Jordan Ellenberg

Reflections on "generative"

In this somewhat informal talk, I will say something about the history of generating text via mathematical processes and ask: what does this have to do with the process of "generation" that writers more frequently use to generate words, sentences, and books (and, for that matter, that mathematicians more frequently use to generate hypotheses, assertions, and theorems?) To some extent this will be based on my own internal experience of both writing novels and doing mathematics, and to some extent on more recent work with Google DeepMind and others about mathematical methods of generating (we'll talk about what I mean by that) ideas and objects of use to mathematicians.

Nina Engelhardt

Mathematics as Crisis and Hope: Mathematics and the First World War in Modernist Literature

Mathematics is "the new method of thought itself, the mind itself, the very wellspring of the times and the primal source of an incredible transformation", so the narrator of Robert Musil's The Man without Qualities claims. Published in the early 1930s, the novel is set in Austria in the year before the outbreak of the First World War and, as the quotation suggests, refers to mathematics to try to explain the crisis that culminates in WWI and to sketch hope for the future. In this talk, I use Musil's The Man without Qualities and his essay "The Mathematical Man", along with other material, to examine how literary texts from and about the early twentieth century present mathematics as contributing to, exemplifying, and offering solutions to the sense of crisis – epistemological, political, cultural – culminating in the First World War. Examining how literary texts draw on mathematical concepts as well as on its historical development and ideas in the philosophy of mathematics, this talk engages with the question whether we can speak of a mathematical modernism, that is, of a cultural embeddedness of mathematics that warrants viewing it as part of the cultural movement of modernism.

Imogen Forbes-Macphail

Line and Number: Poetic and Mathematical Form

The premise of this talk is that poets and mathematicians are both engaged in a problem-solving activity that requires the invention of new formal techniques to express new ideas; and that, in the nineteenth century, many of the problems they were interested in solving were the same. Both coordinate geometry and ekphrastic poetry, for example, engage with the difficulties involved in translating ideas between two different mediums; in projective geometry, and literary point-of-view, objects are defined through a form of triangulation which requires a distinctive approach to thinking about space; while the split between quantitative and qualitative approaches to thinking about form found in Euclidean geometry and topology also structures the way Victorian prosodists imagine different kinds of poetic meter. The language in which we do mathematics shapes what we can conceptualize within it — for example, the invention of exponential notation ($a2$ to replace aa or

"a squared") allowed mathematicians to imagine negative, fractional, or imaginary exponents, concepts literally unthinkable in the earlier notation. Likewise, the vocabulary in which we conduct literary criticism shapes, limits, and directs our thinking. In this talk, I aim to enrich the vocabulary we use to discuss each field by borrowing from the other.

Robert P. Harrison

The Theology of Numbers in Dante's Divine Comedy

Inspired by Sarah Hart's abstract about "Mathematics and Poets," I would like to devote my contribution to the role of mathematics in the prosody, poetics, and theology of Dante's Divine Comedy. Isidore of Seville declared, Tolle numerum omnibus rebus et omnia pereunt (Take from all things their number and all shall perish). The statement holds true for the Divine Comedy, whose architectonic is based on exact as well as inexact math. I hope to show that, in some ways, the latter (inexact math) is more interesting than the former.

Sarah Hart

Mathematicians and Poets

This lecture will look at some of the ways that mathematicians have engaged with poetry and other literature, for example the two lectures given by Galileo on the mathematics and geometry of Dante's Inferno. We'll also ask what these and other examples tell us about the place of mathematics in culture over time.

Rowena Kennedy-Epstein

A Language of Water: Muriel Rukeyser's Biography of Willard Gibbs

In 1939 the American poet and activist Muriel Rukeyser began to research the first biography of the mathematical physicist Willard Gibbs (published in 1942). Why would a 25 year old social and political poet, just returned from documenting the first days of the Spanish Civil War, want to write a cultural biography of an understudied physicist who was famously reclusive and "untranslatable"? Muriel Rukeyser's biography of Gibbs was one of three major projects begun in this period to explore a series of interconnected ideas about American democracy, science, and the uses of the imagination in a time of war. Through Gibbs she was searching for a "'system of relations' that could be expressed symbolically." Especially attracted to his idea of the phase rule, she wrote of her interest in him: "I needed a language of transformation. I needed a language of changing phase for the poem. And I needed a language that was not static, that did not see life as a series of points, but more as a language of water." In this talk I'll explore how Rukeyser's use of Gibbs's life and work offered her a way to theorise and explore new poetic forms.

Arkady Plotnitsky

"On the viewless wings of poesy": Poetics vs. aesthetics in literature and mathematics

… For I will fly to thee,
Not charioted by Bacchus and his pards,
But on the viewless wings of Poesy. …
--John Keats, Ode to a Nightingale

"Lui [le vers], philosophiquement rémunère le défaut des langues, complément supérieur"
[Philosophically, it is verse that makes up for the insufficiency of languages, as a superior complement].
—*Stéphane Mallarmé, Crise de vers*

This paper argues that the creative nature of mathematics is defined by a combination of mathematical and artistic thinking. By "artistic" I do not refer to aesthetic aspects of mathematics or mathematical aspects of aesthetic experience, which subjects are only marginally addressed in the paper. Instead, I an concerned with the invention of new mathematical concepts, theories, or fields. In, thus, juxtaposing poetics and aesthetics, my argument, beginning with the term "poetics" (used in my subtitle), connects to that of Aristotle's Poetics [Peri poietikēs], the title of which is derived from the ancient Greek word poeien as meaning "making," putting something together. (Aristotle's concept of "mimesis" in Poetics essential relates to, and in fact is, that of poeien rather than that of imitation.) Aristotle did not apply the term "poeien" to mathematics and did not consider mathematics in this way, focusing instead, when dealing with mathematics in his other works, on logical aspects of mathematics. By contrast, I argue, under the heading of "the composition principle," that, as a creative endeavor, mathematics is primarily defined by its compositional nature, rather than by its logical or calculational aspects, essential as the latter are in mathematics, especially in its institutional functioning. Of course, mathematics is not the same as literature and art. In particular, the poetics of mathematics is the poetics of concepts, which play a more limited role in literature and art, and the central role of which ally mathematics or mathematical sciences, such as physics, with philosophy. Following certain key concepts of poetic composition of Romanticism, specifically those of J. Keats and P. B. Shelley, and modernism, specifically those of S. Mallarmé, the paper also juxtaposes compositional thinking in literature and mathematics, to Platonism, in the case of mathematics, especially to mathematical Platonism. In his preface to Prometheus Unbound (1820), Shelley speaks of "poetical abstractions," a term echoing "mathematical abstractions," a conception, and more broadly that of abstract mathematics, that were began to emerge in mathematics, especially in algebra, around the same time. By the time of the rise of modernism, Mallarmé expressly connects poetic language to mathematical language, as abstract languages. This argumentation also requires a rethinking of the term "abstract" vs. its conventional meaning as something reductive. Abstract compositions, poetical and mathematical, do not preclude the richness of structures they create, but they redefine the concept of structure, and in the first place, the concepts of abstract and concrete, and how these concepts relate to each other.

Burak Sezer

**Ecomathematical Loops: On Michel Serres and Peter Sloterdijk's
Ecological Topology**

Both Michel Serres and Peter Sloterdijk's philosophical systems rely on mathematical topology, and I will show how the concept of loops translate from mathematical topology to ecological thoughts. Looping systems are of paramount importance to the characterization of topological spaces, but they are, according to Sloterdijk, also an important characteristic of the planet's immunologyand ecological stability. In that regard, Serres' ecological notion of the fold and the knot help us extend the notion of loops into a proper ecomathematical system.

Alma Steingart

Rethinking Mathematical Aesthetics

At mid-century, both mathematicians and scientific humanists called upon structure to unify the arts and the sciences. Further, members of both communities appealed to a structuralist vision in order to define creativity and aesthetics as common features of both endeavors. Yet the structuralist visions advanced by mathematicians and scientific humanists were also fundamentally at odds with one another. Unlike their humanist colleagues, mathematicians' universe was not one of images and illustrations. Indeed, for pure mathematicians, the aesthetic nature of mathematics was inversely proportional to its boundedness in reality. Only by closing their eyes to the world, they suggested, could their creativity be expressed. Ironically, at the same time that scientific humanists turned to structure to make science and art more visibly connected, mathematicians insisted that it was structure's inherent invisibility that joined art and science. This talk will use this historical moment to consider how the meaning of aesthetics in mathematics has transformed in relation to its use in artistic fields including art and literature.

Choi Jieun, Hong Seung Woo, Kim Minhyong, Kim Tae Ho, Park Jee Yoon

Mathematics and the imagination: Literature for Children

During the last 4 years, we have been working on a series of illustrated adventure books for children, in which mathematician Minhyong Lee appears to have discovered an extremely efficient method of computation that allows him to make limited predictions about the future. The story is told mostly from the view of his two daughters, who try to unravel the mystery of his disappearance by looking for mathematical clues in his house, ransacking his memory, and wandering abandoned segments of the London underground. This talk will discuss some of the challenges and joys of this collaboration, especially the process of learning from each other.