

Creative Writing in Mathematics and Science

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1 Overview

Our workshop series, Creative Writing in Mathematics and Science, aims to create a critical yet supportive community of writers who share the goal of reaching the general public through journalism, popularizations, fiction, biographies, plays, poems, and other forms of literary writing such as, increasingly, op-eds and blogs. Like its five predecessors, this workshop brought together 20 mathematicians, scientists, and journalists to discuss their work-in-progress.¹ The community of writers that is emerging from the series is important to all of us. Some are well-established, others are novices; some are mathematicians (and scientists), others professional writers and, increasingly, some are both. We stay in touch, reading each other's drafts, attending public readings (if we can get to them), writing letters of recommendation for one another and blurbs for books; we read each other's manuscripts for publishers. The participant list varies from year to year, with some overlap (which is beneficial for the workshop itself). This year in our workshop announcement we encouraged inquiries, and six participants attended for the first time. We are grateful to BIRS for its continued encouragement and support.

2 How The Workshop Was Run

As in the past, some of our participants identify themselves primarily as writers, others as mathematicians or scientists who also write about their field. Our common goal was to exchange ideas, help improve each others writing, and find new and ingenious ways to reach the general public. All six workshops in this series have been guided by three axioms:

1. Every participant must bring work-in-progress to be critiqued by the group.
2. We all of us are the teachers and we all of us are students. We have much to teach, and learn from, each other.
3. All genres are welcome. Novelist can learn from poets, journalists from playwrights, biographers from popular-science writers, and so on in all permutations.

This year we tried a new daily schedule (the reports of past workshops explain how we did it before). Each day focussed on particular genre: nonfiction, biography, poetry, and drama/fiction. We (the organizers) selected participants to lead a morning discussion on the day's theme (not to teach the subject). This left time,

¹To everyone's regret and the workshop's loss, my co-organizer, Florin Diacu, was unable to attend the workshop, so there were actually only 19 of us.

in the afternoons, for critiquing individual work.

These discussions were very different in format. Don O'Shea, who led the non-fiction discussion, chose an article (by a former workshop participant, not present at this one) for us all to read and critique. Siobhan Roberts, who led the discussion of biography, began by recounting some of the challenges she faced in writing biographies of mathematicians who are still alive. Ellen Maddow and Paul Zimet, the founders of the New York theater company The Talking Band, gave us exercises that raised central questions in writing drama and fiction. Emily Grosholz led the poetry discussion; see her report below for details. On Friday morning we discussed the workshop itself and planned for the future. On Monday and Tuesday evenings, we gathered after dinner to discuss topics of common interest. The public reading of our work, mentioned above, was held on Wednesday evening. Since we didn't give ourselves an afternoon off, many of us went for a hike on Thursday evening. .

3 Responses of the Participants

We (the organizers) asked the participants to describe what they gained from the workshop. Since several of them work in more than one genre, we have not organized their responses by genre. We list them in alphabetical order instead.

At the BIRS 2016 workshop I received feedback on poems and creative nonfiction pieces. We spoke about truth and precision in creative writing which borrow from the scientific method. In addition, I participated actively in discussions around other projects. Topics ranged from math/science communication, the concept of mathematical proof, and permutation in theatrical performance. Overall, the experience was extremely engaging and fruitful. I have revised several poems in direct response to the experience. I have also expanded my network of colleagues working at the interface of arts and sciences. **Madhur Anand**

My thanks for a week with a wonderful group of writers, poets, playwrights, biographers, mathematicians, and scientists; our discussions suggested multiple ways of approaching our writing tasks, the work we heard was at a very high level, and my own poetry manuscript benefitted greatly from comments both general and specific. Each of the genres offered opportunities for new insight. in explanatory writing, how to think of the audience and one's purpose (e.g. "Intrigue the novice but don't embarrass the expert"), how to explore narrative structure and voice in the service of teaching texts; how to incorporate scientific thinking into novel writing; improvisational techniques with mathematical underpinnings for rapidly generating theatre plots; mathematical equations and geometrical objects as a) metaphorical devices for poets b) playful devices for coloring books and constructions. Biographical writers variously explored the lives of their mathematical and scientific protagonists and the cultural consequences of interactions between their disciplines and other arts and sciences; op-ed writers took up the serious task of explaining to newspaper readers relative risk; blog posters of mathematical poetry looked for ways to enrich online access to archives. Environmental ecologists took their own scientific vocabulary, shaken up with life stories, to create poems. So many ideas arose! A big thank you to the organizers and participants, and to BIRS for its sponsorship. **Robin Chapman**

As one who does significant amounts of fiction and nonfiction writing, as well as poetry, I found the wide focus of this workshop extremely helpful. I had several very helpful discussions about the Fibonacci-inspired verse form that I've been working on. I also found the discussion of theater, and the improvisation session, fascinating, though it isn't an area that I've worked in. Overall, this series of workshops has been formative both to my work as editor at the CMS Notes and to my sideline of other creative writing. While it's too early to say what specific fruit this workshop may bear, a talk at the previous workshop in the series was the inspiration for a science fiction story that has appeared on a website, Issues in Earth Science, intended as enrichment material for grade school children. **Robert Dawson**

This workshop was especially helpful because it spanned different genres. As it happens, Im trying to write about mathematics in the genre of poetry, but also in the context of two books on philosophy of

mathematics, where I must carry out quite a bit of exposition of mathematical ideas. So, for example, on the first day, we agreed that diagrams can be useful additions to expository prose and mathematical notation, but we noted that correct placement is key, and also that too many side-car boxes with related information can distract from the main thrust of the argument, and weaken the exposition. And the author must think long and hard about what terms need to be defined formally. If you have to define too many terms, you may be leading the reader into waters that are too deep; yet the languages of mathematics especially in the twentieth century involve lots of special concepts and terms. The last day was devoted to poetry about mathematics and the mathematical sciences, which I led. We talked about poems with structure inspired by mathematics, and traditional structure that can be illuminated by mathematics, as well as poems about mathematical results and concepts, and poems that appropriate mathematical vocabulary and use it in odd and surprising ways. In what ways is a poem like a theorem, and in what ways is it different? Each of us (that is, the poets present) read a sample poem, which also often led to thinking about the temporal and spatial structure of poems, and their symmetries, or the poignant relation between the evanescent writers and their persistent poems (and theorems). **Emily Grosholz**

I have, for more than 30 years, been a collector of poetry related to mathematics. In 2010 I began to share these collected poems on the Internet using a blog, Intersections Poetry with Mathematics at <http://poetrywithmathematics.blogspot.com>. The challenge that I posed to my colleagues at BIRS was to evaluate the blog and to suggest not only ways to improve it and but also ways to make information in this online resource more easily accessible to interested visitors. Advice included the introduction of a SEARCH box, development of links to favorite posts, and use of social media to attract visitors to relevant posts. I am gradually implementing these strategies and continually on the lookout for others.

JoAnne Growney

I learned a great deal at this workshop, but my most significant take-away was the feedback I received on my own writing (including advice on what pieces of feedback I should use to change my writing and what pieces I should examine, then feel free to discard). What is important to me, personally, is that this has motivated me to return to the writing that I had neglected for so many years. The kind and thoughtful encouragement I received is key to the newfound motivation. **Helen Grundman**

The longer I am part of the mathematical community the more I find its culture both wonderful and lacking. On the one hand I can sit down with mathematicians from Japan to Iran and immediately have common experiences and ideas, and a pathway to learning more about worlds, both internal and external. On the other hand the culture can be judgemental, exclude people for reasons that do not live up to scrutiny or seemingly deliberately hide its beauty behind elegant but hard to master languages. Yet what I feel most is the lack of introspection about the culture, making the failings harder to deal with. As a firm believer in the importance of mathematics and abstract thinking in an age of increasingly abstract information I struggle with this. It was a delight, therefore, to meet with a group of people from mathematics and beyond who embraced discussion of mathematical culture and were engaged in placing mathematics in a broader setting. Providing bridges across disciplines and engaging a wider audience of people. This conference on a practical level provided support and criticism of creative projects at a high level. Yet more importantly it gave me, and I feel many of the other participants, a chance to recharge our fundamental love for the subject and return to the challenge of how we can try to make it more accessible and welcoming to all who can benefit on a technical, numerical or aesthetic level. **Edmund Harriss**

I presented a few scenes from the mathematical play I am working on as part of my senior project thesis at College of the Atlantic. My play, currently titled Problem Set, explores the narratives and art of mathematics. In the first scene, Definitions, Professor Wentworth introduces the suspension of disbelief in theater and geometry to the audience. In the second scene, Misfits, Pi and the Koch Snowflake meet in the waiting room at a psychologist's office and discuss what it means to be normal. At the public reading, I also presented a short monologue that juxtaposed the musicality and rhythms of a mathematician working through a problem and an actor warming up before a show. The feedback from the other participants in the workshop was very helpful for me in focusing the scope of my project. I had so many disparate mathematical ideas that I wanted to explore through my writing, but it was too

large a scope to contain in just one play. I was really struggling with which concepts to concentrate on developing deeply for this play in particular. After hearing everyone's feedback, I've decided to focus on considering the process of learning and conceptualizing mathematics in my play, and set aside the stories of historical mathematicians like Archimedes for another play. As a senior undergraduate, it was really encouraging to meet the other participants, who are all engaging with the sorts of really exciting interdisciplinary ideas that I want to spend the rest of my life exploring. I am so thankful for the opportunity to attend this workshop. Talking with and learning from all of these amazing people in such a beautiful place was an experience that will definitely inspire me and my work in the future.

Corrie Ingall

I brought to Banff a few chapters of a manuscript I have been working on. This is to be a nontraditional textbook for an introductory course on analysis with a specific focus on methods of mathematics. Usually books at that stage focus exclusively on proof, and I aim in this project to expand that focus. I also intend to introduce students / readers to the culture and history of mathematics and infuse the narrative with significant amount of philosophical digressions. During the workshop I have received much valuable and constructive feedback about the book. In particular participants suggested that I separate out the various informal comments from the technical mathematical content, drop some of the preliminary text, possibly consider alternative forms of publishing. Each and every piece of comment I received on my work was constructive and, I believe, will allow this manuscript to be much more effective in the end. The workshop discussions on other participants work have also been rewarding and eye-opening for me. Once again I was reminded of the immensity of the task of the writer and the poet. Once again I observed the craft nature of writing and the sheer amount of work that goes into creating something that is of value to someone besides its creator. And once again I could see clearly that readers can help improve work at any stage. All in all, I am delighted and honored that I had the opportunity to participate in the workshop. I made new connections with people who I now see as my friends as well as my colleagues, and I worked towards my own personal writing goals, all the while being reminded of the very collaborative and community aspects of the two life pursuits I find myself dedicated to: mathematics and writing. **Gizem Karaali**

My purpose in attending the creative writing workshop at BIRS was to get inspiration for a starting point for a new play with mathematical content and structure. My play *Delicious Rivers* was inspired by my participation in similar workshops organized by Marjorie Senechal. Once again it was energizing to be in a room with a group of people, from a variety of disciplines grappling with the challenges of writing about complex ideas with clarity and elegance. Books that were suggested by fellow participants that might provide ideas for my new play are *It Died for Beauty – Dorothy Wrinch and the Cultures of Science* by Marjorie Senechal, and *Euler's Gem: the Polyhedron Formula and the Birth of Topology* by David S. Richeson. **Ellen Maddow**

I came to the workshop with three short Op-Ed articles for national (print and digital) newspapers. One was a draft of my annual Pi Day article for Slate Magazine, and the other two were extracted opinions that stemmed from my forthcoming book *Fluke: The Math and Myth of Coincidence*. Those articles led to many valued intelligent conversations, discussions, opinions, and constructive ideas that continued with residual discussions even days after our five day residency through the BIRS list. From the intelligence and collegiality of workshop participants, my articles were rewritten and very much improved. Everyone talked about how much they benefitted from the sessions and about how they felt a sense of accomplishment along with an awareness of work to be done. It was my third BIRS workshop in math and science writing, the third with a very capable, wise, and professional group. I came away with a comfortable list of ideas for improvements and an exhilarating sense of accomplishment, a feeling that would be hard to come by in my usual world of solitary writing. The satisfaction went far beyond the welcomed critiques of my own work. Reading and listening to the works of my colleagues, to the prose and poetry, gave me a strong sense of my own contribution to the writing cause. I felt a sense of value and benevolence at being able to give constructive criticism to others, when I could. I felt exhilarated by the rewarding opportunity of reading the works of others, because reading those works and listening to the presentations of those works gave me, the lonely writer, a sense of writing from the other side. From that other side one gets an invaluable sense of how readers read and interpret what

the writer means to say, but doesn't always succeed in delivering the intended meaning. As everyone knows, getting to Banff is not an easy trip, especially for someone coming from as far away as Vermont. Yet each time I come, I leave with a feeling that the trip was well worth the weariness. I leave with a feeling of great accomplishment and satisfaction that my work has been constructively criticized by a team of knowledgeable colleagues who genuinely care about the works of others. **Joe Mazur**

The workshop raised—in my mind, anyway—two big questions. One relates to the importance of understanding in creative writing about mathematics, both the extent to which a writer must understand the mathematics to convey something meaningful about it and the degree to which a writer can hope to impart understanding to lay readers. The other question—a perennial one—is about truth: the distinction between fiction and nonfiction, and the importance (or not) of coming down squarely in one category or the other. Even more valuable to me than the feedback from my fellow workshopppers on my own work—though I did greatly appreciate the encouragement and suggestions I received about my nascent screenplay—was the insights the workshop gave me into the process and product of other writers. I very much enjoyed seeing how a poet writes prose, for example, and I hope to bring some of Madhur's economy of language, attention to sound, and careful selection of sometimes startling details to my own work in the future. And as someone who too often waits passively for inspiration to strike, I may try to replicate on my own a theater-type exercise like the ones Paul and Ellen led. The serendipitous juxtapositions of ideas that result would, I think, jog my at times too-logical brain into a more creative, possibly more productive state. I left Banff with a list of books to read, a number of writing ideas to pursue, and confirmation that there exists at the intersection of mathematics and writing a vibrant community of which I am thrilled to be a part. **katharine merow**

One of the more memorable discussions that I remember from the BIRS Workshop took place on the first day, when we took up the non-fiction genre. On the one hand there is a desire by some writers in the mathematics community to convey mathematical concepts more directly than the popular press has done so far. A recent example in this direction is Cedric Villani's research memoir *Birth of a Theorem*, an unfiltered, day-by-day account of the discoveries for which he was awarded the Fields medal. The gambit on the part of the author is that by giving up the task of explaining the mathematics in elementary terms, it will be possible to create a "fly on the wall" experience for the general reader. On the other hand there is a concern about the responsibility of mathematical non-fiction authors to their content and readers. Within the discipline, Piper Herron's has recently raised serious concerns about a lack of inclusiveness in the mathematics community. Her dissertation offers a more generous approach to communicating mathematical abstractions through writing. Villani and Herron are just two authors whose writing has very recently drawn attention to the larger question of audience. Less recent, but still influential in such debates is "On Proof and Progress in Mathematics" by Bill Thurston. **Philip Ordning**

I found the workshop extraordinarily valuable. Among the themes that had particular salience for me were the role of truth in biography. What happens when a story is retold by an individual so that he or she believes it, but other evidence suggests that it cannot be true? Another striking takeaway was the contrast between how a piece would be read, and what the piece actually said. (Im thinking in particular of how Joe Mazurs draft editorials were read, and the workshop participants sense of how they would be interpreted by the readership that Joe wanted to reach.) In other discussions, I was struck by remarks indicating that a writers assumptions about what a reader will read are very much at odds with readers actual behavior. Apart from the intrinsic interest of the discussions, I personally felt renewed and charged up by the institute. I arrived, I think, a bit weary and even a little burned put, and I came away excited and reinvigorated. **Donal O'Shea**

I brought to the workshop the seed of an idea for my next biography, about the great mathematical logician Kurt Gdel, who is perhaps best known for his Incompleteness Theorems, stating: For any consistent formal system that can express facts about basic arithmetic: 1) there are true statements that are unprovable within the system; and 2) the systems consistency cannot be proven within the system. My goal is to explore how Gdels often times fantastical and paradoxical works, and their uses and abuses, have permeated the popular imagination and continue to become increasingly relevant as we grapple with the universe and our place therein. I also led the workshop day dedicated to scientific

biography, which focused loosely around the notion of fact versus fiction, both specifically in the telling of biographical stories, and generally in translating for a popular audience technical content via all genres, whether non-fiction broadly speaking, fiction, poetry, or playwriting. As a starting point, I drew upon the challenges of writing my newest book, *Genius At Play, The Curious Mind of John Horton Conway* (previously workshopped at BIRS), published in July 2015 by Bloomsbury. As an epigram for the Conway biography, I borrowed from the poet Emily Dickinson: Tell all the Truth but tell it slant. For the Gdel project I am employing as a preliminary guide the logician Verena Huber-Dysons observation: There is more to TRUTH than can be caught by PROOF. Mathematical and scientific truth is precise, objective, obstinate. Memory and historical truth is nebulous, subjective, malleable. During this workshop day we addressed the question of how to craft the fodder of fact in order to tell clear and engaging scientific stories that ring true. **Siobhan Roberts**

At BIRS, I workshopped an article on women in different mathematical subfields, finished a poem, received useful feedback on multiple poems, and participated in the poetry reading. The article has since been submitted to a journal. I very much appreciated the opportunity to connect with a community of mathematical and scientific writers. I'm especially excited to know more scientific poets! **Ursula Whitcher**

A question I came into the workshop this year was, what firm beliefs have you held that you now question or no longer believe. This question was raised for me by the much publicized study by Princeton economists Anne Case and Angus Deaton showing that middle-aged white Americans are dying in much larger numbers than they used to. Although several of the study's findings were promptly questioned by statisticians, press commentators jumped to interpret these findings according to their own belief systems. The dubious facts fit neatly into ideological narratives, both on the left and right, confirming what the commentators already believed. The participants in the workshop gave illuminating personal examples of their own previously held beliefs that they now doubted or abandoned. This discussion continued in a slightly different form during Siobhan Roberts presentation on writing scientific biography. In writing a biography of the mathematician, John Conway, who was a colorful, but unreliable storyteller, she was faced with the question about what is knowable about a person. If there are gaps in the biographer's knowledge, what is permissible to surmise? This discussion led me (at Siobhan's suggestion) to read *Incompleteness: The Proof and Paradox of Kurt Godel* by Rebecca Goldstein. In math, as in theater (and, of course, as in life) there are questions about what is knowable. Currently I am starting work on a play that looks at the same subject from multiple Points of View, (in a literal visual sense as well as a metaphorical sense) and the question arises is there one POV that is more truthful than another. So the discussions within the Creative Writing Workshop at Banff continue to churn in my mind and lead me to new readings and paths of inquiry as I work. As a writer for theater, I am grateful to have the opportunity to be with very smart people who are versed in another language (i.e. mathematics) and willing to act as generous translators for non-mathematicians like me. Of course, this is a two-way street. I believe the mathematicians and science writers have gained some new knowledge from the presentations by me and my collaborator, Ellen Maddow about how mathematical ideas can be made graspable through theatrical means. I have participated in three Creative Writing Workshops for Mathematicians at Banff, and I have come to deeply appreciate the reciprocal nature of the learning that occurs in these sessions.

Paul Zimet

4 Outcome of the Meeting

The meeting will, we hope, result in the completion and publication of the varied works-in-progress presented here. It will also strengthen the community of writers that this workshop series has been building. As mentioned at the beginning, each workshop (since the first) has brought together a mix of new and veteran participants, a mix that strengthens workshop discussions and helps the community grow. Participants have stayed in touch year-round, commenting on further work, celebrating publications. We also hope BIRS will let us organize another workshop on Creative Writing in Mathematics and Science. You will hear from us again.

5 Appendix: Examples of creative writing by this year's workshop participants

Madhur Anand

A New Index for Predicting Catastrophes (poems), McClelland and Steward, 2015.

Robin Chapman

Abundance, Cider Press, 2009. Winner of Cider Press Review Editors Book Award.

the eelgrass meadow, Huntington Beach, CA: Tebot Bach Press, 2011. Honorable mention, Posner Poetry Award.

One Hundred White Pelicans, Huntington Beach, CA: Tebot Bach Press, 2013.

Six True Things, Huntington Beach, CA: Tebot Bach Press, in press.

Florin Diacu

The Lost Millennium Histories Timetables Under Siege (2nd. ed.), Johns Hopkins University Press, 2011. (Translations: Romanian.)

Megadisasters The Science of Predicting the Next Catastrophe, Oxford University Press, Oxford, U.K. and Princeton University Press, Princeton, N.J., 2009/10 (Translations: Japanese, Chinese.)

Emily Grosholz

"Time and Cosmology," Special issue of *Studies in History and Philosophy of Modern Physics*, 2015.

Proportions of the Heart: Poems that Play with Mathematics (poems, with mathematical art by Robert Fathauer), Tessellations Publishing, 2014.

"Leibniz, Time, and History," Special issue of *Studia Leibnitiana*, Band 44 / Heft 1. Franz Steiner Verlag, 2013.

JoAnne Growney

"Intersections Poetry with Mathematics blog, at <http://poetrywithmathematics.blogspot.com>

<http://poetrywithmathematics.blogspot.com/2012/06/can-mathematics-maximize-happiness.html>

<http://poetrywithmathematics.blogspot.com/2010/03/poetry-of-logical-ideas.html>

Edmund Harriss

With Alex Bellos, *Snowflake Seashell Star: Colouring Adventures in Numberland*, Cannongate Books, GB, 2015

American edition: *Patterns of the Universe: A Coloring Adventure and Math and Beauty*, The Experiment; Act Clr Cs edition, 2015

Corrie Ingall

"Problem Set," a play. In progress.

Ellen Maddow

"Delicious Rivers", a play about Penrose tilings, developed in this workshop series. Performed at Smith College and La Mama Etc (NY) in 2007.

Joe Mazur

Fluke: The Math and Myth of Coincidence, (New York: Basic Books, 2016)

Enlightening Symbols: A Short History of Mathematical Notation and Its Hidden Powers, Princeton, New Jersey: Princeton University Press, 2014)

Katharine Merow

"Math and Art Intersect in Man Ray Exhibition." *MAA FOCUS*, April/May 2015: pp.4-6.

"A Toast! To Type 15!" *Math Horizons*, November 2015: pp.10-11.// "Math is my Femme Fatale," *The Mathematical Intelligencer*, 34, 1, 2012 pp42-43.

Philip Ordning

Variations on a Proof: Exercises in Mathematical Style (working title), Princeton, in progress

With R. Kossak (co-editor), *Simplicity: Ideals of Practice in Mathematics and the Arts*, Springer, in progress.

“Triangle O” Bulletins of the Serving Library 9, 2015
 “A Definite Intuition,” *Bulletins of the Serving Library* 5, 2013

Donal O’Shea

SRQDaily (srqmagazine.com), Saturday Perspectives Edition, op-eds, second Saturday of month (Serendipity and Requirements (Mar 12, 2016), The Invisible Humanities (Feb 13, 2016), Reflecting on 2015: (Jan 9, 2016), Data Science is Important (Dec 12, 2015), Hiring Faculty (Nov 14, 2015), etc..),
The Poincare Conjecture: In Search of the Shape of the Universe, Walker, 2007

Siobhan Roberts

Michael Atiyahs Imaginative State of Mind, *Quanta*, 3 March 2016
 “Cogito, Ergo Summer, *The New Yorker*, 27 August 2015
Genius at Play: The Curious Mind of John Horton Conway, Bloomsbury/Penguin Random House, 2015, 453 pages.
 “Conways Memento Mori, *Numberphile/YouTube*, 1 July 2015, documentary short film.

Marjorie Senechal

“The Simplicity Postulate”, in R. Kossak and P. Ordning, eds, *Simplicity: Ideals of Practice in Mathematics and the Arts*, Springer, to appear.
I Died for Beauty: Dorothy Wrinch and the Cultures of Science, Oxford, 2013
 “Figures, Fingers, and Rings”, *The Huffington Post*, May 28, 2013
 “The Map She Carried,” OUP Blog, January 11, 2013

Paul Zimet

“Star Messengers,” a play about Galileo at the millennium, performed at Smith College, 2000, and at La Mama Etc in NY, 2001.

The visible achievements of previous BIRS workshops include, in addition to many publications of individual participants:

a well-attended public reading in Max Bell Hall in June 2006,

playwright Ellen Maddows math-laced music comedy *Delicious Rivers*, written in collaboration with Marjorie Senechal, which was performed at La Mama Cafe in New York and at Smith College in 2006,

the work of 20 past workshop participants showcased in *The Shape of Content*, an anthology of creative writing in mathematics edited by the three co-organizers of the third workshop. This book generated rave reviews. We are still looking for a publisher for a second anthology (the publisher of the first, Klaus Peters of A. K. Peters, Ltd, retired and, to our sorrow, has died .) Should we find one, we will invite all the participants in all six workshops to contribute material.

the panel discussion *Breaking Barriers: Writers, Scientists, and Mathematicians in Conversation*, a joint event of our group and the writers in residence at the Banff Centre, a highlight of the workshop we held in 2010,

a public reading of our current work at 2013 workshop, which people from the Banff Centre, including some of the writers in residence, attended. This series was videotaped and posted on BIRSs website.

a more informal (and unrecorded) public reading at this workshop, attended by people from the Banff Centre, including many participants in the concurrent workshop.