

MSI: Music, Film and Mathematics together

Tommy Britt (George Mason University),
Jennifer Granville (Leeds Metropolitan University),
Andrew Granville, (Université de Montréal),
Robert Schneider (Emory University)

August 10, 2013 to Tuesday August 20, 2013

The residency of MSI: Music, Film and Mathematics together, was supported by both BIRS and the Banff Centre. This support went far beyond bed and board, becoming a cross-disciplinary, cross-campus collaboration and research project.

The official members of our team were:

- Robert Schneider, a research student in mathematics, who is also a composer, music producer and artist;
- Tommy Britt, a documentary film maker and film academic;
- Jennifer Granville, a writer, film academic and film maker;
- Andrew Granville, a mathematician, and mathematical “vulgarizer”.

At the Banff Center our intention was to film a live performance of the piece of music, *Reverie in Prime Time Signatures*, using musicians in residence at the Banff center to play the various instruments. This piece was specially composed for a rehearsed reading of the screenplay, *MSI: Anatomy of Integers and Permutations*, written by Andrew and Jennifer. The score for *Reverie in Prime Time Signatures* was subsequently used in notated form in the graphic novel, *MSI: Anatomy*, which is being prepared for publication by Princeton University Press. Following the performance, our goal was to mix the music, and to make a film record of both the performance and the mixing process; the film shot being used to make a short documentary, as well as to form part of a larger documentary.

Whilst the graphic novel is in itself an artifact that forms part of the body of our research into the nature of creativity across science and math, and how to expose that to a wider audience, the documentary is an investigation into these processes and highlights the investigators ideas, reflections and the progress of their research.

In the move toward doctoral practice based research in the arts, there is a constant tension between whether or not the artifact itself constitutes the research, or whether there must always be some form of contextualization that in some ways justifies the artifact. Our group, by its very nature, embodies that conflict and our work at BIRS/Banff Centre went some way to clarifying and articulating the question as well as actually creating two new artifacts, the short documentary and the recorded music. (Links to both of these will be forwarded to BIRS and the Banff Center as soon as they are completed).

BIRS and the Banff Centre proved to be the ideal venue to take this research forward. The available facilities gave us a firm base from which to develop our ideas, with the benefit of a strong, technical foundation to support us:

- The lecture theatre that we used for an exploration both visual and aural of the mathematics inherent in the music we were recording;
- The concert hall where we recorded the composition, with its excellent acoustics;
- The quality camera equipment; and
- The excellent post-production facilities.

We were given access to talented young musicians, and rare musical instruments (such as a harpsichord). During the recording session, the musicians were introduced to the mathematical nature of the composition and asked to improvise, bearing in mind the world that the music had grown out of. Clearly, this is an approach musicians must always take, but in this instance the world was one of mathematics and the Sieve of Eratosthenes! This was an unusual request for the musicians, who dealt with the challenge in different but original ways. We believe that the results are moving and beautiful and so we feel justified in claiming that the musicians became part of our research group.

- Emma Schmiedecke - Cello
- Camilo Davila Clarinet
- Christine Han Harpsichord
- Chris James Flute

The Banff Centre staff and work/study technicians were interested in our work, encouraging and very knowledgeable in their fields, and helped us to take full advantage of extraordinarily well equipped technical facilities. Our group was able to contribute to the workstudies experiences during the mixing session. The technicians who recorded and mixed the composition, were drawn in to our research questions, as we investigated the appropriate equipment and techniques to yield the mathematical resonance and atmosphere in the recording. a difficult concept to explain but one which is addressed in the documentary.

- Pouya Hamidi - Sound Engineer/Work Study
- Stuart Bremner Sound Engineer /Work Study

Our documentarian was given permission to freely record around the Banff Centre and offered access to evocative locations unlocking visual ideas and compositions that would not have been accessible anywhere but in this wonderful, unique setting.