

**Connections for Women: Geometric Group
Theory**

August 17, 2016 - August 19, 2016

MSRI, Berkeley, CA, USA

Organizers:

Ruth Charney (Brandeis University)

Indira Chatterji (Université Nice Sophia-Antipolis)

Mark Feighn (Rutgers University)

Talia Fernós (University of North Carolina)

REPORT ON THE MSRI WORKSHOP “CONNECTIONS FOR WOMEN: GEOMETRIC GROUP THEORY” AUGUST 17 – 19, 2016

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- Indira Chatterji (Université Nice Sophia-Antipolis)
- Mark Feighn (Rutgers University)
- Talia Fernós (University of North Carolina)

Scientific Description

The field of geometric group theory emerged from Gromov’s insight that even mathematical objects such as groups, which are defined completely in algebraic terms, can be profitably viewed as geometric objects and studied with geometric techniques. Contemporary geometric group theory has broadened its scope considerably, but retains this basic philosophy of reformulating in geometric terms problems from diverse areas of mathematics and then solving them with a variety of tools. The growing list of areas where this general approach has been successful includes low-dimensional topology, the theory of manifolds, algebraic topology, complex dynamics, combinatorial group theory, algebra, logic, the study of various classical families of groups, Riemannian geometry and representation theory.

The goals of the MSRI semester-long *Geometric Group Theory* program are to bring together people from the various branches of the field in order to consolidate recent progress, chart new directions, and train the next generation of geometric group theorists.

The three-day *Connections for Women* workshop featured talks by six prominent female mathematicians on a wide range of topics in geometric group theory. Each speaker gave two lectures, separated by a breakout session during which participants met in small groups to discuss ideas presented in the first lecture. On the second afternoon, there was a panel discussion entitled *Building and Sustaining Momentum*. A list of speakers and the schedule is attached. The workshop was open to all mathematicians.

Highlights of the Workshop

The discussion sessions between lectures were particularly effective. Participants broke up into groups of about 5 and senior people were advised to disperse themselves among the groups. Participants reported two important consequences. On the one hand, the discussions allowed them to clarify any questions that arose during the first lecture and to quickly gain a deeper understanding of the topic. On the other hand, the small groups provided an interesting way for people to get to know each other in a close, relaxed environment. It also provided junior participants a chance to work together with more senior participants to understand topics in which neither were experts. Comments from the surveys about the breakout sessions include:

I really enjoy the structure of the schedule : talk-discussion-talk. It was enormously helpful to understand the first part and be ready for the second.

I really enjoyed the discussion sessions between the lectures. They provided an excellent environment to clear up questions and solidify understanding.

Another highlight of the workshop was the panel discussion on Building and Sustaining Momentum. Five women at various career stages described challenges they had faced during their career due to lack of encouragement or lack of confidence. They talked about how these issues can affect career development and offered positive suggestions on how to deal with such challenges. A lively discussion followed with many questions and personal stories.

Overall, the feedback on the workshop was very positive:

The set up for the workshop (including discussions) was awesome!

Wonderful experience, amazing and helpful staff! I had great discussions and made great connections. Looking forward to the next!

Organizers		
First Name	Last Name	Institution
Ruth	Charney	Brandeis University
Indira	Chatterji	Université Nice Sophia-Antipolis
Mark	Feighn	Rutgers University
Talia	Fernós	University of North Carolina
Speakers		
First Name	Last Name	Institution
Yael	Algom-Kfir	University of Haifa
Moon	Duchin	Tufts University
Tullia	Dymarz	University of Wisconsin-Madison
Talia	Fernós	University of North Carolina
Kate	Juschenko	Northwestern University
Kim	Ruane	Tufts University



Connections for Women: Geometric Group Theory

August 17-19, 2016

Schedule

Wednesday, August 17, 2016			
9:00AM - 9:10AM	Simons Auditorium		Welcome
9:10AM - 10:10AM	Simons Auditorium	Tullia Dymarz	Quasi-isometric rigidity
10:10AM - 10:30AM	Atrium		Break
10:30AM - 11:20PM	Simons Auditorium		Discussion Groups
11:30AM - 12:30PM	Simons Auditorium	Tullia Dymarz	Quasi-isometric rigidity
12:30PM - 2:00PM	Atrium		Lunch
2:00PM - 3:00PM	Simons Auditorium	Kim Ruane	Visual and Tits Boundaries of CAT(0) spaces
3:00PM - 3:15PM	Atrium		Tea Break
3:15PM - 4:05PM	Simons Auditorium		Discussion Groups
4:15PM - 5:15PM	Simons Auditorium	Kim Ruane	Visual and Tits Boundaries of CAT(0) spaces

Thursday, August 18, 2016			
9:00AM - 10:00AM	Simons Auditorium	Talia Fernós	CAT(0) Cube Complexes and Low Dimensional Cohomology
10:10AM - 10:30AM	Atrium		Break
10:30AM - 11:20AM	Simons Auditorium		Discussion Groups
11:20AM - 12:10PM	Simons Auditorium	Talia Fernós	CAT(0) Cube Complexes and Low Dimensional Cohomology
12:10PM - 1:20PM	Atrium		Lunch
1:20PM - 2:20PM	Simons Auditorium	Kate Juschenko	Sofic groups - an introduction
2:30PM - 3:20PM	Simons Auditorium		Discussion Groups
3:30PM - 4:30PM	Simons Auditorium	Kate Juschenko	Sofic groups - an introduction
4:30PM - 4:45PM	Atrium		Tea
4:45PM - 6:15PM	Simons Auditorium		Panel Discussion
7:00PM - 8:15PM	MSRI		Dinner at Taste of Himlayas

Friday, August 19, 2016			
9:10AM - 10:10AM	Simons Auditorium	Moon Duchin	Growth of groups
10:10AM - 10:30AM	Atrium		Break
10:30AM - 11:20PM	Simons Auditorium		Discussion Groups
11:30PM - 12:30PM	Simons Auditorium	Moon Duchin	Growth of groups
12:30PM - 2:00PM	Atrium		Lunch
2:00PM - 3:00PM	Simons Auditorium	Yael Algom-Kfir	Fibrations of free-by-cyclic groups
3:00PM - 3:15PM	Atrium		Tea
3:15PM - 4:05PM	Simons Auditorium		Discussion Groups
4:15PM - 5:05PM	Simons Auditorium	Yael Algom-Kfir	Fibrations of free-by-cyclic groups

Participants		
First Name	Last Name	Institution
Carolyn	Abbott	University of Wisconsin-Madison
Yael	Algom-Kfir	University of Haifa
Catalin	Badea	Université de Lille I (Sciences et Techniques de Lille Flandres Artois)
Calista	Bernard	Stanford University
Corey	Bregman	Rice University
Nathan	Broaddus	Ohio State University
Nic	Brody	University of California, Berkeley
Nicholas	Cahill	University of Utah
Michael	Cantrell	University of Illinois, Chicago
Yu-Chan	Chang	Louisiana State University
Ruth	Charney	Brandeis University
Indira	Chatterji	Université Nice Sophia-Antipolis
Sangbum	Cho	Hanyang University
Michelle	Chu	University of Texas
Thierry	Coulbois	Université d'Aix-Marseille (AMU)
Rémi	Coulon	Université de Rennes I
François	Dahmani	Université de Grenoble I (Joseph Fourier)
Pallavi	Dani	Louisiana State University
Angelica	Deibel	Brandeis University
Coleman	Dobson	California State University
Spencer	Dowdall	Vanderbilt University
Cornelia	Drutu	University of Oxford
Moon	Duchin	Tufts University
Thibaut	Dumont	University of Utah
Tullia	Dymarz	University of Wisconsin-Madison
James	Farre	University of Utah
Mark	Feighn	Rutgers University
Talia	Fernós	University of North Carolina
Elizabeth	Field	University of Illinois at Urbana-Champaign
Elia	Fioravanti	University of Oxford
Neil	Fullarton	Rice University
Giles	Gardam	University of Oxford
Ilya	Gekhtman	Rheinische Friedrich-Wilhelms-Universität Bonn
Funda	Gultepe	University of Illinois at Urbana-Champaign
Emily	Gunawan	University of Minnesota, Twin Cities
Neha	Gupta	University of Illinois at Urbana-Champaign
Radhika	Gupta	University of Utah
Meggan	Hass	University of Nebraska
Arnaud	Hilion	Université d'Aix-Marseille (AMU)
Meng-Che	Ho	University of Wisconsin-Madison
Camille	Horbez	Université de Paris XI
Francesca	Iezzi	University of Warwick
Alessandra	Iozzi	ETH Zürich
Kasia	Jankiewicz	McGill University

Participants		
First Name	Last Name	Institution
Peihong	Jiang	Brown University
Premalatha	Junius	West Chester University
Kate	Juschenko	Northwestern University
Delaram	Kahrobaei	City University of New York (CUNY)
Fanny	Kassel	Université de Lille I (Sciences et Techniques de Lille Flandres Artois)
Noureen	Khan	University of North Texas
Heejoung	Kim	University of Illinois at Urbana-Champaign
Rostyslav	Kravchenko	Northwestern University
Swathi	Krishna	Indian Institute of Science Education and Research Mohali
Robert	Kropholler	University of Oxford
Giang	Le	Ohio State University
Ian	Leary	University of Southampton
Larsen	Louder	University College
Joel	Louwsma	Niagara University
Marissa	Loving	University of Illinois at Urbana-Champaign
Joseph	Maher	College of Staten Island, CUNY
Kathryn	Mann	University of California, Berkeley
Sarah	Mousley	University of Illinois at Urbana-Champaign
Cristina	Mullican	Boston College
peter	neuwirth	Willis Towers Watson
Anisah	Nu'Man	Trinity College
Priyam	Patel	University of California, Santa Barbara
Kala	Perkins	GTU, UC Berkeley
Catherine	Pfaff	University of California, Santa Barbara
Kim	Ruane	Tufts University
Jacob	Russell	City University of New York (CUNY)
Andrew	Sánchez	Tufts University
Eugenia	Sapir	University of Illinois at Urbana-Champaign
Lisa	Schneider	Susquehanna University
Kevin	Schreve	University of Michigan
Shane	Scott	Georgia Institute of Technology
Ignat	Soroko	University of Oklahoma
Karol	Strzałkowski	Polish Academy of Sciences
Hongbin	Sun	University of California, Berkeley
Markus	Szymik	Norwegian University of Science and Technology (NTNU)
Robert	Tang	University of Oklahoma
Jing	Tao	University of Oklahoma
Samuel	Taylor	Yale University
Tetsu	Toyoda	National Institute of Technology, Suzuka college
Siming	Tu	University of Chile
Caglar	Uyanik	University of Illinois at Urbana-Champaign
Federico	Vigolo	University of Oxford
Richard	Wade	University of British Columbia
Pei	Wang	Rutgers University

Participants		
First Name	Last Name	Institution
Derrick	Wigglesworth	University of Utah
Adva	Wolf	Stanford University
Yang	Xiao	Brown University
Robert	Young	New York University, Courant Institute
Letao	Zhang	State University of New York, Stony Brook

Officially Registered Participant Information

Participants		93
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Gender		93
Male	49.46%	46
Female	50.54%	47
Declined to state	0.00%	0

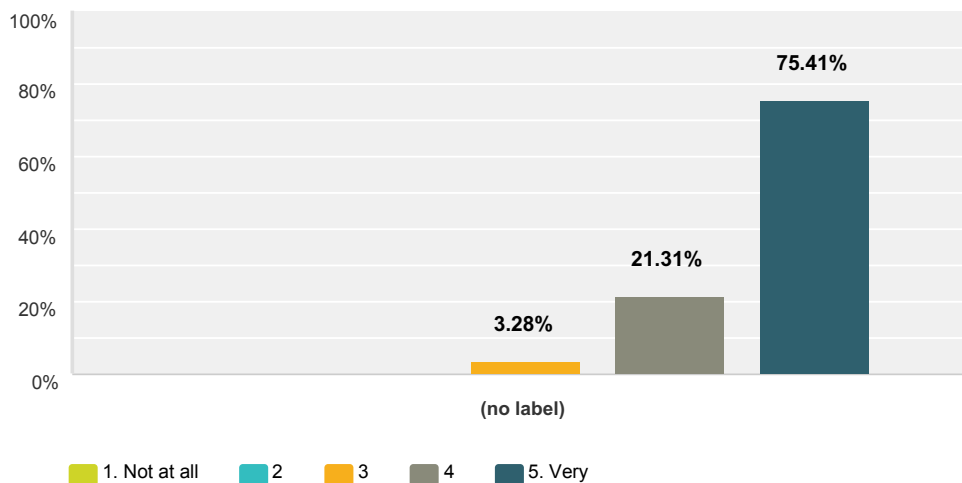
Ethnicity*		106
White	68.82%	64
Asian	24.73%	23
Hispanic	5.38%	5
Pacific Islander	1.08%	1
Black	2.15%	2
Native American	0.00%	0
Mixed	6.45%	6
Declined to state	5.38%	5

* ethnicity specifications are not exclusive

61 responses out of 93 participants = 66% response rate

Q1 The workshop was intellectually stimulating

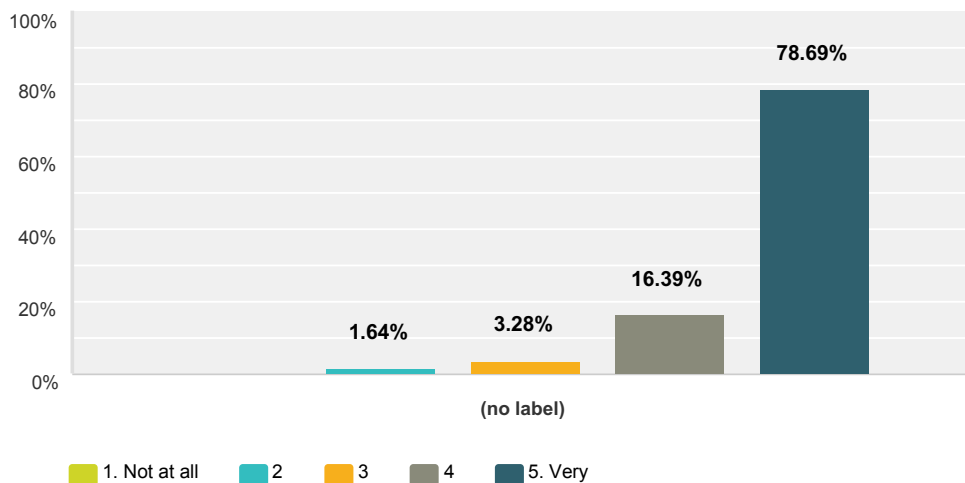
Answered: 61 Skipped: 0



	1. Not at all	2	3	4	5. Very	Total	Weighted Average
(no label)	0.00% 0	0.00% 0	3.28% 2	21.31% 13	75.41% 46	61	4.72

Q2 The overall experience of the workshop was worthwhile

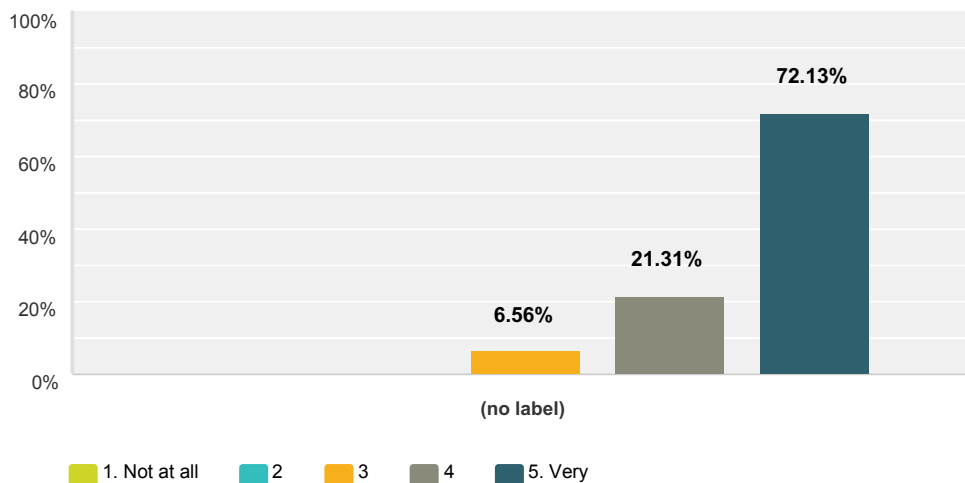
Answered: 61 Skipped: 0



	1. Not at all	2	3	4	5. Very	Total	Weighted Average
(no label)	0.00% 0	1.64% 1	3.28% 2	16.39% 10	78.69% 48	61	4.72

Q3 The time between lectures was adequate for discussion

Answered: 61 Skipped: 0



	1. Not at all	2	3	4	5. Very	Total	Weighted Average
(no label)	0.00% 0	0.00% 0	6.56% 4	21.31% 13	72.13% 44	61	4.66

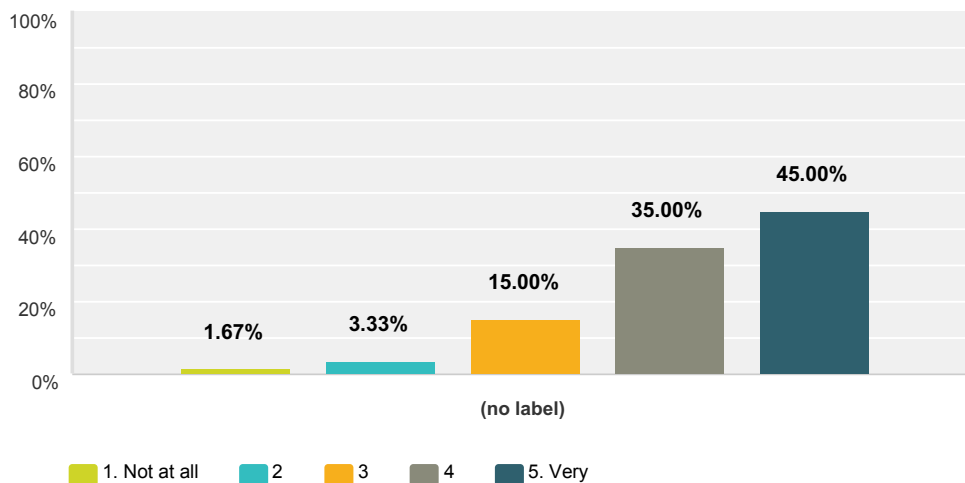
Q4 Additional comments on the workshop organization

Answered: 13 Skipped: 48

#	Responses	Date
1	Thank you!	8/27/2016 2:00 PM
2	I really enjoy the structure of the schedule : talk-discussion-talk. It was enormously helpful to understand the first part and be ready for the second.	8/26/2016 12:02 PM
3	Talks were excellent! I have recommended the recordings to many people	8/26/2016 11:57 AM
4	Discussion sections were a great idea!	8/24/2016 8:52 PM
5	The set up for the workshop (including discussions) was awesome!	8/20/2016 10:36 AM
6	I really enjoyed the discussion sessions between the lectures. They provided an excellent environment to clear up questions and solidify understanding.	8/20/2016 9:45 AM
7	A bit confusing schedule	8/20/2016 8:02 AM
8	I liked the scheduled discussion periods.	8/20/2016 7:23 AM
9	Discussion sections were excellent. Encouraging more movement and discussion among groups would be appreciated. One section, Moon interacted with many groups and got discussion moving. So, more facilitators like that would be a contribution.	8/19/2016 9:59 PM
10	Thank you!	8/19/2016 9:56 PM
11	I really enjoyed this workshop. And lectures and the discussion were helpful and great. Thank you.	8/19/2016 6:16 PM
12	I really enjoyed the conference and think the organizers did a great job picking speakers. The speakers did a good job with their respective lectures and were very accessible during the discussion session. I additionally liked how organizers also chipped in to help during the discussion session. Lastly, I found the panel helpful in navigating grad school/postdoc/tenure track positions while dealing with confidence issues and the imposter syndrome. The panelist provided practical techniques to deal with these issues. I look forward to the next conference.	8/19/2016 6:13 PM
13	The discussion sessions were great	8/19/2016 6:04 PM

Q5 I was well prepared to benefit from the lectures

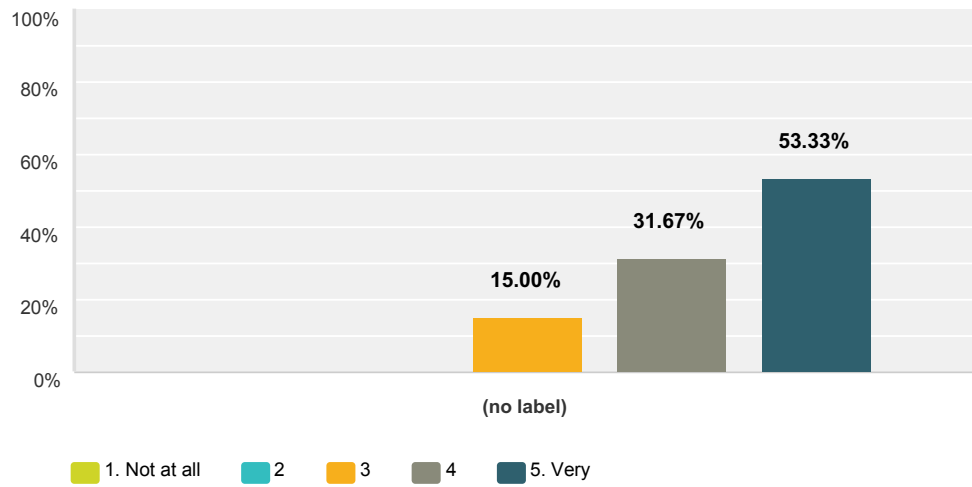
Answered: 60 Skipped: 1



	1. Not at all	2	3	4	5. Very	Total	Weighted Average
(no label)	1.67% 1	3.33% 2	15.00% 9	35.00% 21	45.00% 27	60	4.18

Q6 My interest in the subject matter was increased by the workshop

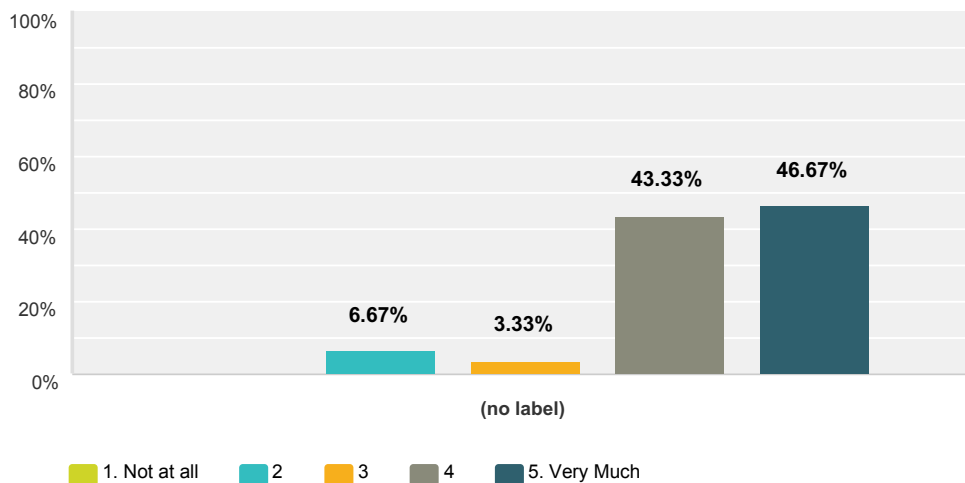
Answered: 60 Skipped: 1



	1. Not at all	2	3	4	5. Very	Total	Weighted Average
(no label)	0.00% 0	0.00% 0	15.00% 9	31.67% 19	53.33% 32	60	4.38

Q7 The workshop helped me meet people with similar scientific interests

Answered: 60 Skipped: 1



	1. Not at all	2	3	4	5. Very Much	Total	Weighted Average
(no label)	0.00% 0	6.67% 4	3.33% 2	43.33% 26	46.67% 28	60	4.30

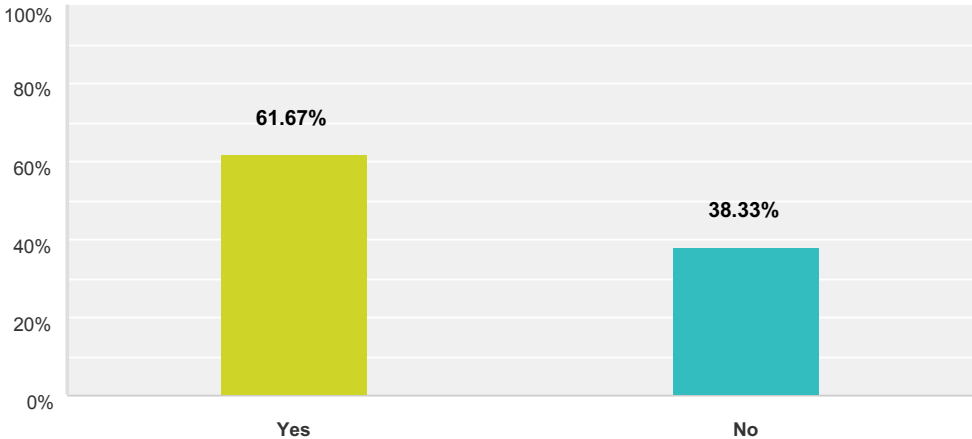
Q8 Additional comments on your personal assessment

Answered: 2 Skipped: 59

#	Responses	Date
1	Contact information of all participants will be very useful.	8/19/2016 6:14 PM
2	I am here for the whole program. I was unsure whether to go to this meeting, but I went to the first two of three days and benefitted greatly. I would have liked to go to the whole thing, but with another meeting next week I needed some time out to do other things.	8/19/2016 5:02 PM

Q9 Did you attend the panel discussions?

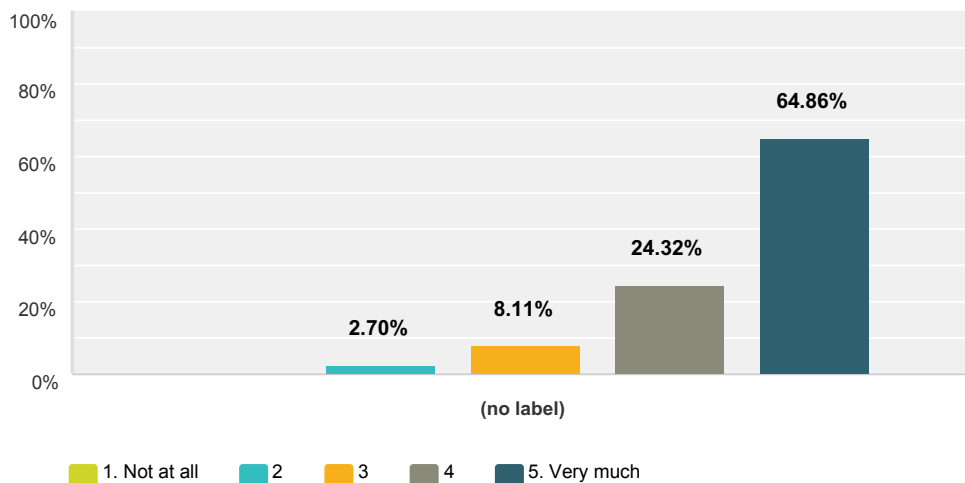
Answered: 60 Skipped: 1



Answer Choices	Responses
Yes	61.67% 37
No	38.33% 23
Total	60

Q10 Did you find the panel discussion worthwhile?

Answered: 37 Skipped: 24



	1. Not at all	2	3	4	5. Very much	Total	Weighted Average
(no label)	0.00% 0	2.70% 1	8.11% 3	24.32% 9	64.86% 24	37	4.51

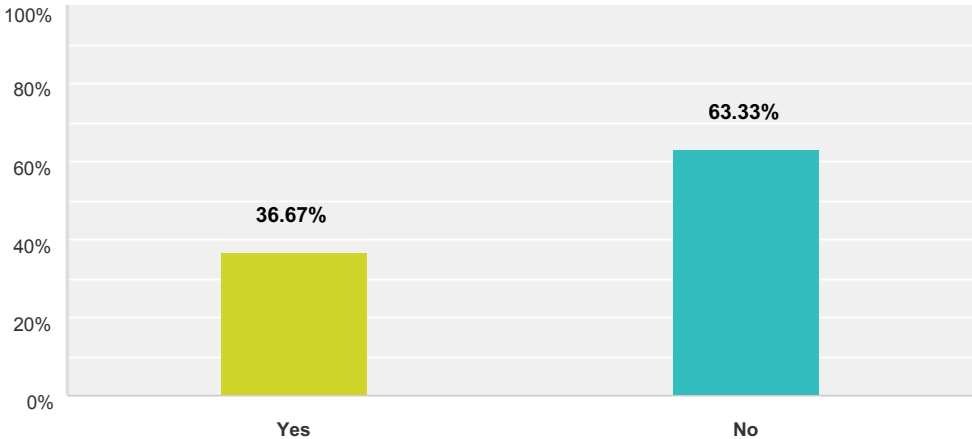
Q11 What other subjects should be discussed in future panel discussions?

Answered: 4 Skipped: 57

#	Responses	Date
1	It would be interesting to have also some men in the panel	8/20/2016 8:03 AM
2	How to stimulate minority group interests in mathematics.	8/19/2016 8:20 PM
3	Getting your dissertation published. Questions you should be asking during the early years of your tenure track (or postdoc) that you did not know you should be asking. Advice on building research collaborations Practical timeline during your tenure track position to ensure you get tenure. Have people speak from various types of institutions.	8/19/2016 6:17 PM
4	(I did not attend all of them)	8/19/2016 5:23 PM

Q12 Did you attend the dinner?

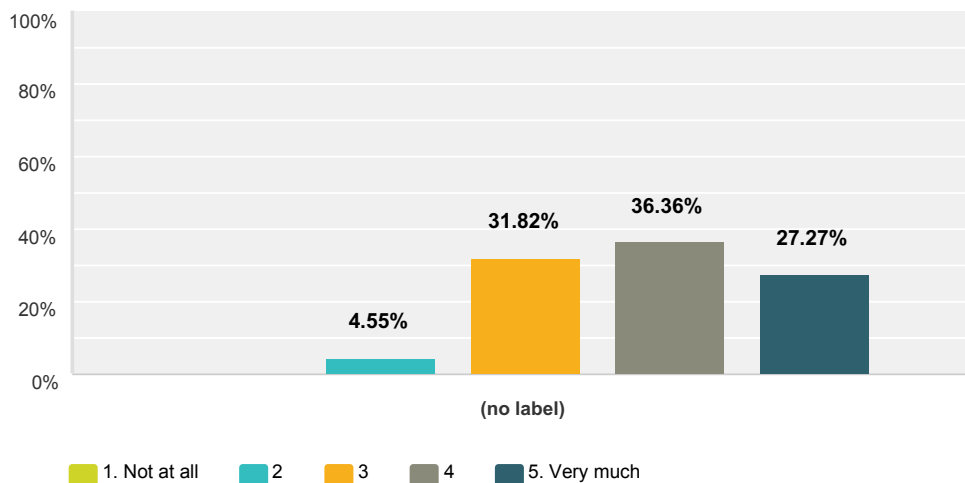
Answered: 60 Skipped: 1



Answer Choices	Responses	
Yes	36.67%	22
No	63.33%	38
Total		60

Q13 Did the dinner help to solidify the contacts you made in the workshop?

Answered: 22 Skipped: 39



	1. Not at all	2	3	4	5. Very much	Total	Weighted Average
(no label)	0.00% 0	4.55% 1	31.82% 7	36.36% 8	27.27% 6	22	3.86

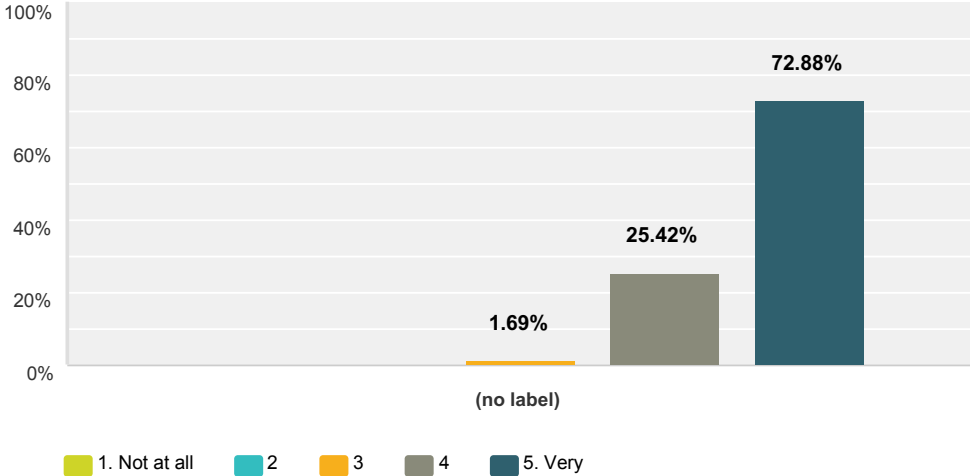
Q14 Please provide any comments about the dinner

Answered: 9 Skipped: 52

#	Responses	Date
1	I think the location was a bit too noisy and crowded for such a group gathering.	8/30/2016 3:02 PM
2	it was too crowded and loud in the restaurant. I prefer a smaller setting (smaller group at one table).	8/26/2016 12:29 PM
3	I made a very important contact during the dinner. It was fantastic!	8/21/2016 5:39 PM
4	It would have been nice if it was a buffet and we were able to move around.	8/21/2016 11:52 AM
5	Perhaps many people did not register, but it was adequate for fewer people	8/20/2016 8:04 AM
6	It was a good opportunity to get to know people both more senior and more junior than myself who I might not have met otherwise.	8/20/2016 7:24 AM
7	More tables would be great.	8/19/2016 9:58 PM
8	I think I was so shy to talk to others	8/19/2016 6:19 PM
9	The dinner was lovely but the long table was a little constraining on who we could talk to. I would have preferred an environment in which we could move around the room more.	8/19/2016 5:26 PM

Q15 I found the MSRI staff helpful

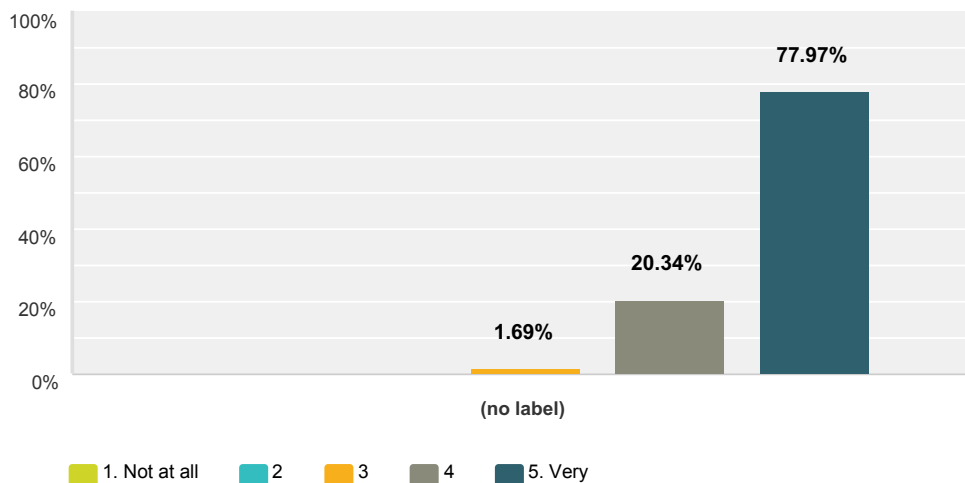
Answered: 59 Skipped: 2



	1. Not at all	2	3	4	5. Very	Total	Weighted Average
(no label)	0.00% 0	0.00% 0	1.69% 1	25.42% 15	72.88% 43	59	4.71

Q16 The MSRI facilities were conducive for such a workshop

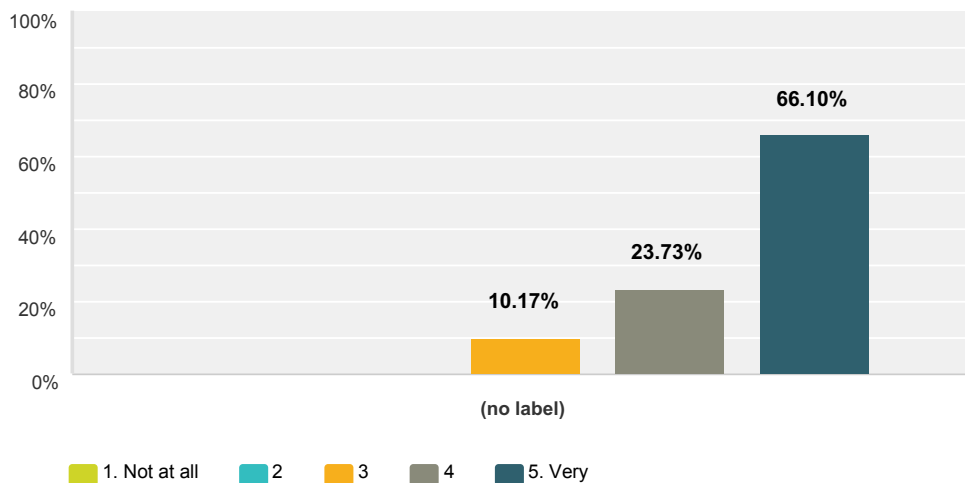
Answered: 59 Skipped: 2



	1. Not at all	2	3	4	5. Very	Total	Weighted Average
(no label)	0.00% 0	0.00% 0	1.69% 1	20.34% 12	77.97% 46	59	4.76

Q17 The MSRI computer facilities were adequate for such a workshop

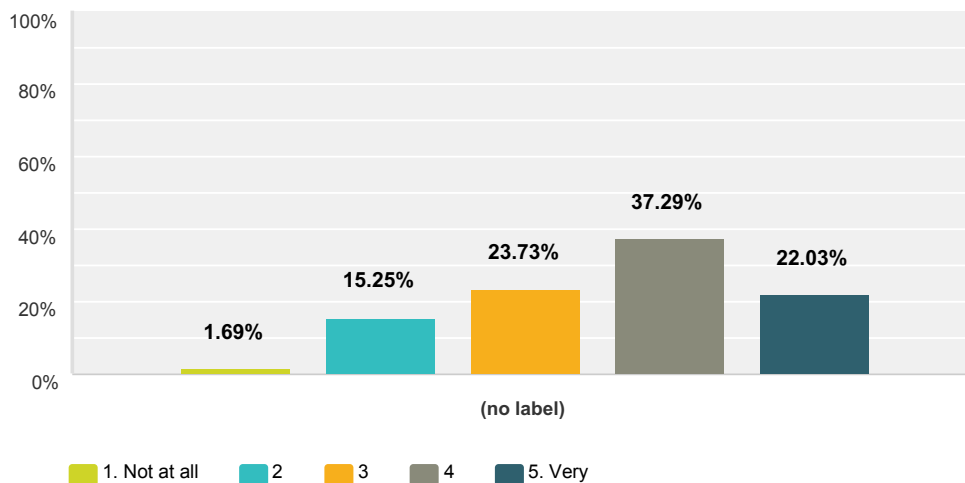
Answered: 59 Skipped: 2



	1. Not at all	2	3	4	5. Very	Total	Weighted Average
(no label)	0.00% 0	0.00% 0	10.17% 6	23.73% 14	66.10% 39	59	4.56

Q18 The MSRI lunch arrangements were satisfactory

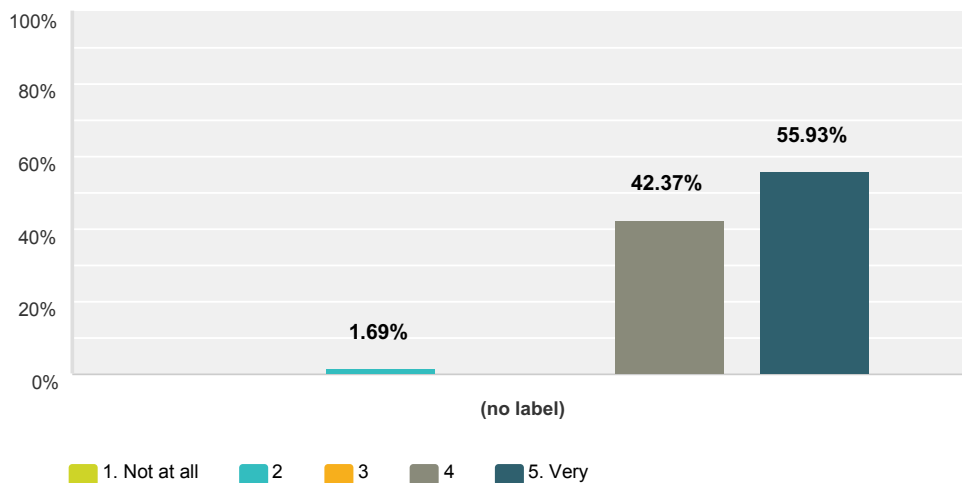
Answered: 59 Skipped: 2



	1. Not at all	2	3	4	5. Very	Total	Weighted Average
(no label)	1.69% 1	15.25% 9	23.73% 14	37.29% 22	22.03% 13	59	3.63

Q19 The MSRI tea arrangements were satisfactory

Answered: 59 Skipped: 2



	1. Not at all	2	3	4	5. Very	Total	Weighted Average
(no label)	0.00% 0	1.69% 1	0.00% 0	42.37% 25	55.93% 33	59	4.53

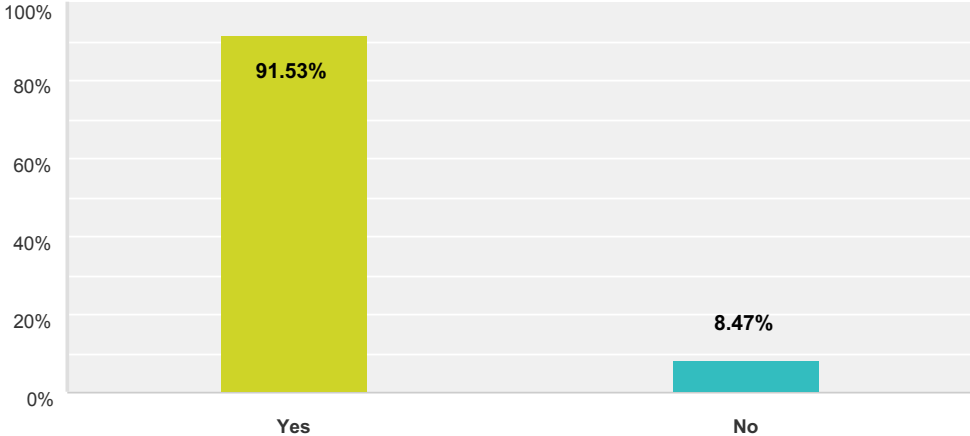
Q20 Additional comments about the venue

Answered: 8 Skipped: 53

#	Responses	Date
1	As a vegetarian, the lunch options from the vendor were limited, and were not very filling.	8/26/2016 11:23 AM
2	It would really help me to be able to drink coffee during talks. I need the caffeine.	8/22/2016 11:03 AM
3	There could be better options for the vegetarians. Also the vendor seemed under stocked.	8/21/2016 11:53 AM
4	The lunch line is long and very slow. Also most options run out before a lot of people reach the end of the line. If there was more than one person charging for food this could be better.	8/20/2016 10:39 AM
5	Lunch was overpriced and there were too few options (many things were sold out). The fruit at tea was not satisfactory.	8/19/2016 10:00 PM
6	More lunch options.	8/19/2016 10:00 PM
7	The system to pay for lunch was very slow, but the food was well worth waiting for.	8/19/2016 7:02 PM
8	Not being allowed to drink tea during lectures is hard !	8/19/2016 5:24 PM

Q21 Did you use MSRI's wireless network?

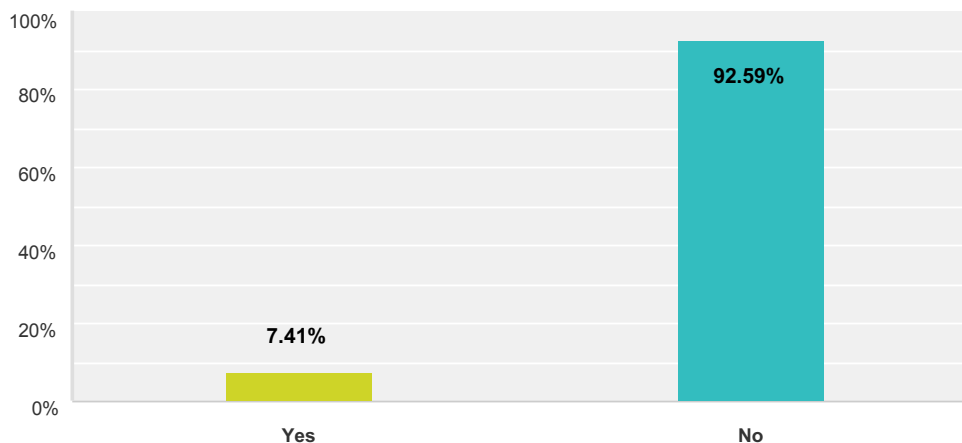
Answered: 59 Skipped: 2



Answer Choices	Responses
Yes	91.53% 54
No	8.47% 5
Total	59

Q22 Did you experience any difficulties with the network?

Answered: 54 Skipped: 7



Answer Choices	Responses	
Yes	7.41%	4
No	92.59%	50
Total		54

#	Please if yes, please describe your difficulties	Date
1	The connection is quite slow	9/1/2016 1:29 PM
2	slow!	8/26/2016 11:16 AM
3	Poor connection in auditorium	8/22/2016 4:34 PM
4	It was not possible to access dropbox.	8/19/2016 8:21 PM

**Q23 We welcome any additional comments
or suggestions you may have to improve
the overall experience for future
participants.**

Answered: 5 Skipped: 56

#	Responses	Date
1	It's a great workshop and I enjoyed it a lot. Thanks so much for organizing!	8/30/2016 3:03 PM
2	It is a fantastic venue with very helpful staff, thanks!	8/27/2016 2:02 PM
3	I understand and support the idea of having a moment where female participants can gather, but I wished everyone could have gone to dinner. Perhaps this could be two different event? Thanks anyway for this great workshop.	8/26/2016 12:05 PM
4	Wonderful experience, amazing and helpful staff! I had great discussions and made great connections. Looking forward to the next!	8/21/2016 11:37 PM
5	The lunch catering service on Wednesday and Friday was not great (not very good food, not many vegetarian options). Apart from this everything was fantastic!	8/19/2016 5:04 PM