent place to work at.
  - b. No response
- 23.
- a. Simply: it was absolutely invaluable to my career.
  - b. I would have liked more organized social events for postdocs. Also: it was not an issue to me at the time, but I can imagine that many postdocs might need help/support for child care. I am not sure if this is something MSRI has in place already (especially for their workshops), but it is critical for helping women in particular to stay in the game.
- 24.
- a. Far and away the best mathematical networking experience I've had.
  - b. No response
- 25.
- a. Beautiful, relaxed, quiet, productive.
  - b. No response

- 26.
- a. No response
  - b. ask mentors to really meet weekly
- 27.
- a. I believe that MSRI programmes promote research in mathematics more than any other programme I have ever attended or even heard of.
  - b. I think that mentoring should be more substantial.
- 28.
- a. The semester at MSRI has been one of the most stimulating periods of my life: having the opportunity to meet the top experts from all over the world has been a great opportunity that shaped my research and made possible to make connections that have been very fruitful.
  - b. No response
- 29.
- a. Nothing. I was truly satisfied with my experience at MSRI as a postdoc.
  - b. It would be nice if we could have more information about facilities at UC-Berkeley, e.g., informations about libraries at UC-Berkeley.
- 30.
- a. This is one of the best places to do research because of the people interested in the mathematics, good library and good resources.
  - b. A workshop on grant writing would be very helpful. I would envision it as providing examples of successful or unsuccessful grant proposals with explanation of what is good and bad in the proposals. It would be also helpful if the collaboration would be to a certain extent forced. For example, a list of projects is given and everyone is strongly encourage to subscribe to one of the project. Perhaps this should be done with an option to change projects.
- 31.
- a. I had an extremely productive stay at MSRI, which directly resulted in 3 published papers, but more importantly lead me towards new research directions and collaborations that continue to be very fruitful today. I found the atmosphere at MSRI very engaging, and I felt motivated to work very hard on several projects. Besides being around the very best researchers, I also found the natural ambience to be inspiring, in my mind making MSRI perhaps the best place to do mathematics. I benefitted not just from the presence of many experts in my area of research, but also from talking to members of the complementary program - because of that I was able for instance to successfully incorporate non-commutative ideas into my research in commutative algebra, and solve this way problems that were otherwise intractable via standard techniques.
  - b. From my experience the support for research was excellent. What I would have liked to see more is more opportunities for professional development. I don't think that they should be mandatory, since some may just prefer to focus on their research, but I think

that there should opportunities to discuss how to write an effective research grant, where to look for funding, how to best prepare oneself for an academic interview, and also to learn what other options are available out there if you end up not staying in the academic world, and how to best pursue them.

32.

- a. no
- b. no

33.

- a. MSRI has quiet and beautiful surroundings that help me stay in a good mood and focus on research. I really miss this place.
- b. For foreigners, more flexible visa options and staying lengths would be very helpful, such as type B and type H. Also, some suggestions for tax return of non-resident foreigners would be helpful.

34.

- a. No response
- b. Maybe inform the postdocs that it's better if they could pay the tax in advance to avoid penalty, and MSRI is not withholding any tax.

35.

- a. When you have so many great people in one location it lowers the threshold for going up to someone you don't know and asking a question. This is crucial.
- b. I think if the mentoring were more structured it would have helped me. But those are my needs and maybe not the needs of others.

36.

- a. My time at MSRI was all in all perfect. I was surrounded by major researchers of my field. The place and the program is set up in a way that it is easy to meet people. So I managed to casually talk with researchers I otherwise would not have been able to. It probably had the biggest effect on my career since I graduated.
- b. I was happy with everything, if I had to mention one thing, I remember, it was hard to get down from the hill after a certain, not so late time of the afternoon. Maybe some later buses would help that issue. I was using a bike, so that was not a major issue for me at the end. Oh, and you could help members by renting out bikes at the institute, it was quite cumbersome to get one, I ended up having to go through 3 bikes during my stay.

37.

- a. It is wonderful. I appreciate this experience a lot.
- b. No response

38.

- a. It was a wonderful opportunity. Even though eventually I made a transition away from the area I worked on while at MSRI, I still established a lot of professional contacts which were very helpful for the development of my career.
- b. No response

39.

- a. MSRI provides wonderful opportunities to the mathematical community and its programs are in general of the highest quality. It fosters a great atmosphere for interacting with other researchers in the area and learning from them.
- b. I think the postdoctoral experience would be a lot more valuable if the mentors would engage the postdocs in new research programs. In my specific case, there was almost no interaction between me and my postdoctoral mentor.

40.

- a. An MSRI postdoc was a transformative experience for me and helped me get a tenure track assistant professor position. It also helped me create a network of researchers and give visibility to my work. It gave me a birds eye view of the field of inverse problems and I am now comfortable talking to pretty much anyone in the field about their work. This goes both ways: since I know what others know in my field, I also know how to better target my explanations. I also established one solid collaboration that is strong to this date and tried to collaborate with at least 2 other researchers that I met during this semester. Some of the ideas we had during my postdoc at MSRI are only coming to fruition now.
- b. An MSRI postdoc is 6 months, and I think MSRI did a fantastic job coordinating with the institution I was going to, so that they would let me leave for the whole semester. This coordination is essential. I suggest it could be amplified by e.g. giving postdoc positions earlier than most other postdoc positions so that the MSRI postdoc has more chances of getting a 2-3y postdoc.

41.

- a. Good place for people who want to take a sabbatical year or are not in the job market and want to avoid teaching. Otherwise no.
- b. Mentors and organizers spend way too much time traveling and in many cases it is simply hopeless to get ahold of them. With all of the time that mentors spend traveling there is no chance to have an enriching interaction. It is unfair that postdocs are so heavily constrained when it comes to traveling and on the other hand mentors travel freely thus completely neglecting their mentees. Also, the salary is really a problem, specially since MSRI is having difficulty helping their postdocs finding housing. With the salary that MSRI pays it is impossible to get decent housing in the bay area due to low income and most apartment complexes would either turn one away or impose draconian fees. The salary paid by MSRI should be at least twice the current salary. Finally, the housing department at MSRI is a complete shame, I was only offered one accommodation which ended up falling through and I was forced to take an apartment which was a joke (no mail, no oven, no parking, nothing) and all of this despite applying for housing in a timely manner. On the other hand I know of full professors who were



given several options to choose from when they were looking for housing. How come that postdocs are offered such limited options for housing?

42.

- a. The experience was really important. The interest and knowledge of the mentor I had were truly beneficial as well as the nice environment at MSRI. I hope to be back again soon!
- b. Maybe have more peer talks about struggles/advice people have at the specific time of their career.

43.

- a. I can't think of another environment that is as conducive to research. MSRI is the perfect place to focus on a problem with access to many of the experts in a particular area.
- b. No response

44.

- a. MSRI has provided by far the most friendly, active, exciting, and productive research environment in mathematics I have ever experienced, and I have benefitted greatly from every aspect of the program, may it be the many informal seminars, and teas, that have led to a number of ideas, the thoroughly pleasant and conducive to work atmosphere and location, and the unparalleled opportunity to meet many of the senior leaders in my field.
- b. I think that language like "MSRI has one of the most competitive postdoctoral programs," etc. raises false expectations among postdocs. While the experience has been hugely beneficial to my professional career, I do not think it has made any difference for finding a permanent job. In my experience postdoctoral fellows are increasingly pressured, and while various additional workshops would be helpful, they would have to be effective and very targeted, because after all 1 semester is not all that long, and especially in the fall semesters postdocs will be under pressure to produce, and to apply. Personally I think the mentorship program is a wonderful idea, but I do think that the senior people have to be prepared for it, and the responsibilities /expectations have to be communicated to them. Mentorship is only as good as the mentor. Finally I think transparency, and honesty are essential at all levels: Postdocs have to be prepared for the reality of job market. Having said that, I do think MSRI's strongest quality lies in the exceptional research environment it provides, and the things I remember the most are the outside black board, the library, and informal seminars, which are focused on pure research without distractions, and in some sense this maybe be even more important than training for the job market.

45.

- a. My research collaborations formed at MSRI helped me to develop new ideas because of which I was able to successfully supervise two Ph.D students afterwards. They have also benefitted from the connections I formed at MSRI.
- b. No response

- 46.
- a. The day-to-day experience, and regular interactions, facilitated through a semester at MSRI was the most potent means for me to develop professionally and acquire a taste for which research questions to pursue.
  - b. I wish there had been far more opportunities to give presentations to the community in attendance, especially early in the semester. I wish there could have been more, and diverse, ways to engage with senior researchers. I might suggest more frequent, and lower-key, seminars, each focused on a specific topic that needn't last an entire semester. While it is always possible to self-organize such, the dependency on such initiative, and leadership, could be replaced by a more reliable formal structure.
- 47.
- a. No response
  - b. I was disappointed with my (lack of) interaction with my MSRI assigned mentor. The senior researcher was certainly friendly, but made it clear that he was uninterested in having regular meetings, or really, in mentoring or discussing research at all. My suggestion to MSRI would be to be clearer when outlining the expectations of mentors to the mentors themselves. I don't think it is for everyone, and having a negative experience with a mentor is probably worse than having no mentor at all.
- 48.
- a. I really enjoyed the time at MSRI!
  - b. No response
- 49.
- a. I found the environment very conducive to research and had a very productive time at MSRI. Being in close proximity with a large body of some of the most knowledgeable people in my specific subfield was especially helpful, for example there was one collaboration that I started during the program and we had finished by the end. This was due to being able to concentrate solely on research, and being constantly exposed to the newest developments in the area on a daily basis.
  - b. No response
- 50.
- a. My experience was great! I felt I was in a very supportive environment, I made a lot of connections that are still very important to my research four years later, and the mentorship program helped me a lot during and after my time at MSRI.
  - b. No response
- 51.
- a. I consider my stay at MSRI to be an extremely important part of my career. It allowed me to greatly further my research, start new collaborations and build new connections. I also believe that holding the prestigious postdoctoral fellowship at MSRI allowed me to later successfully apply for competitive funding ... and positions (I hold a research-only professorship...) and has had an incredible influence on my scientific career.
  - b. It is perfect! I don't see anything that would need improvement.

52.

- a. MSRI provides a very good research and development environment for young mathematicians. I greatly benefited from my experience in MSRI.
- b. No response

53.

- a. My time as a postdoctoral fellow helped me tremendously in terms of exposure. I believe this played a very significant role on the tenure-track job market.
- b. It would be nice if getting food while working late/irregular hours wasn't such a nightmare. That may sound silly, but it really was an impediment to making the most of the institute.

54.

- a. The postdoctoral mentorship scheme is a concept that is distinctive to MSRI and one that works very well, in being both hands on -- the mentors and mentees are in some sense assigned to work together, and given intelligent suggestions to encourage them to play their roles effectively -- and at the same time hands off, in allowing the mentoring partnership to develop in whatever way seems appropriate to the individuals involved, without specific targets or expectations to be met that might stifle the process.
- b. The mentorship scheme was an excellent, well thought-through resource, for the reasons addressed above (Q22). The postdoctoral seminar was a drain on time (also organisationally) that categorised postdoctoral fellows as "other" to the main program, in particular excluding them from the stream of speakers chosen for other seminars. While the idea might have been to allow for "job talk" practice, working things out in front of an esteemed audience doesn't necessarily help, unless they are there as they have explicitly been invited to provide supportive feedback. However, banning senior audience members excludes postdoctoral fellows from full interaction with other program members (especially if excluded from having a forum in seminars). Thus if job interview preparation (which includes, especially for the US system, a far more involved process than just giving a talk and having a single relatively short interview) were sought, folding this explicitly into the mentorship program would be more productive. An alternative would be providing directed mentorship on this point from national and international program visitors (parallel to the mentorship program), in the sense that, for example, someone from France could be explicitly available for support if a postdoctoral fellow were interested in applying for jobs in France. The five-minute talk day was exhausting and only (partly) useful for those present for a longer term or near the start of the program (i.e. when the day took place); better to spread out sessions throughout the semester to accommodate those who arrived later and keep everyone's engagement in the event (it also should not be compulsory for anyone -- the better it works the more appealing it should be to participate, not the other way around). The "ethics training" requirement was a complete waste of time, since the vast majority of it was targeted at aspects of academia irrelevant for mathematics -- the worst thing being, then, that the relevant aspects get lost in all the noise. Finally, a suggestion of what NOT to change: as mentioned above, the mentorship scheme benefits from its flexibility. While mentors should be chosen who will really engage with the idea of postdoctoral mentoring (not all program organisers understand this, for example...), and

- those mentors should be given directed prompting and suggestion at the start of the program (as happens now), the relationship between mentor and mentee should not be forced and should be allowed to develop in a way that benefits the postdoctoral fellow as much as possible, whatever that means, without too much monitoring or box-ticking required.
- 55.
- a. MSRI is an incredibly strong brand in the Mathematics community that carries an enormous amount of scientific credibility and weight. The honor of having been chosen as an MSRI Postdoctoral Fellow has been extremely important for the success of my academic career.
  - b. No response
- 56.
- a. While I knew many of the other mathematicians in my field at MSRI, the MSRI program helped me make more robust connections to them---it's not that I made entirely new connections, but that more senior mathematicians got to know my work more thoroughly and vice versa.
  - b. No response
- 57.
- a. Don't change anything!
  - b. No response
- 58.
- a. This is a wonderful program. No duty of publications, free communication atmosphere, however still generate interesting results from then on.
  - b. No response
- 59.
- a. I like that I can still use the MSRI email address. I write it in several of my current papers, since it is the only stable (academic) email address that I have, since other institutions close accounts of past employers.
  - b. No response
- 60.
- a. Whether someone who will spend time as a fellow at the MSRI ends up working in the US or not, the time at the MSRI will link this person with contacts to the US in a strong way. It will increase the chance that this person will visit and collaborate with people in the US in the future, and hence enhance the scientific production in the US.
  - b. I think the social activities are very important. It is hard for a junior researcher to make contacts, especially with more senior researchers. Social events will help to break the ice.
- 61.
- a. I had one of my best semesters ever.

- b. No response
- 62.
- a. MSRI was unique in that due to the workshops there was such an extremely high number of experts in my field concentrated there during the semester I was a post-doc there.
  - b. I valued a lot the freedom I was given. So for me these kind of workshops I tend to ignore them, but maybe they are useful for other people. I would suggest to keep doing them.
- 63.
- a. The change of mathematical scenery, as it were, gave me very valuable stimulation -- I went from a department with around three faculty members and one other postdoc with sympathetic interests to an environment where everyone around had them. (I imagine though that the NSF likes things quantified and I'm not sure what quantitative outcome to seek here.)
  - b. Not that come to mind.
- 64.
- a. The all experience was great and it was very stimulating. I increased my network of international contacts and I was able to communicate my results as a speaker of several workshops at MSRI.
  - b. My tutor helped me a lot for what concerned job applications and gave me a lot of good advices about journals. But we were working in two fields not so close. I would suggest to give mentors that are more mathematically close.
- 65.
- a. The postdoc at MSRI was a rich experience to create long-term professional contacts and to learn new mathematics.
  - b. The choice of mentors could be sometimes more careful, so that new collaborations can actually start. Some postdocs during the semester could not meet their mentors on a regular base (not because they were unwilling to...).
- 66.
- a. My time at MSRI was phenomenally important to my career development and to my growth as a researcher. I made many contacts during my time there, which resulted in collaborations and several invitations to conferences and for research stays in the following years.
  - b. No response
- 67.
- a. Excellent working conditions. It is amazing and inspiring to be surrounded everyday by potential collaborators and leaders in your field.
  - b. Have a restaurant/canteen would be very nice.

- 68.
- a. No response
  - b. I do not believe in the postdoc system at all. It is a terrible experience and ruins the postdocs life. It is also a hindrance in the development of the candidate's professional development, his independent research agenda. These days I strongly discourage my students for a research career.
- 69.
- a. I liked learning about fields connected to mine that I never would have discovered
  - b. There could have been more practical training in these areas, like a weeklong crash course in theoretical computer science at the graduate level would help people not only be aware of the field but also start reading it on their own.
- 70.
- a. A very enriching experience. Highly stimulating working environment. I have learned a lot participating in reading seminars organized by professors on the program and made many research contacts. I wish there were more institutes that offer thematic programs like that.
  - b. Maybe to include short workshop on grant writing and another one on preparation for job interviews.
- 71.
- a. MSRI Postdoctoral Fellowship is the best way for young researchers to get to know the community they will work with. I connected with dozens of people while at MSRI and many of them played significant roles in my career afterwards.
  - b. No response
- 72.
- a. My time at MSRI helped me develop strong connections with other people in my research area. Now that I am a professor at a PUI, these connections have served me to place my students in REUs and Ph.D programs.
  - b. No response
- 73.
- a. I did not have a true mentor during my first academic postdoc. It was only at MSRI did I have what I would truly call a mentor - really three of the senior faculty visiting in the fall semester of 2012 acted as mentors to me, and I communicate with them to this day. (I have written 4 papers with one and 3 with another.)
  - b. I've mentioned this before, but my main difficulty came from the fact that I was completing a postdoc when I accepted the MSRI position for the fall only. Very few places I interviewed were willing to allow me to postpone starting until the spring semester, which made finding a job very difficult. However, in the long run the time I spent at MSRI has completely changed my career trajectory and I am very grateful for having had the opportunity.

- 74.
- a. Giving an Evans lecture helped me a great deal - as a result I made new professional contacts not only at MSRI but at Berkeley as well. I am still collaborating with someone there. The mentoring program was fantastic, and even though I don't collaborate with my former mentor, we still keep in touch.
  - b. No response
- 75.
- a. Amazing place, only a partial assessment can be made at this point of the impact it had on my career.
  - b. Advice on proper placement of resulting articles. Currently have three preprints that have great results with ideas that started at MSRI and are still in the peer reviewing process.
- 76.
- a. It was just good being around other mathematicians. Informal mentoring is more helpful to me than any formal programs.
  - b. No response
- 77.
- a. I strongly believe that my time at MSRI is the reason I am still in mathematics today.
  - b. The postdoctoral fellowship program is truly remarkable. My only suggestion for improving the program would be to expand it considerably. In addition to bringing in more postdoctoral fellows each semester, I think it would be nice to keep postdocs on for a longer period beginning with their program of expertise and continuing for at least an additional semester. This would both foster a sense of independence in their own research program and give the opportunity to pursue an academic interest in the topic of the following semester program.
- 78.
- a. After finishing Ph.D. I was in position of trying to get a job in academia. --- This is no small task for most. For myself, coming from a small (mostly mathematically isolated) department the task was even harder. (MSRI was the most fun and exciting time in my life.) Much to learn, and not just facts and formulas and themes and techniques and "programe"; the amazing thing of MSRI to me was [the presence of so many senior mathematicians].... everyone at MSRI that semester was someone whose work I had tried to read and understand. I got to meet them and talk with them, many cases about math. Even in the cases I did not talk math one on one, I got to hear them discuss math in seminar and mini-courses. --- This is the fundamental understanding I had when leaving MSRI; mathematics is done in community and I have a place in that community.
  - b. The postdoc seminar was intimidating; but also having done it most rewarding. [A professor] came down the steps after and asked me a few questions and told me he enjoyed listening and wished me well in finding work and that "I deserved to be a good place." --- that is not a job, but it was affirmation and something I hold on to. Also we had a moment to meet and have lunch with the [Board of Trustees]. Karen Ulenbeck came and sat with me and we had lunch. (Won't ever forget that and her

encouragement.) Also the Directors, David Eisenbud and Hélène Barcelo were extremely welcoming! This made so much of a difference to me! --- I actually got emotionally entangled in uncomfortable way. I did not at all handle it well, but the fact that the directors of MSRI were welcoming to me everyday made me feel welcome in the space. (Also, made sure that I had a mentor. Something happened between beginning and ending semester and I was not in a position to negotiate very well.) I thank them for their expansiveness and generosity! (although they would probably say they were only doing their job.)

79.

- a. It was a great experience but didn't seem to help with my postdoc applications.
- b. No response

80.

- a. No response
- b. A lot of questions were about mentorship. During my postdoc, all the senior professors did research with each other and the postdocs seemed somewhat left out to dry.

81.

- a. It was very important to my experience that I was among other postdoctoral fellows from groups underrepresented in mathematics.
- b. I would suggest having some structure to the mentoring. It appeared that some mentors were not even aware that they had this position.



## **Appendix D: Areas of Additional Training**

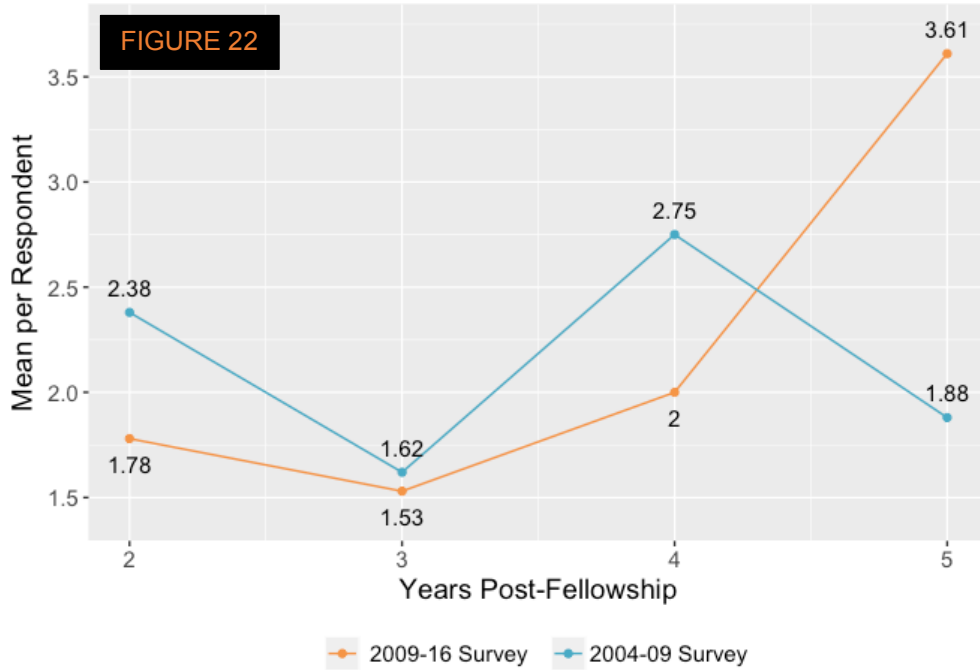
We asked fellows in what areas they would have “appreciated significantly more training.” In addition to the list of selections provided, fellows were able to specify any additional areas that were not among those listed. Free form responses to this question are listed below. We have corrected spelling errors in some cases to facilitate ease of reading.

### **Responses from Individual Fellows**

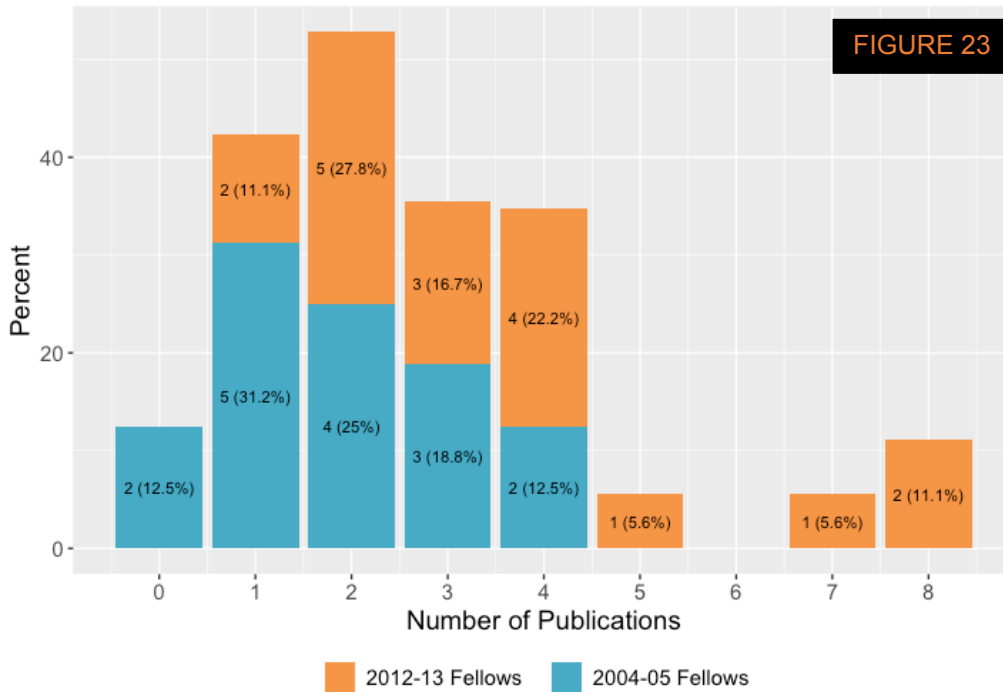
- I already had a tenure-track job. Advice on how to get tenure would have been useful.
- The entire idea of postdoctoral positions is ill conceived.
- Introduction to new and active research directions
- Could have had more mini courses rather than seminars
- I found the environment at MSRI incredibly stimulating and I already benefited greatly from my interactions with everyone in the program including my mentor, .... I cannot imagine anything different that could have prepared me more for my current track in mathematics.
- I want to comment here that I think it's important not to dilute the experience of being at MSRI with the sorts of training regimes alluded to in the above, at least not in a mandatory way. Being compelled to take such training would have negatively impacted my experience as a postdoctoral fellow.
- prioritization of research directions
- many of those things were far from my mind as I had more postdoc years lined up
- For me it was great that at MSRI I was given the freedom to focus on my work, and wasn't forced into any kind of training for job interviews, organizing conferences, writing grants and so on. I was working on a difficult project (at least I found it difficult) so I needed all my energy to complete it, so again, it was great that there were no distractions
- I was not able to apply for an NSF Grant without a home institution, my subsequent position was a postdoc at MPIM

## Appendix E: Comparing 2004-09 and 2009-16 Outcomes

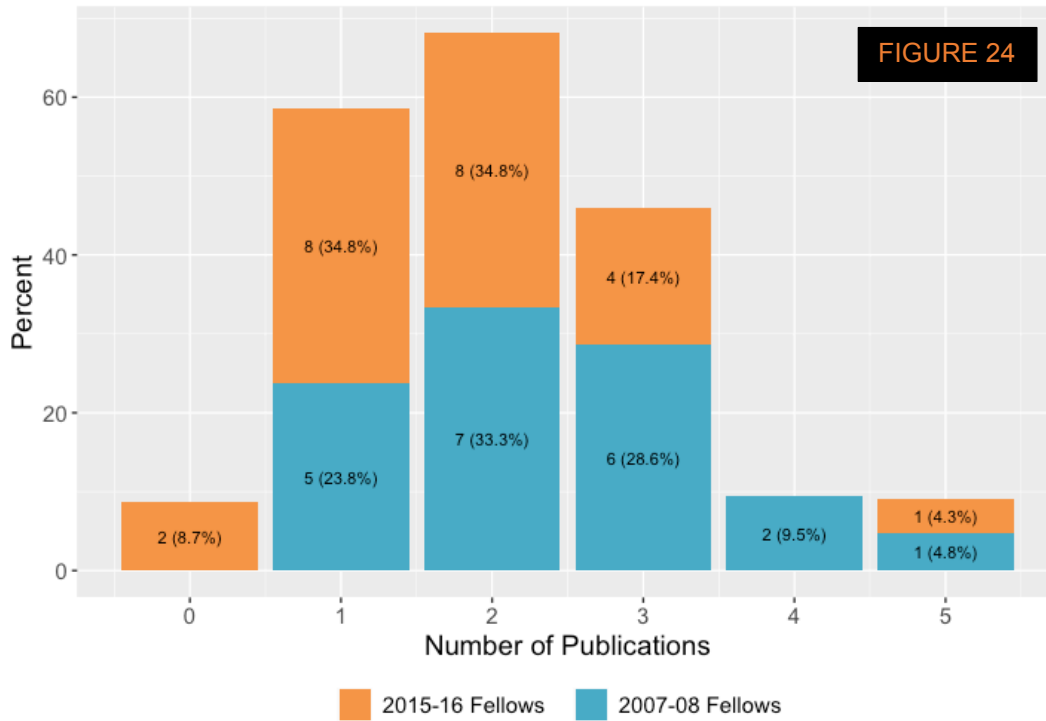
Mean Papers Published Resulting From MSRI Work per Respondent



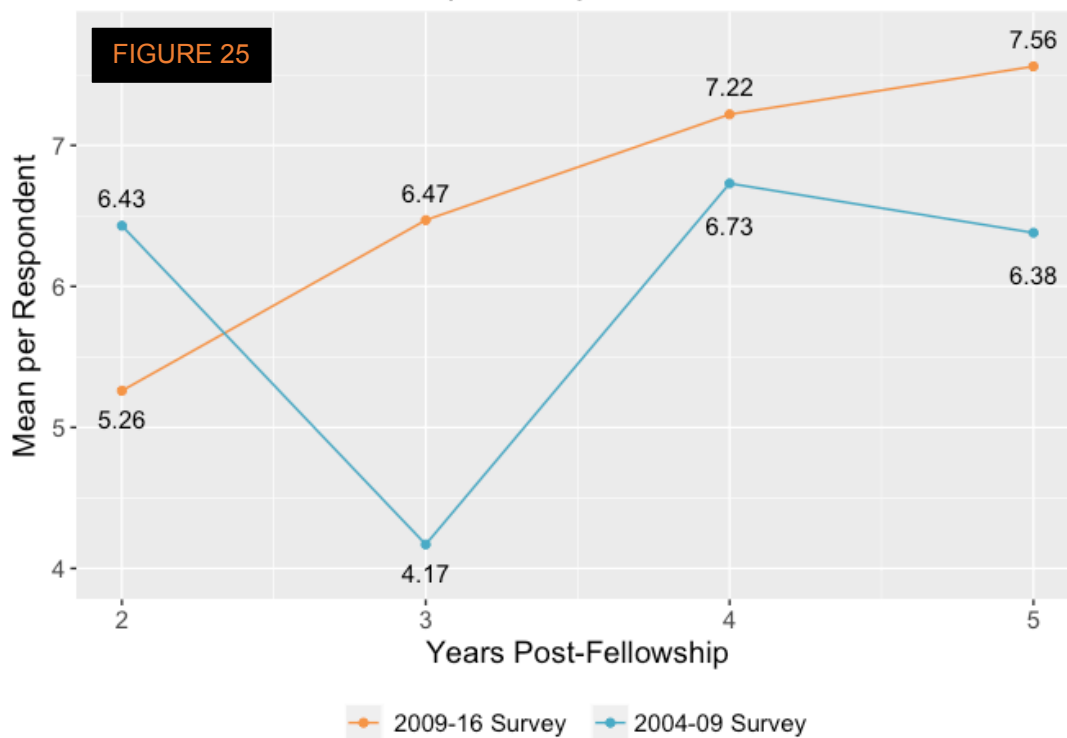
Publications Based on MSRI Work 5 Years Post-Fellowship



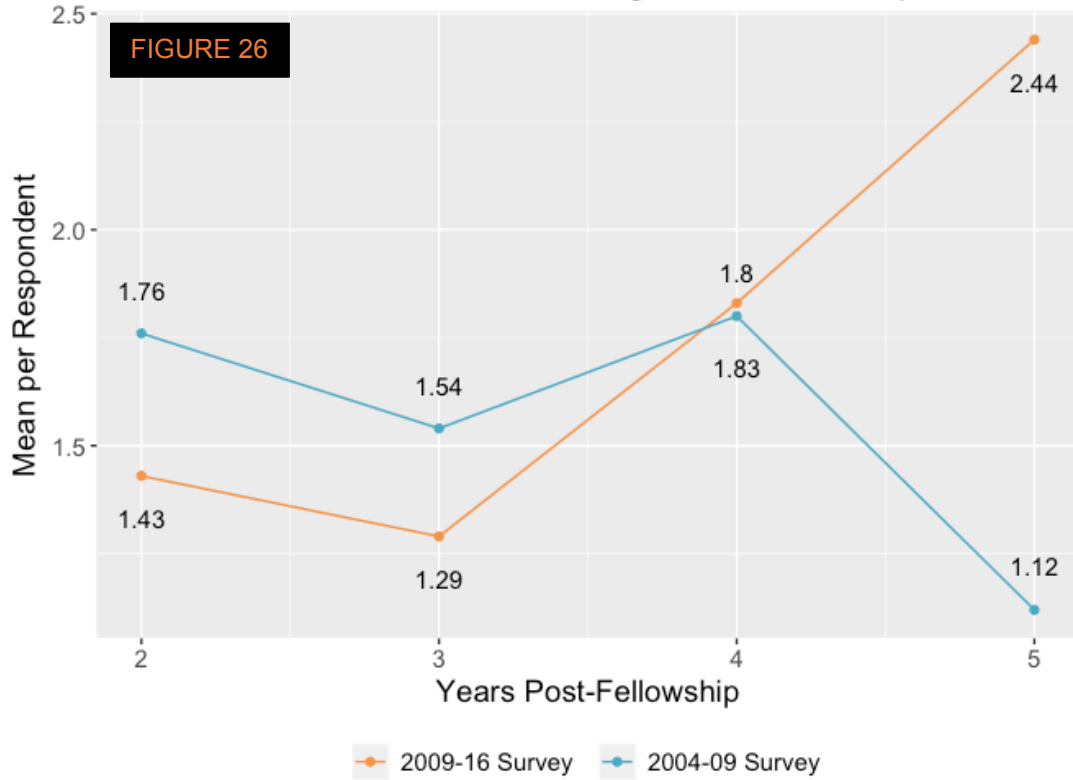
Publications Based on MSRI Work 2 Years Post-Fellowship



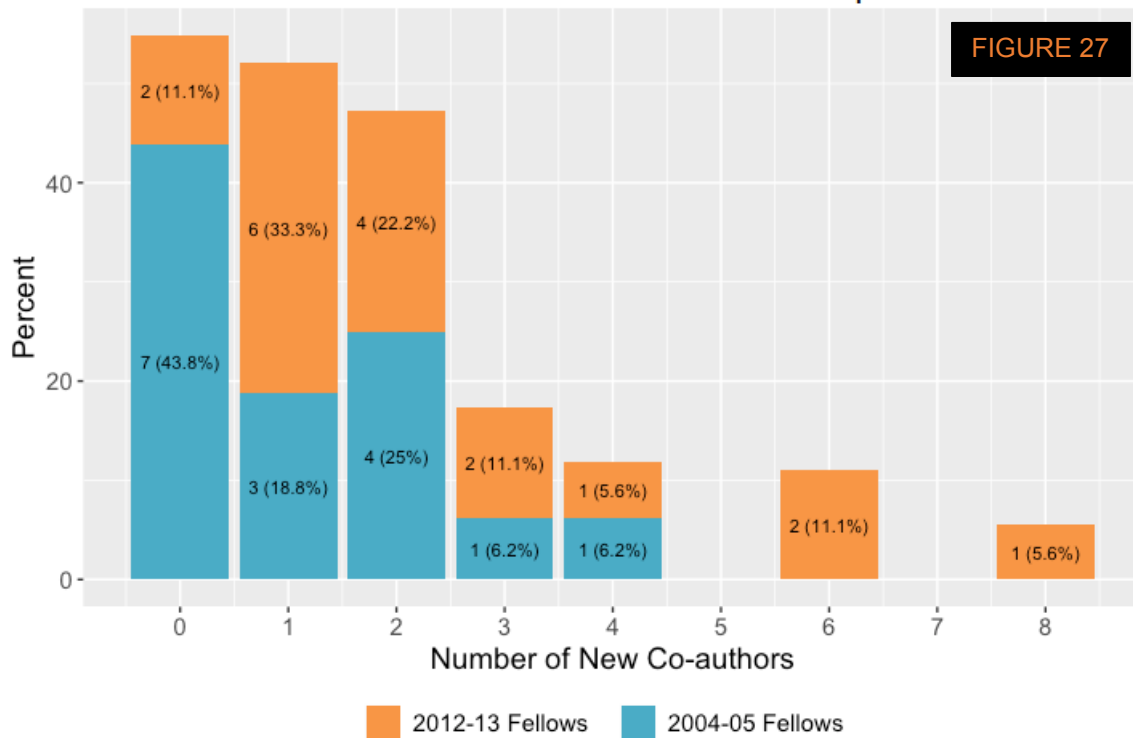
Mean Presentations Given Based on MSRI Work per Respondent



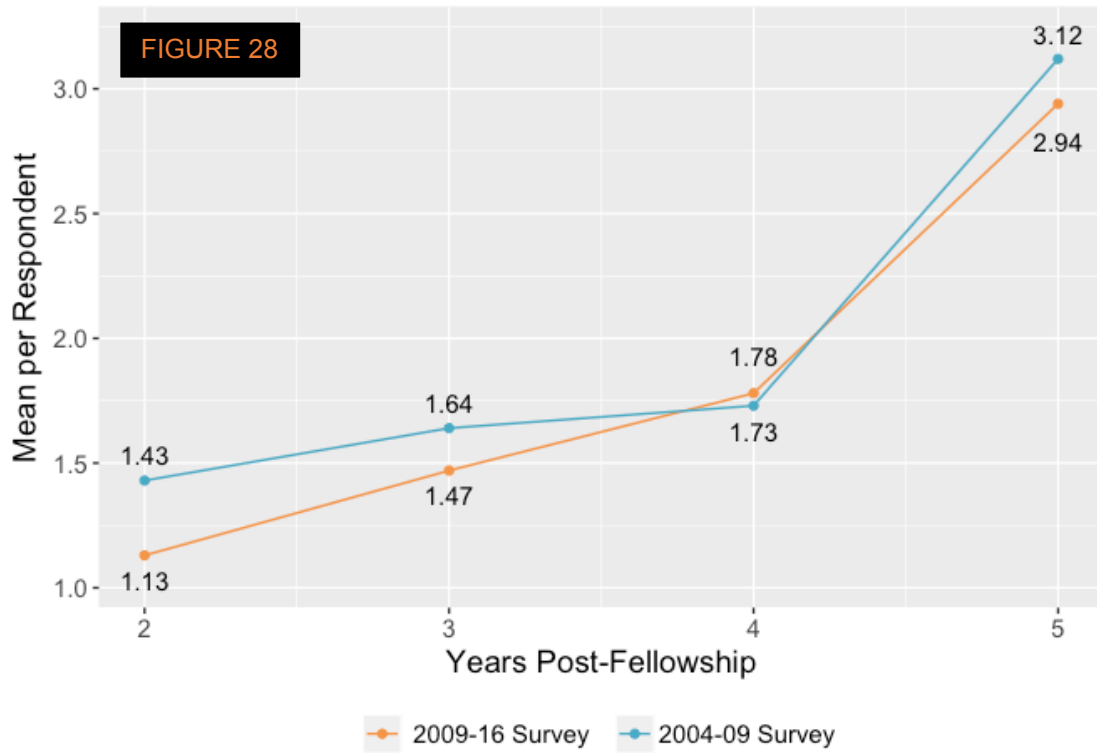
Mean New Co-authors Resulting From MSRI Experiences



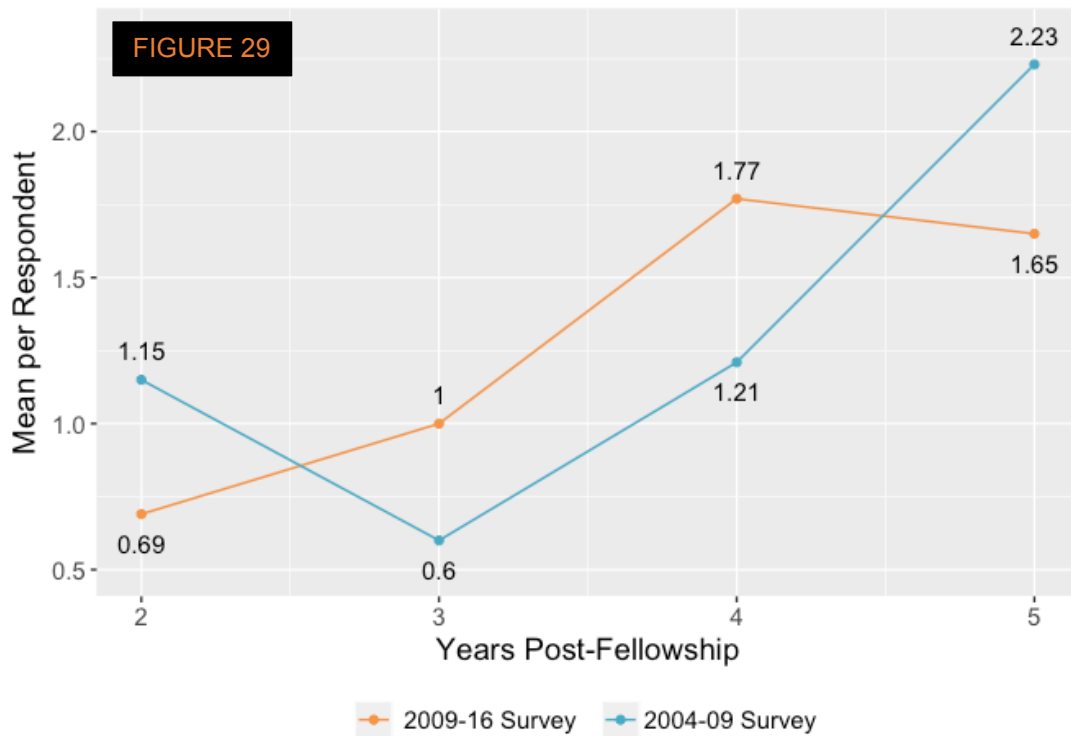
New Co-authors Resulting From MSRI Experiences  
Fellows 5 Years Post-Fellowship



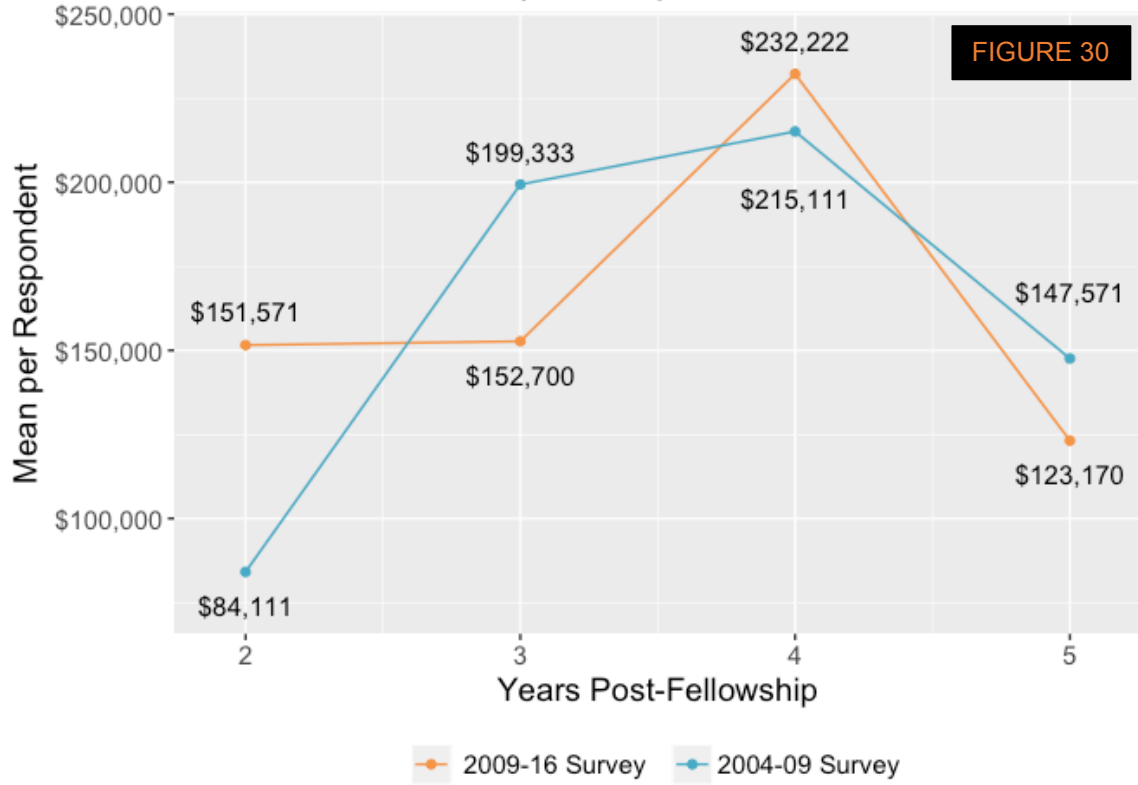
Mean Grant Proposals Submitted per Respondent



Mean Grant Proposals Funded per Respondent

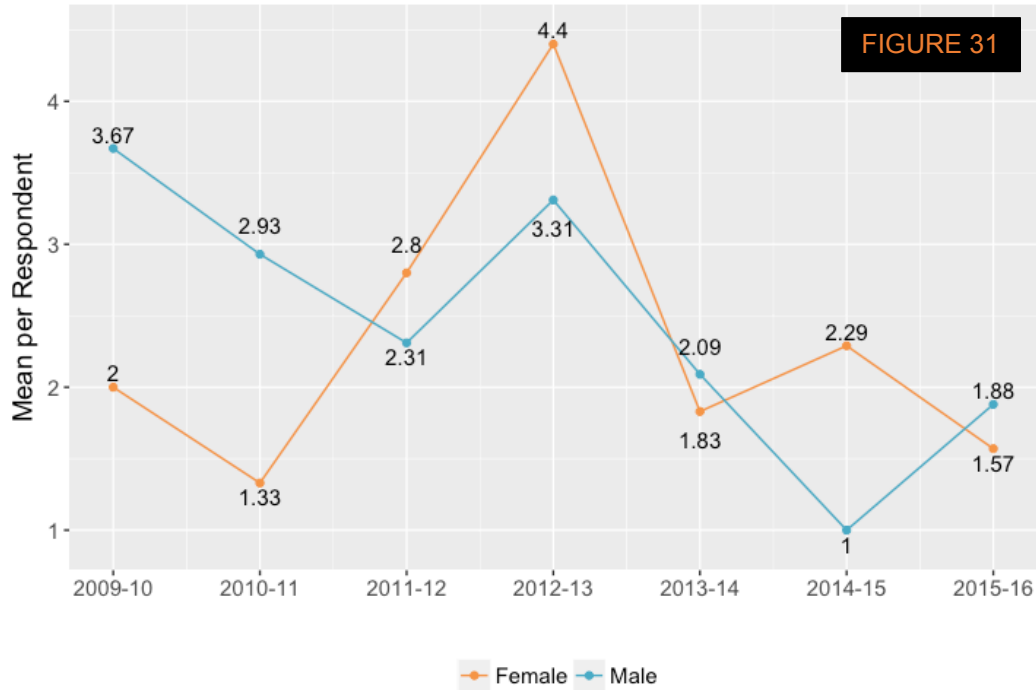


### Mean Dollar Amount Funded per Respondent

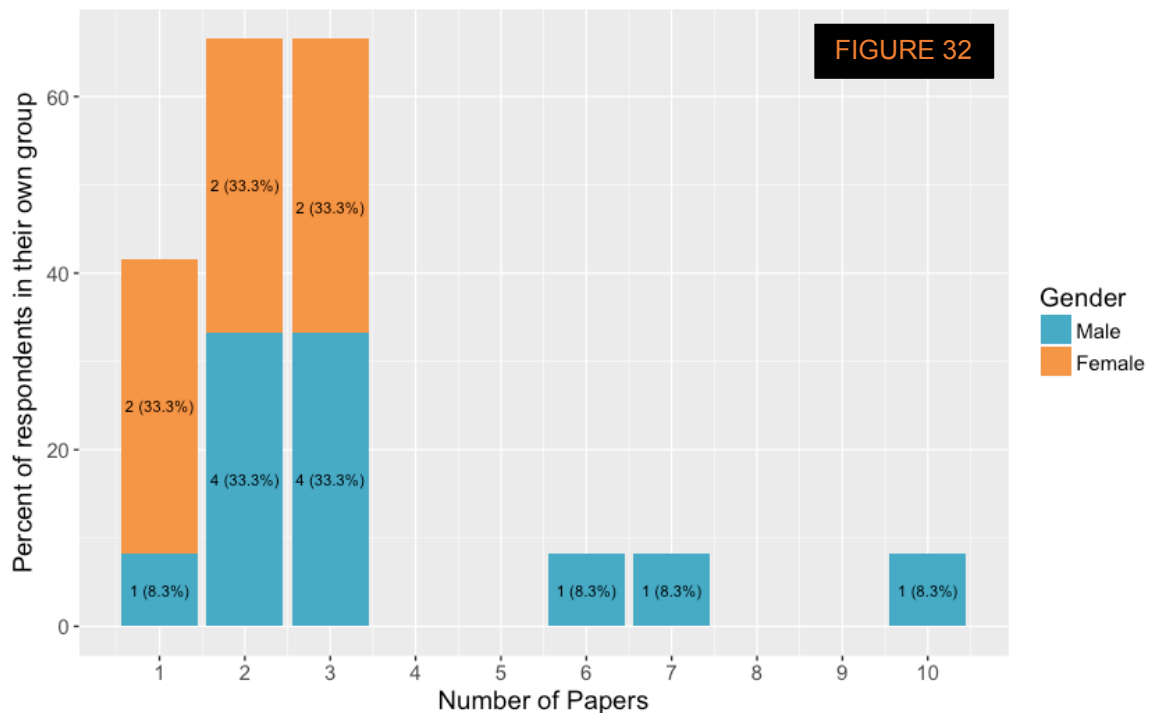


## Appendix F: Comparing 2009-16 Outcomes by Gender

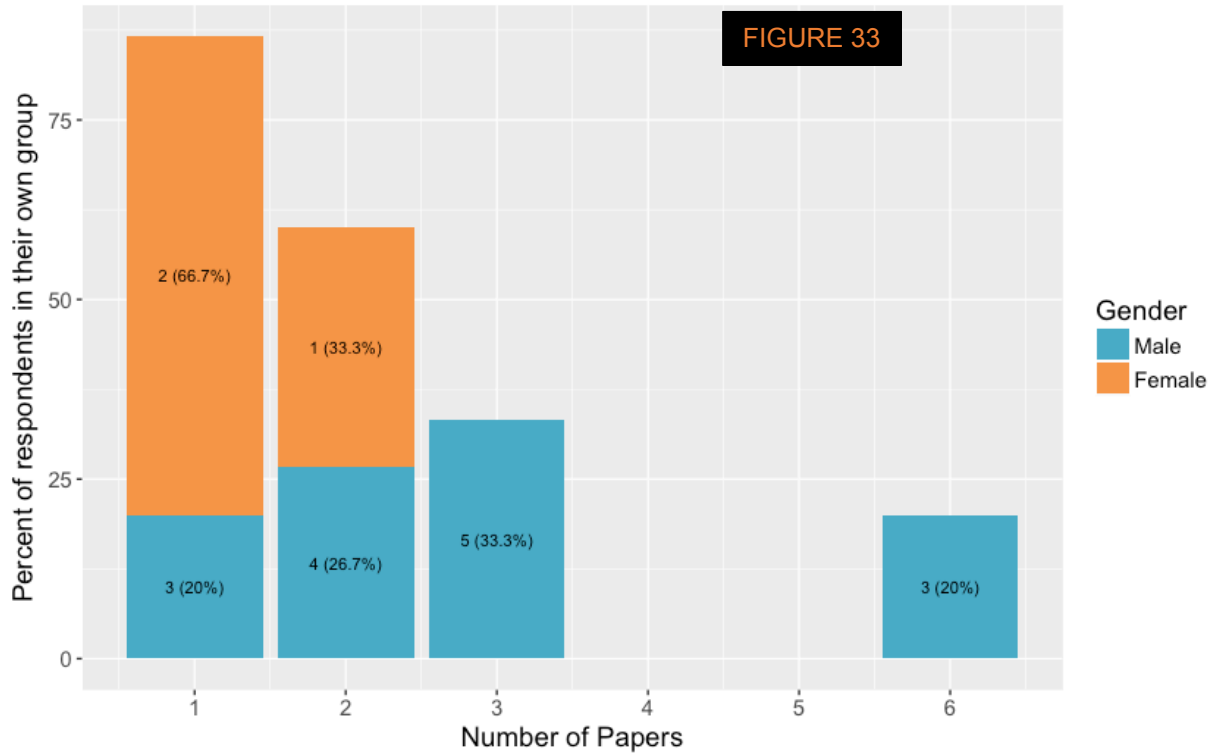
Mean Papers Published Resulting From MSRI Work per Respondent by Gender



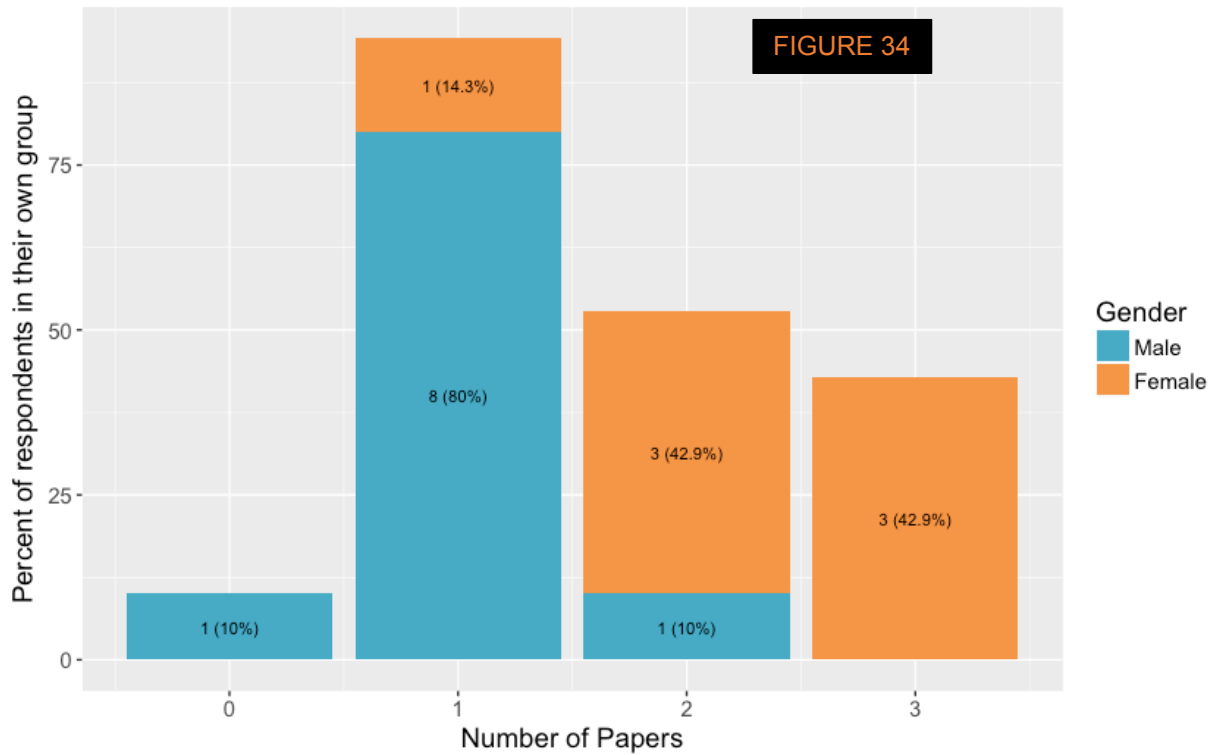
Papers Published Resulting From MSRI Work by Gender 2009-10 Cohort



Papers Published Resulting From MSRI Work  
by Gender 2010-11 Cohort

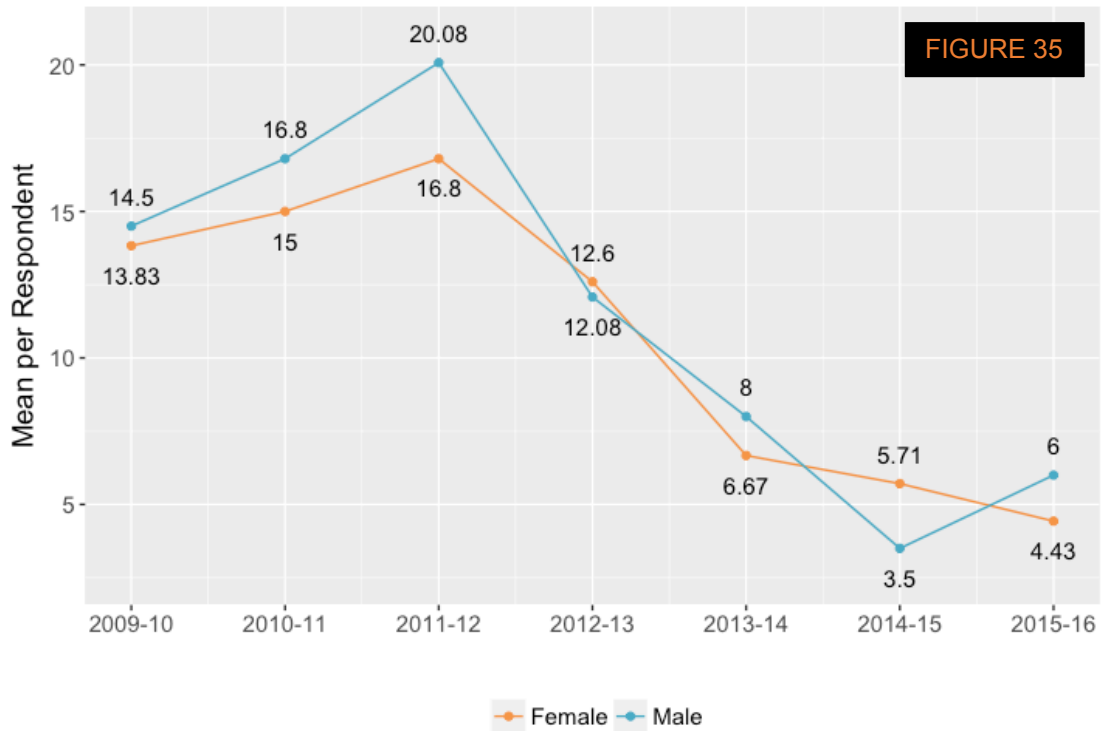


Papers Published Resulting From MSRI Work  
by Gender 2014-15 Cohort

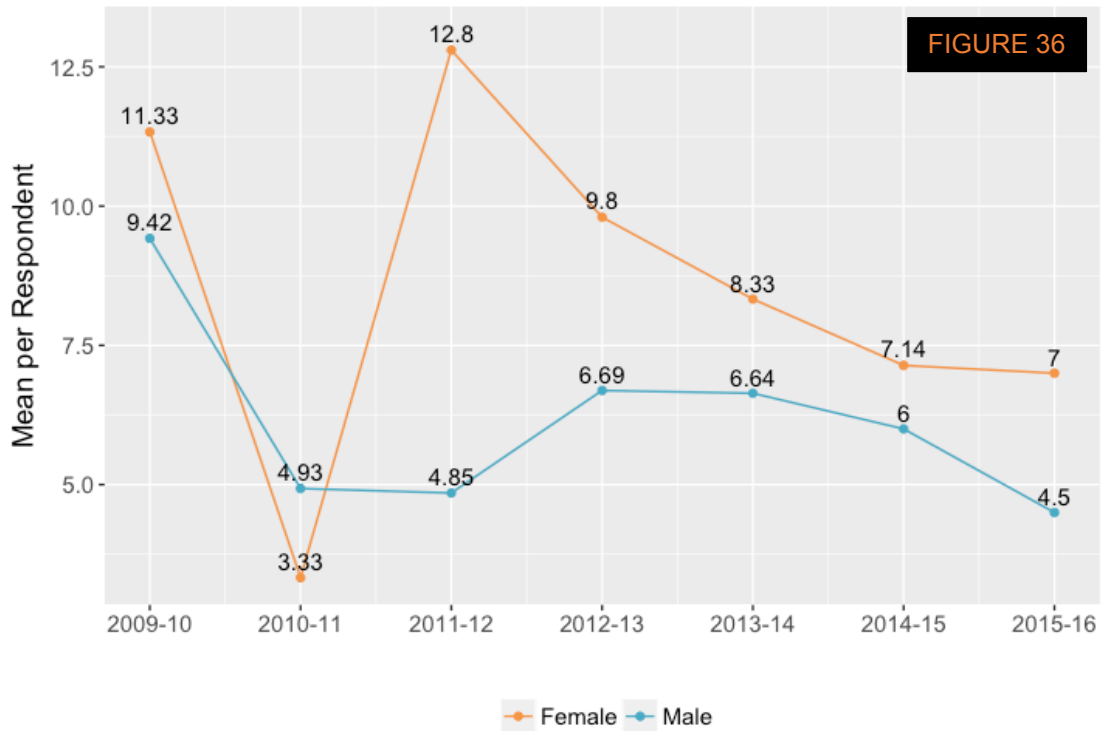




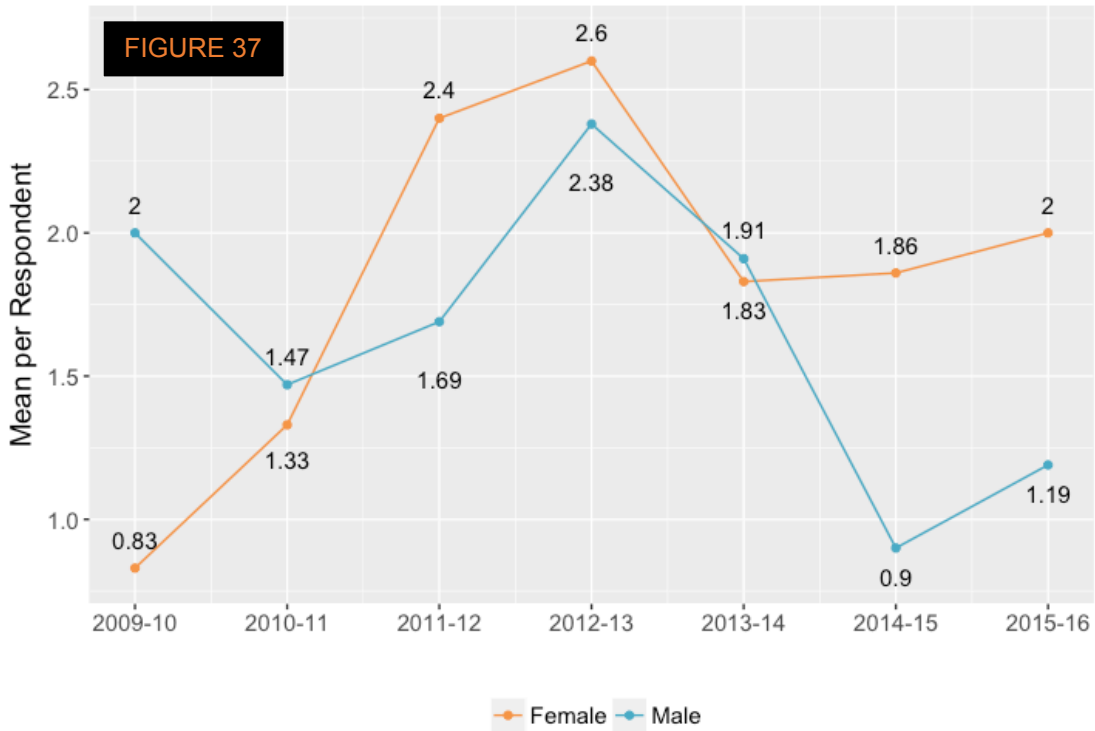
Mean Total Peer Reviewed Papers per Respondent by Gender



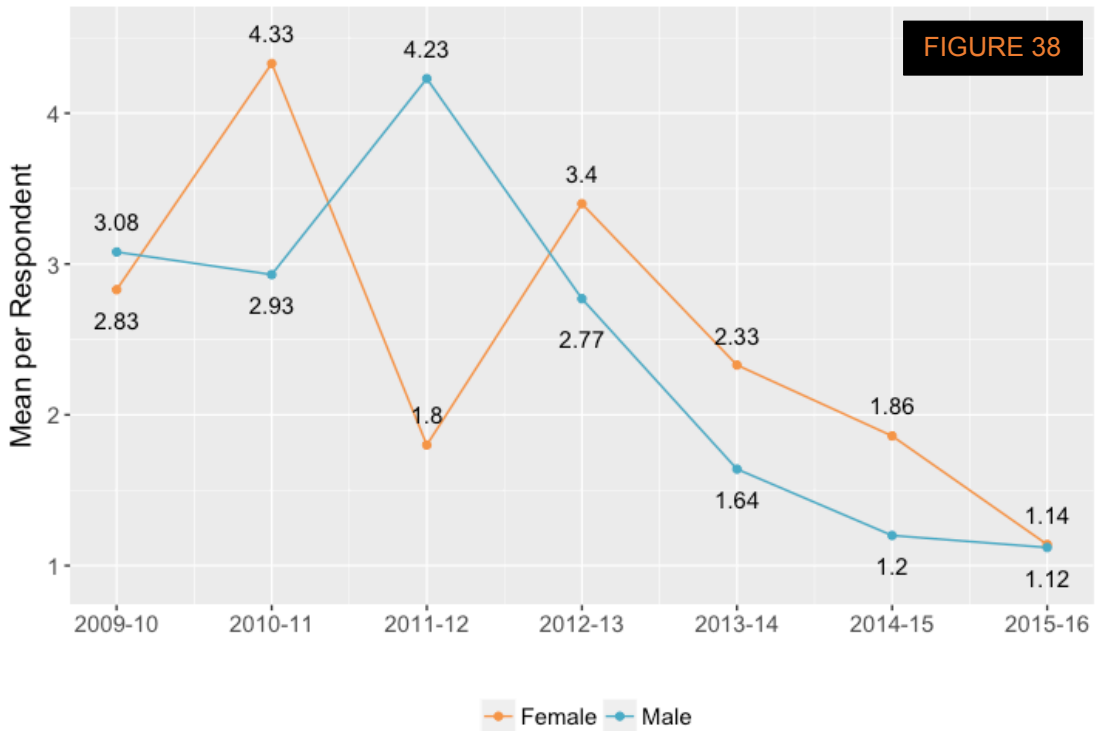
Mean Presentations Given Based on MSRI Work per Respondent by Gender



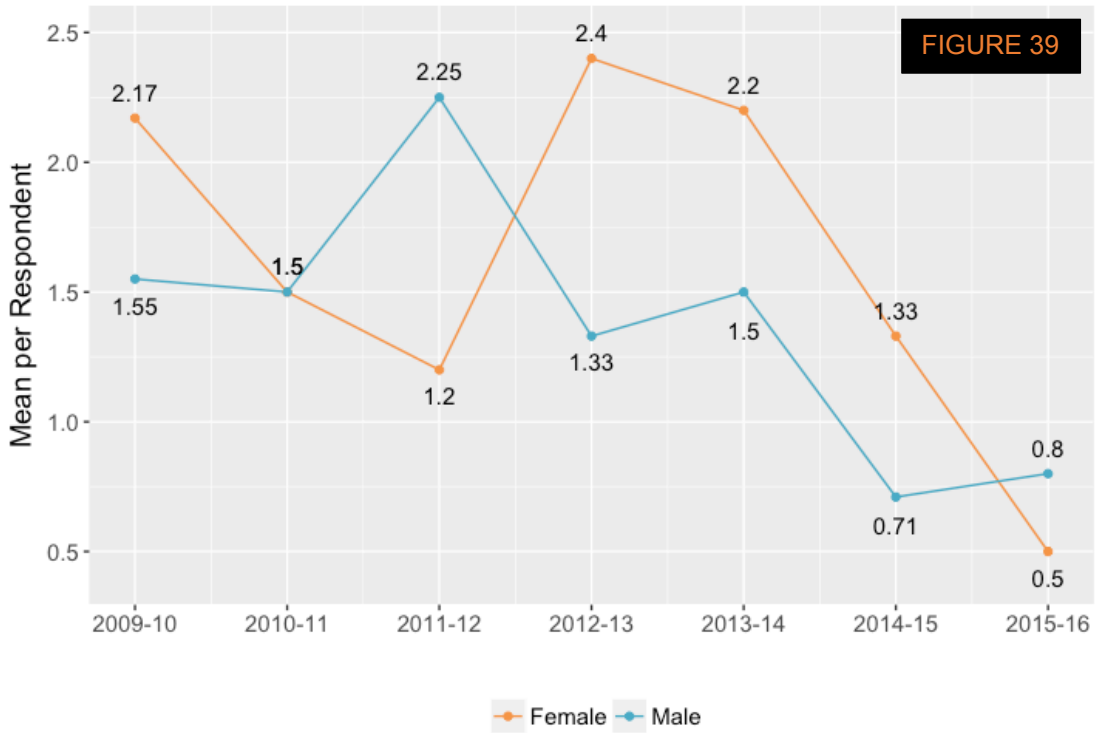
Mean New Co-authors from MSRI Experience per Respondent by Gender



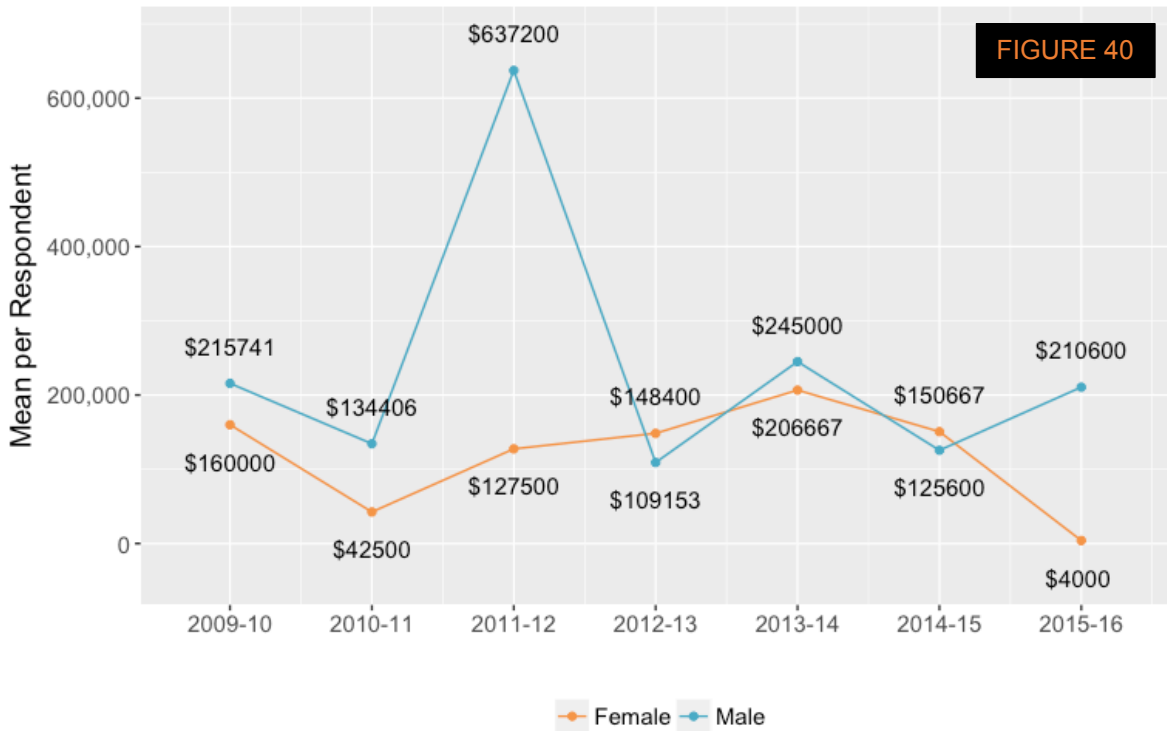
Mean Grant Proposals Submitted per Respondent by Gender



Mean Grant Proposals Funded per Respondent by Gender



Mean Dollar Amount Funded per Respondent by Gender



## Appendix G: Glossary of Terms

**Academic:** An individual who holds a position at an educational institution.

**AMS:** American Mathematical Society

**AMS departmental groupings (1996 to 2011):** From 1996 to 2011, the AMS used a classification system based on the rating of “scholarly quality of program faculty” according to the 1995 National Research Council’s (NRC) assessment of doctoral programs.

See <http://www.ams.org/notices/201209/rtx120901262p.pdf> for more information.

**Group I Public:** the 25 mathematics departments at public institutions whose doctoral programs were assigned a rating of 3.0 or greater by the NRC.

**Group I Private:** the 23 mathematics departments at private institutions whose doctoral programs were assigned a rating of 3.0 or greater by the NRC.

**Group II:** the 56 mathematics departments whose doctoral programs were assigned a rating equal to or greater than 2.0 but less than 3.0 by the NRC.

**Group III:** the remaining 65 doctoral mathematics departments in existence at the time whose doctoral programs were rated below the threshold for Groups I or II.

**AMS departmental groupings (2012 – present):** The AMS classifies U.S. Mathematics departments as either Public or Private and further divides these groups based on the size of their doctoral program. Separate classifications are given to Applied Math, Statistics, and Biostatistics departments. Departments that do not grant doctoral degrees are classified based on the highest degree awarded.

See <http://www.ams.org/profession/data/annual-survey/groupings> and <http://www.ams.org/profession/data/annual-survey/groups> for more information.

**Math Public Large:** the 26 departments at public institutions with the highest annual rate of Ph.D.’s awarded ranging from 7.0 and 24.2 per year between 2000 and 2010.

**Math Public Medium:** the 40 departments at public institutions with an annual rate of Ph.D.’s awarded ranging from 3.9 and 6.8 per year between 2000 and 2010.

**Math Public Small:** the 64 departments at public institutions with an annual rate of Ph.D.’s awarded less than 3.9 per year between 2000 and 2010.

**Math Private Large:** the 24 departments at private institutions with the highest annual rate of Ph.D.'s ranging from 3.9 and 19.8 per year between 2000 and 2010.

**Math Private Small:** the 28 departments at private institutions with an annual rate of Ph.D.'s awarded less than 3.9 per year between 2000 and 2010.

**Group M:** the 177 mathematics departments whose highest degree awarded between 2000 and 2010 was a Master's degree.

**Group B:** the 1,007 mathematics departments whose highest degree awarded between 2000 and 2010 was a Bachelor's degree

**Doctoral granting mathematics departments:** Mathematics departments whose highest degree awarded is a Ph.D.

**MSRI:** The Mathematical Sciences Research Institute, established in 1982 and located in Berkeley, CA. The institute is dedicated to the advancement and communication of fundamental knowledge in mathematics and the mathematical sciences, the development of human capital for the growth and use of such knowledge, and the cultivation in the larger society of awareness and appreciation of the beauty, power and importance of mathematical ideas and ways of understanding the world.

**Non-academic:** An individual who holds a position outside of the educational system including government, industry, non-profit, self-employed, and other positions.

**Non-Asian Minority:** An individual, regardless of citizenship or permanent residency status, who is a member of one of the following racial or ethnic groups typically underrepresented in the mathematical sciences: Black, Hispanic/Latino, Native American, or Pacific Islander.

**Non-tenured postdoctoral faculty:** An individual who holds a full-time postdoctoral position at a U.S. institution and does not have tenure.

**P-value:** A measure of statistical significance, which indicates the probability of finding the observed, or more extreme, results when the null hypothesis is true. The significance thresholds used in this study are the following:

**Marginally significant:** The p-value in a two-sided test of differences in proportions is equal to or greater than 0.05 and equal to or less than 0.1 indicating a 5% to 10% probability that the observed difference would occur by chance.

**Significant:** The p-value in a two-sided test of differences in proportions is equal to or greater than 0.01 and less than 0.05 indicating a 1% to 5% probability that the observed difference would occur by chance.

**Highly significant:** The p-value in a two-sided test of differences in proportions is less than 0.01 indicating a less than 1% probability that the observed difference would occur by chance.

**Postdoctoral Fellow:** A category of program membership reserved for early career individuals (typically less than five years beyond their Ph.D.) to spend five months at MSRI participating in research activities and collaborating with an assigned mentor.

**Respondent:** A postdoctoral fellow who responded to the survey.

**Tenured/tenure-track:** An individual who holds a tenured position or who holds a position eligible for tenure.

**Underrepresented Minority (URM):** A U.S. citizen or Permanent Resident who is a member of one of the following racial or ethnic groups typically underrepresented in the mathematical sciences: Black, Hispanic/Latino, Native American, or Pacific Islander.

**U.S. Based:** Individuals whose home institution is located in the United States, regardless of their citizenship or permanent residency status.

**US/PR:** Individuals who are citizens or permanent residents of the United States, regardless of the location of their home institution.

## **Appendix H: List of Scientific Programs 2009-16**

### **2009-10**

- Tropical Geometry
- Symplectic and Contact Geometry and Topology
- Homology Theories of Knots and Links

### **2010-11**

- Inverse Problems and Applications
- Random Matrix Theory, Interacting Particle Systems and Integrable Systems
- Arithmetic Statistics
- Free Boundary Problems, Theory and Applications

### **2011-12**

- Quantitative Geometry
- Random Spatial Processes

### **2012-13**

- Cluster Algebras
- Commutative Algebra
- Noncommutative Algebraic Geometry and Representation Theory

### **2013-14**

- Optimal Transport: Geometry and Dynamics
- Mathematical General Relativity
- Algebraic Topology
- Model Theory, Arithmetic Geometry and Number Theory

### **2014-15**

- New Geometric Methods in Number Theory and Automorphic Forms
- Geometric Representation Theory
- Dynamics on Moduli Spaces of Geometric Structures
- Geometric and Arithmetic Aspects of Homogeneous Dynamics

### **2015-16**

- New Challenges in PDE: Deterministic Dynamics and Randomness in High and Infinite Dimensional Systems
- Differential Geometry