Mathematics, Music, Art, Architecture, Education, Culture

Bridges 2016 Poetry Anthology

Jyväskylä

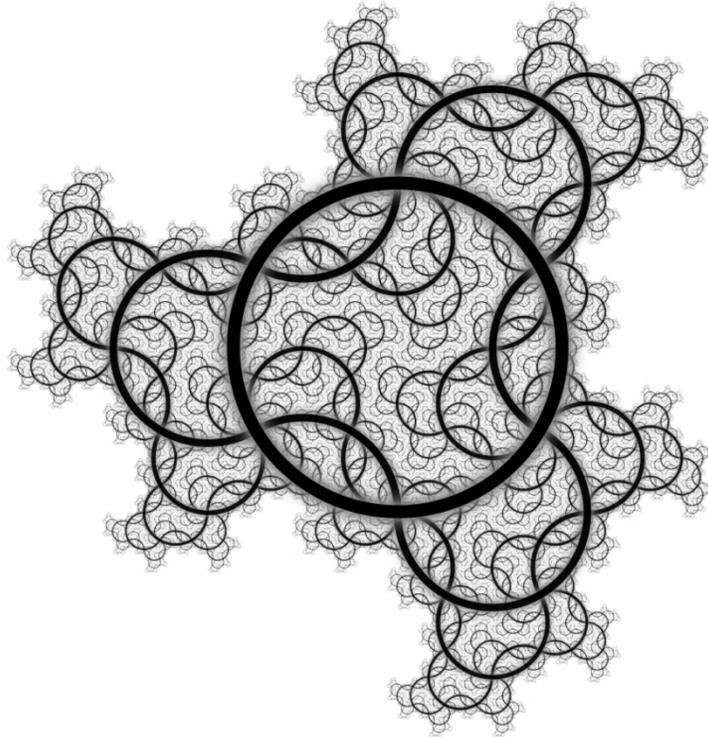**Baltimore**   **Seoul**

Enschede   **Towson**   **Coimbra**

2011 – 2016

Bridges 2016 Poetry Anthology

Jyväskylä,
Baltimore, Seoul, Enschede, Towson, Coimbra

A collection of poems with strong links to mathematics
by the poets featured at Bridges 2011 – 2016 poetry readings

Sarah Glaz, Editor

Editor: Sarah Glaz
       Department of Mathematics
       The University of Connecticut
       Storrs, Connecticut 06269
       Sarah.Glaz@uconn.edu

Cover Design: Phil Webster
Title Page Image: "Fractal Curves" by Robert Fathauer

Bridges 2016 Poetry Anthology

Sarah Glaz, Editor

Contents

Poems

by Past Bridges Conferences Featured Poets

Introduction

Newton's binomial is as beautiful as Venus de Milo.
What happens is that few people notice it.

—Fernando Pessoa *(as* Álvaro de Campos*)*
translated from the Portuguese by Francisco José Craveiro de Carvalho

Welcome to the Bridges 2016 Poetry Anthology, a collection of poems with strong links to mathematics written by the poets featured at the Bridges conferences from 2011 – 2016.

This year's Bridges conference in Jyväskylä, Finland, promises another exciting and inspiring installment in the annual series of math and art conferences that have been held since 1998 under the umbrella of the Bridges organization. The Bridges conferences' poetry program started in 2011, when I coordinated a mathematical poetry reading at Bridges Coimbra, Portugal. This first reading consisted of a small number of poets reading their work to a small audience. Two of us also gave presentations on poetry-related topics in the talk sessions. During the six years that have passed since then, the poetry program at Bridges has flourished and expanded. The number of poetry-related talks has increased significantly, workshops on aspects of the craft have become a regular feature of the conference's program, and other activities—such as poetry-related discussions and theatrical performances—have also made occasional appearances. The mathematical poetry readings themselves changed in response to the growing poetry community. More poets come together to read or show their work and to display or exchange their latest publications. And the audience is getting larger with every passing year. It is a pleasure to be part of the vibrant and creative poetry community at Bridges, and see it grow in front of my eyes.

The present volume is the second poetry anthology that grew out of the Bridges poetry readings. The first volume included work by the poets featured at the Bridges poetry readings from 2011 to 2013. The volumes' tables of contents reflect the tremendous growth of the Bridges poetry community. While the 2013 anthology is 57 pages long and features seventeen poets, the current volume is 75 pages long and features twenty-three poets—a growth of over 30%. Although richer and more diverse than its predecessor, the current volume springs from the same source and shares many of the distinctive characteristics of the Bridges poetry readings.

From the beginning, the Bridges poetry readings have featured poems with multi-dimensional links to mathematics and a wide range of styles. The poems' connections to mathematics cover the entire gamut of what is possible. They use mathematical language as metaphor, play with geometric and symbolic imagery, treat mathematical results or history of mathematics as content for poems, allow mathematical properties to drive poetic structure, and propose mathematics itself as commentary on life, ideas, and emotions. The styles of the poems are equally diverse, ranging from traditional to multimedia and from lyrical to visual.

As a fortunate consequence of the locations and participants at Bridges conferences, the poetry readings acquired an international flavor. Represented here are translations into English of poems from a number of languages, as well as poems originally written in English from many English-speaking countries around the globe. Finally, the exciting diversity extends to the other activities in which the

poets are deeply engaged, activities that have left their mark on the poetry. The featured poets are college professors doing research in mathematics, statistics, environmental studies, history, philosophy and education; engineers; higher-education administrators; librarians; professional artists, writers, translators, and poets; primary and secondary school teachers, and more.

This volume is organized in two sections. The first section contains poems written by the poets invited to read at Bridges Finland; while the second is devoted to poems written by poets who have been invited to previous Bridges conferences but could not participate in this year's reading. In addition, the anthology provides biographical information about the poets, including titles of recent publications and urls for poets' websites, where readers can find further poetic delights.

I look forward to the upcoming reading in Finland. Happily for us, the proximity to Norway, Germany and Great Britain brings with it the exciting mathematical poetry of Mike Naylor, Manfred Stern, and Eveline Pye. Joining them at the reading from further away, and represented on these pages, is the equally exciting work of Madhur Anand, Tatiana Bonch-Osmolovskaya, Carol Dorf, Emily Grosholz, Alice Major, Tom Petsinis and Vera Schwarcz. Completing the volume are samples of the lovely mathematical poetry of past Bridges poets: Mike Bartholomew-Biggs, Marion Deutsche Cohen, Francisco José Craveiro de Carvalho, JoAnne Growney, Philip Holmes, Gizem Karaali, Larry Lesser, Kaz Maslanka, Dan May, Deanna Nikaido, Stephanie Strickland and Amy Uyematsu.

I am indebted to all the poets and translators whose poems appear here for their work, to Terri Saul for artwork and to Karl Kempton for his inspiring visual poem. I thank all the poets for patiently going over parts of the anthology and making good suggestions for improvements. Particular thanks for gracious help with various aspects of this anthology to Alice Major, Emily Grosholz, JoAnne Growney and Vera Schwarcz. Thanks to Debbie Sierpinski for the extraordinary Word skills with which she put the finishing touches on this manuscript. Many thanks to Robert Fathauer, at Tessellations Publishing, for the beautiful title page image and for all the work and care he put into producing this book. My gratitude to Reza Sarhangi, Bridges organizations' president, for his continual support of my Bridges poetry activities. Last, but not least, I thank my husband, Joe Glaz, for sharing the experience of all the Bridges conferences with me.

Like me, many of the poets came to their first Bridges conference and were captivated: now they come every year. It happens to the best of us! I invite you to the next Bridges poetry reading to see for yourself.

Sarah Glaz
Storrs, Connecticut

Poems by
Bridges Finland Featured Poets
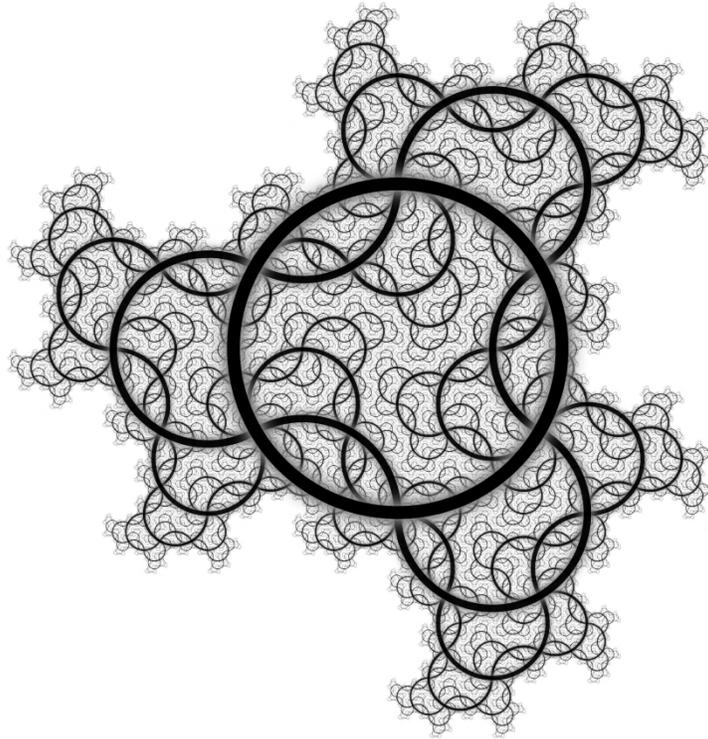
A Mathematical Poetry Reading
Friday, August 12, 2016

Madhur Anand

Madhur Anand's debut collection of poems, *A New Index for Predicting Catastrophes* (McClelland & Stewart/Penguin Random House Canada, 2015), has been reviewed in national and international magazines and was nominated for the 2016 Trillium Book Award for Poetry. Publisher's Weekly said "Anand's attention to and ability to evoke explicit, exponential beauty in scientific and natural form are simply stunning." Her work has more recently appeared in *The Rusty Toque* and *The Walrus*. In 2009 she co-edited the anthology *Regreen: New Canadian Ecological Poetry.* She is a professor in the School of Environmental Sciences at the University of Guelph, Canada. Her research interests include forest ecology, sustainability science and ecological modelling. She lives in Guelph, Ontario with her husband and three young children. Additional information on Madhur's scholarship and publications may be found at: http://www.uoguelph.ca/~manand/Madhur_Anand/Welcome.html

Rhizome Logic

Rare are irises that live for years all dolled up
in deserts. Amidst Negev sand, starry annuals,

shrubs, and striated lizards, I came across a ring
of six flower heads, the original stalks a void

of former blooms. How satiny purple curls succeed:
openings so circular, equations fall apart.

Madhur Anand

No Two Things Can Be More Equal

In undergrad I learned about the identity
matrix. Ones on the main diagonal and zeros
elsewhere. Anything multiplied by it is itself.

Then later, to love that way, and the definition
of Buddhist from a Tibetan girl across from me
and two bowls of steaming breakfast noodles in Lhasa.

If you are happy, I am happy. Fairly simple.
If you are happy, I am happy. Although was I?

Accountants would count and distribute joy if they could.
But it's simpler. Two lines of one length, parallel.

Madhur Anand

Garam Masala

Some species cross oceans to germinate in pressure
cookers or undergraduate textbooks. They're mixed in

known parts for generating heat. Others populate
the Red List: Salim Ali's fruit bat, Nilgiri leaf

monkey, Nicobar tree shrew. Close-packing of equal
spheres. Like spices in round tiffins. Gauss proved the highest

average density, the greatest fraction of space
in infinite regular arrangement, is constant.

Madhur Anand

Type One Error

I avoid news, talk to strangers, walk around the block
a thousand times and toss nickels for random samples.
I still get a few false positives. *I'm fine. It's good*.
That in reality I should have ordered the eggs
Benedict. "Straw" yellow would bring out the living room
walls more than two coats of "Hay Stack." Nowadays red pines
of southern Ontario are planted, which makes seasons
easier to approximate. Even-aged stands seen
at high speeds through the window are good experience
but will not supply the needed degrees of freedom.
One deterministic seed, the mind recounting when
counting is not enough, though where many poems begin.

Tatiana Bonch-Osmolovskaya

Tatiana Bonch-Osmolovskaya was born in former Soviet Union and studied physics at Moscow Institute of Physics and Technology and philology at Moscow State Humanitarian University. Her Ph.D. degree is on Russian experimental poetry. Tatiana is author of ten books in Russian, including *Introduction to the Literature of Formal Restrictions* and *Labyrinths of Combinatorial Literature*, and coeditor of the anthology, *Freedom of Restriction.* Her poetry in English appeared in: *Can I tell you a secret?*, *Across the Russian Wor(l)d*, *Bridges Anthology*, *London Grip*, *The Disappearing*, and *Journal of Humanistic Mathematics*. She is a member of the Executive Board of the International Symmetry Association, editorial committee of *Another Hemisphere Journal* and a guest-editor of *Symmetry* literary sessions. She co-organized the *Mathematics and Arts* seminar, *GolosA (Voices) Festival of Combinatorial Poetry*, and *Symmetry Festival Literary Session*. http://antipodes.org.au/en.aboutAssociation.html

Love in Paris

To live in Paris. To walk down a street and sing loudly,
l'amour, l'amour,
to a cooing couple at a coffee shop table.
To be a chef. No, a waiter. To mix drinks, make coffee and chocolate,
to hear as someone sings again,
l'amour, l'amour,
and run outside to have a look.
To drink chocolate in a café, to chat and kiss,
to laugh and wave to a passer-by who looks at you and sings,
l'amour, l'amour.
At least, to come to Paris for a weekend.
Two or three days in Paris,
to walk by the Saint-Michel place, to drink a chocolate in a café
and watch as a woman laughs and sings to a kissing couple,
l'amour, l'amour.
The waiter runs outside to see who is singing again about love in Paris.
The girl waves to the woman
and smiles over her lover's shoulder.
At this brief minute, she waves for you too, gives you a smile and a moment of
love in Paris.

Tatiana Bonch-Osmolovskaya

Movie Watcher

An unskilled worker comes to a film shoot
to discover himself in a role
of an actor playing a part of
an ordinary guy who came to a film shoot
to be engaged as an unskilled worker

he carries around boxes and shifts the tripods,
spotlights, screen fans
the sun is so bright
that the shining of the spotlights is almost imperceptible
still he carries them from place to place
wherever he's been ordered
meaningless work, but the pay is good
after work he is invited to dinner with everyone
they give him beer and wine – he mustn't drink, but he does
breaks down, beats someone up, ends up in the mud,
gets up and hugs his girlfriend
can't wait for the last day of shooting
all of this filmed of course
it is so interesting – to observe the real life of an ordinary guy
a new word in the cinematography

a young film director looks sadly
at the bustle on the shooting site
he received a grant for making this movie
it is socially important to picture ordinary guys
now he comprehends the essence of their life
he gives them jobs
they earn good money
for moving spotlights and screens under the bright sun
to wherever he points
of course, not without excesses
during the shooting, it is always this way

later he will show them the movie
in the dark cave of a cinema
he'll encase them in rustling silk and champagne
he'll tie them to chairs with chains made of the noise of cat steps
of the voices of fish and the saliva of birds
they will finally look at the real life
flashing before them
shadows on the screen

Tatiana Bonch-Osmolovskaya

As I Told Her

as I told her to hang up
the linens outside the house
along the fence under the tree
as I repeated to her when I finished washing
the linens as I sorted out
the linens as I picked from the basket
the linens as I dropped it
as I repeated
in my childhood she would tell me it was the time to hang up
the linens I'd come back I'd play and gather
mulberries since the childhood leaving the basket
with the linens walking by the branch as I reached for
the linens as I chose
berries as I told her
as I repeated under the mulberry tree it was time to hang up
the linens as I noticed it as I gathered it as I noticed
the linens in the front yard from the road when we rushed past a house
as I have always repeated
under the mulberry tree when dusk came it was time to hang up
the linens outside the house
as I repeated as I recognized the tree as
mulberries fell from the tree as I noticed as I wished to hang up
the linens repeated washed hang up
the linens on ropes close to the house along the fence under the tree
as I noticed it from the road as I repeated to tell myself it was time to hang up
the linens

Author's Note: The three poems, *Love in Paris*, *Movie Watcher*, and *As I Told Her,* are fractal poems. Each poem unfolds, or is compressed, like a complex graphical fractal, where a single image or theme is repeatedly seen by one or several viewers from different perspectives or distances.

Tatiana Bonch-Osmolovskaya

A Name After the City

there were eight tanks in the accordion radiator in my bedroom where I slept when I was eight
they were burning hot, central heating boiled water inside them, I heard it running and gurgling
hot heavy cast iron radiator of high heat capacity
it was next to my bed under a window
outside it was a tall pine tree with the dead burnt top
they said the top burnt because of radiation from the nuclear accelerator
and nuclear reactors of the Joint Institute of Nuclear Research
the Nuclear Institute was the main enterprise of the town
my parents worked there, not at the accelerator, in another laboratory under the guidance of Ilya Frank
my mother got weekly coupons for milk as compensation for the adverse conditions
it was worth 15 kopeek, you could exchange it for a half litre of milk
in 1967, George Flerov's research group experimenting with ion bombardment of nuclei 243Am element
by 22Ne ions discovered the 105th element of the Mendeleev system
that was the year we moved to the town
I went to a childcare centre and my sister to a nursery day care
it took them three more years to publish an article in the Nuclear Physics Journal
they reported a 9.40 MeV and a 9.70 MeV alpha-activity and assigned the decays to the isotopes ^{260}Db
    or ^{261}Db
1970 was the year I went to primary school
we lived on Peace Street, parallel to Kurchatov street, both crossed by Vavilov street
on the facade of a building, there was a ten metres mural saying "Atom is not a soldier, Atom is a
    worker"
I thought I knew what 'atom' meant
how could it be 'a soldier', or 'a worker'? it was 'an atom'
we lived in a Khruschevka apartment
there was a cellar to keep wood for the apartment stove to heat water for the shower
there was a gas in a cylinder for the kitchen, we exchanged it for a new one when it ran out of gas
there were cast iron centrally heated radiators under the windows
in 1976, they used thermal gradient chromatography
to identify the product of decay of this element as definitely the 260 pentabromide
this year I started high school
I focused on math, puzzles and poetry
the researchers proposed to call the 105th element after Niels Bohr
another group proposed to name it after Otto Hahn
another – after Joliot-Curie
I should have mention there was Joliot-Curie street too, a boulevard and a square
I finished a maths high school in Moscow, then graduated from the Moscow Institute of Physics and
    Technology, then earned a PhD in literature
they named two crossing streets after George Flerov and Ilya Frank
after these magnificent physicists died
as for the 105th element, it was called by its number, *unnilpentium* for some time
until they decided to name it Dubnium, after the name of our city

Carol Dorf

Carol Dorf is fascinated with the boundaries between disciplines and forms. For the past fifteen years she has taught mathematics at Berkeley High School, and has led poetry workshops. Recently, she's brought her passions together by publishing an issue of mathematical poetry in the online magazine *Talking Writing*, where she is the poetry editor. She has also introduced poetry into the mathematics classroom, and taught poetry writing to mathematics teachers. Her work has been published in journals including: *Slipstream, Glint, The Mom Egg, Spillway, Sin Fronteras, Antiphon, Poemeleon, About Place, The Journal of Humanistic Mathematics, Scientific American, and Maintenant,* and has been anthologized in: *Not A Muse, Best of Indie New England, Boomer Girls*, and elsewhere. Her most recent book, *Theory Headed Dragon,* appeared with Finishing Line Press in 2016. http://talkingwriting.com/why-poets-sometimes-think-in-numbers/

Combinatorial 5

On the haywire path, I'm baffled.
Pascal with his distracting rules

is no help in this game of change.
Chance an attempt. Drinking tea

won't hybridize the climate.
My eyes adapted to walking blind.

Folded back upon ourselves. Shift
from night to day. Sun salutation

ceremonial, too much. All that's well.
The fan blows heat. Are you cold?

Carol Dorf

Gold Standard

Acts of preservation

                       renature

      the excluded

                           imagination

We've yet to enter

                           the Monte Hall:

cash nexus --

                 Does it increase your chances

       of winning

to choose another door

                 (it does)

Why is money more hidden

                       than fetishes?

Like Egyptians

       burying gold with the dead

we bury evidence

       the difference

Carol Dorf

The Zero – Taught Us – Phosphorus

Taught by zeros
     she handled
          Phosphorus
made her bed
     on the periodic table –
desperate
     for structure
          to organize time's
               glacial epochs

She found power
     in contained
          explosions
and in the contrary –
     elements that resisted
          fire's reactive
               intentions –
first red, then blue flicker, to white

This paralysis
     bloomed into
          "vital energies,"
               speed of light.

Carol Dorf

Euclidian Shivers

So, how does the Triangle
relate to the Circle?

Euclid and a radius prove points
that radiate from the center, a circle;
a method to circumnavigate space.

Would this seem more real if we pulled
ribbons from some agreed upon place,
perhaps the Maypole?

Preoccupied with tangents and triangles,
it is hard to visualize chords,
a concordance, to be in accord.

Author's Note: The illustration to *Euclidean Shivers* is the chapbook art of Terri Saul.

Sarah Glaz

Sarah Glaz is professor of mathematics at the University of Connecticut specializing in the area of commutative algebra. She also has a lifelong interest in poetry. Sarah translated poetry from several languages, wrote articles on the connections between mathematics and poetry, experimented with poetry in the mathematics classroom, co-edited the poetry anthology *Strange Attractors*: *Poems of Love and Mathematics*, is editor of the print and online *Bridges Poetry Anthologies* 2013, 2014, and 2016 (forthcoming), and served as Guest Editor for the *Journal of Mathematics and the Arts Special Issue: Poetry and Mathematics.* Sarah's mathematical poetry appeared in: *Ibis Review*, *Convergence*, *The American Math Monthly*, *The Ghazal Page*, *Journal of Humanistic Mathematics*, *Recursive Angel, Talking Writing, American Scientist,* and *The London Grip.* She is an associate editor for *Journal of Mathematics and the Arts*.
http://www.math.uconn.edu/~glaz

The Integers Are Not a Happy Medium

When I arrive
you are already there
waiting
a shadow swiftly fleets across your brow
The integers are not a happy medium
you say by way of greeting
They fly which way
scatter without restraint
fritter through fingers faster
than one can count the gains
And you are late again

Sarah Glaz

I Am a Number

1   I am tall
and
one sided
like an ostrich
Pluck the eye
of my feather
Whittle
the stick
of
remembrance
bare
of
ornamentation
Alone

2   I am fat with contentment
In the arc
of survival
we win
by a hair
Kick
the less
fortunate
down the plank
to make space

3   I am prime
and conflicted
One more or one less
The spoke in the wheel
or grease that makes it go
Increase and multiply
or divide
and divorce

4   I am Parmenides' *many*
on the edge of ancient counting:
the stars in the sky
fattened sheep of pharaoh
the dappled cows of the gods grazing under the sun
and all the grains of sand
on the seashore

Sarah Glaz

I Am a Number (II)

5 Forged in time's fire
   my golden figure
   rises
   open
   to the past
   and the future
   I count my digits
   All Present
   yet only
   half way there

6 I can be factored
   into selves
   from
   former lives
   each one
   more potent
   than
   I
   am
   Unmultiplied
   I disappear

7 Last prime
   before
   the count of time
   halts
   and
   the great mystery
   begins

8 How did it come to that

9 I have no time

10 Decem

Sarah Glaz

eclipse: moon writes sun letters
sun + moon =
sun + moon =
sun + moon =
sun + moon =
sun + moon =

Sun Plus Moon by Karl Kempton

Eclipse – a Love Poem

The moon writes a letter on sun's face: an inverted C
looking backwards toward a point of no return.

Later, a perfect O appears: O as in *lOve*,
a love letter, the moon emerges from a cloud at

the precise center of the blaze blinding the naked
eye. Then the slow withdrawal begins: C reverses

position – light seeking the mirror image of itself.
How different things might have been given another

angle: ∪ – the union sign mysteriously formed
in the penumbra, or upside-down ∩ – symbol for

intersection culled from the alphabet of mathema-
tics. Imagination's play of closeness at a distance.

Emily Grosholz

Emily Grosholz is the author of seven poetry collections, most recently *Proportions of the Heart: Poems that Play with Mathematics,* with artwork by Robert Fathauer (Tessellations Publishing, 2014). Her guest-edited issue *Studies in History and Philosophy of Modern Physics* on "Time and Cosmology" appeared in 2015, and her book *Great Circles: The Transits of Mathematics and Poetry* is due from Springer in 2017. She is Liberal Arts Research Professor of Philosophy and a member of the Center for Fundamental Theory / Institute for Gravitation and the Cosmos at Penn State University and a member of the research group SPHERE / UMR 7219 / University of Paris 7. Emily has been an advisory editor for the *Hudson Review* for thirty-two years, and joined the editorial board of the *Journal of Humanistic Mathematics* six years ago. http://www.emilygrosholz.com/index.html

Mnemosyne

For Ursula Goldenbaum and Elhanan Yakira

A musical black hole, like some great bellows
Breathing animus into the pipe organ of space,
Unlike Bach's polyphonic organ in the Leipzig Kapelle,

Sings in the oval rills of the Perseus Galaxy Cluster
Two hundred fifty million light years away,
Two hundred fifty million years ago, but whether

Past or present hangs on how the reminiscent soul
Decides to reckon time. At fifty octaves deep
Below our middle C, it plays only B flat, a singlet

Theme for a B minor mass that no one ever hears,
But we still hear the mass performed in Bach's Kapelle
Days after nine-eleven-one, not to applause but tears.

Emily Grosholz

The Tallinn Ferry

The ferryboat from Helsinki to Tallinn
Passes small islands into the open sea,
The Baltic. Brackish, neither sweet nor salt,
It plays congenial host to microscopic
Flora and fauna flourishing only here.
Only here. The sunset shines behind us
And lights the northern dome of heaven slantwise
As if dusk were midday, which it is,
Almost, in summer near the Arctic Circle.

This boat reminds me of another ferry
I boarded more than forty years ago,
From Brindisi to Patras. A southern sea
With the same perfect circle at the edges
Thanks to our finite eyes, the curvature
Of almost perfect earth, that oblate sphere,
The same slate blue at evening, but another
Dark-eyed man was waiting on the shore,
Hidden behind the folded wing of years.

For hours there is nothing on the horizon.
It's just a circle, as the river of time
Is just a line: fixed banks or flowing stream?
The line withholds its secrets, like the circle.
Then gleams arise, the facets of a cliff,
The windows of a city, the shimmer of ships
Moored close together round a crescent harbor.
And so my vanished loves sometimes appear
At sunset, as the ferry veers towards home.

Emily Grosholz

In Praise of Fractals

Variations on the Introduction to
The Fractal Geometry of Nature by Benoit Mandelbrot
(New York: W. H. Freeman and Company, 1983)

Euclid's geometry cannot describe,
nor Apollonius', the shape of mountains,
puddles, clouds, peninsulas or trees.
Clouds are never spheres,
nor mountains cones, nor Ponderosa pines;
bark is not smooth; and where the land and sea
so variously lie about each other
and lightly kiss, is no hyperbola.

Compared with Euclid's elementary forms,
Nature, loosening her hair, exhibits patterns
(sweetly disarrayed, afloat, uncombed)
not simply of a higher degree *n*
but rather of an altogether different
level of complexity:
the number of the scales of distances
describing her is almost infinite.

How shall we study the morphology
of the amorphous? Mandelbrot
solved the conundrum by inventing fractals,
a lineage of shapes
fretted by chance, whose regularities
are all statistical, like Brownian motion,
whose fine configurations
turn out to be the same at every scale.

Some fractal sets are curves
(space-filling curves!) or complex surfaces;
others are wholly disconnected 'dusts';
others are just too odd to have a name.
Poincaré once observed,
there may be questions that we choose to ask,
but others ask themselves,
sometimes for centuries, while no one listens.

Questions that ask themselves without repose
may come to rest at last in someone's mind.
So Mandelbrot in time
designed his fractal brood to be admired
not merely for its formal elegance
as mathematical structure,
but power to interpret, curl by curl,
nature's coiffure of molecules and mountains.

What gentle revolution of ideas
disjoins the nineteenth century from ours!
Cantor's set of nested missing thirds,
Peano's curve of fractional dimension,
Mandelbrot's fractals, counter the old rule
of simple continuity,
domesticating what shortsightedly
was once considered monstrous.

Nature embraces monsters as her own,
encouraging the pensive mathematician
to find anomaly
inherent in the creatures all around us.
The masters of infinity,
Cantor, Peano, Hausdorff, and Lebesgue,
discovered sets not in the end transcendent
but immanent, Spinoza's darling Cause.

Imagination shoots the breeze with Nature,
and what they speak (mathematics) as they flirt
reveals itself surprisingly effective
in science, a wrought gift
we don't deserve or seek or understand.
So let us just be grateful,
and hope that it goes on, although our joy
is always balanced by our bafflement.

Emily Grosholz

Elliptic Curves and Modular Forms Converge South of the Taklamakan

For Winnie Li

A skein of silk amid the iron and bronze weapons,
The trade routes brought my number theory teacher, Dr. Li,
Who writes faster with white chalk on the blackboard
Then any human being I ever followed across a proof,
Raising clouds of chalk dust at the furrowed extremities
Of each long expedition towards a theorem. Camels
Cough and huddle by the caravanserai, in moonlight.

I carry coughdrops with me in my bookbag, under notes,
So I won't interrupt her train of thought by sneezing,
And try to copy every line she writes, as well as those
Brief detours on heuristics, or her mild evaluations
Of depth or usefulness or interest of conjectures, placed
Unexpectedly like waterfalls down clefts in limestone,
Or her infrequent, offhand explanations of the way
She generalized a printed remark of Serre's, from gamma-
Zero-*p* (*p* prime, indexing groups of matrices) to any level.

How algebraic form can complement the smooth analysis
That frames the proof, the complex upper half-plane poised
Like some great violet dome on whose connected face
The primes come out, appearing one by one in constellations
Above the Taklamakan Desert where the Silk Route ran
From Xian, between the winding Yellow River and the great
But perished Wall, to break against the lovely gates of Kashgar.

Alice Major

Alice Major has published ten poetry collections, most recently *Standard Candles* (University of Alberta Press, 2015). Her book of essays, *Intersecting Sets: A Poet Looks at Science,* has been awarded the Wilfrid Eggeston Award for non-fiction. Among her writing awards are the Pat Lowther Award for poetry. Her interest in mathematics began at the age of twelve, when she was introduced to non-Euclidean geometry in one of Martin Gardner's books. Ever since, like Percy Bysshe Shelley, she turns to math and science "to replenish my store of metaphor." She has been president of the League of Canadian Poets, first poet laureate for her home city of Edmonton (in western Canada), and is the founder of the Edmonton Poetry Festival. In 2012 Alice was inducted to Edmonton's Arts and Culture Hall of Fame. http://www.alicemajor.com/

Pythagorean Theorem
1965

The girl learns Euclid and Pythagoras—
that theorem, luminous and ancient
as Egypt. It seems mysterious
      and beautiful, this simple shape she draws
      on a clean page with her ruler. Just
      a triangle. But obedient to laws
that bind its measurements—the length of sides
linked intimately, but not by inches notched
along line's thin dimension. They're unified
      in another space entirely—they share
      area, square. The sides are the shadow edges
      of another shape. It's like a prayer
that she is learning, this theorem
of trinity and distance—a formula
sent down to her from time, an orison
      that she can hear and learn,
      repeat within the congregation
      of the classroom, and then send on again.

Alice Major

Now, That Amphibious Moment

between past and future.
Zero. Neither negative nor positive,
the narrowest of no-man's lands
between two kingdoms.

And I cannot share it with you any longer.
We have the past together. Your life
tangled in my memory.
I carry you with me into the future.
In whatever kingdoms I will travel to,
you come with me.

But 'now' is lost to us, a present
past sharing.

I turn to give you some small piece of news.
Infinitesimal, but you would have cared about it.
Even this atom is too huge
for nothing to grasp.

Alice Major

Honeycomb Conjectures

Hypothesis 1

Wax's fragile scaffold
can bear the weight of pounds and pounds
of sweetness.

Hypothesis 2

Repetition is acceptable.
Honeycomb. Hexagon. We could tile the universe
unending.

Hypothesis 3

Wax's mathematics. Six
straight sides contain least wax,
most honey.

Hypothesis 4

Wax accumulates.
Tiny beads exuded, glandular secretions,
excretions, accretion.

Hypothesis 5

We can be fed into existence –
sliver of silver egg inserted into honey –
then worked hard, hard, hard.

Hypothesis 6

It takes a million flowers
to fill our honey stomachs. A world sucked up,
squeezed out.

Author's Note: *The honeycomb conjecture* (first posed more than 2000 years ago) was proven in 1999 by Thomas Hales. The conjecture states that the hexagonal arrangement uses least amount of wax to enclose the most space.

Alice Major

Clock Arithmetic

> *"You can make anything equal to anything else,*
> *but then you have to live with the consequences."*
> *– Robert Moody explains the concept of 'modulo' to the poet.*

It is five *modulo* twelve –
late afternoon in another rapid day
spinning through the week's dial.
We hurry from classroom to dining hall –
chattering mathematicians and artists
at this centre set in its ring of mountain.

Peaks rim our view like numerals
on a clock face, as though their edged crests
are painted with a fine brush on glass air.

How many pines out there? One?
A hundred and one? A thousand
and one? It's all the same to clock arithmetic
which only cares about that *one*
left over, the something that remains.

With our stipple of symbols and syllables,
we endeavour to understand
the mountain's pointed presence.
What is equal? What remains?
What are the consequences?

Our words and algorithms come close,
then veer off, fail to achieve
perfect congruence with that snow-shape
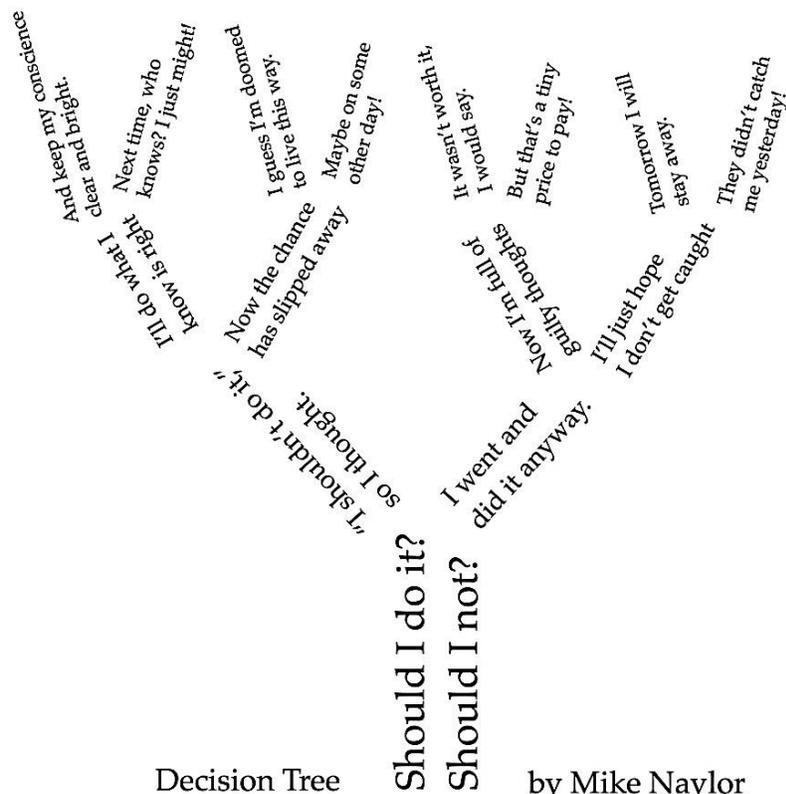painted in sunset's satin spectrum.

Still, the peak is always something
our numbers can come back to. We must believe
there are paths through the pines
by which we can begin to scale
its *massif* and an underlying trust
that we are equal
to anything.

Mike Naylor

Mike Naylor is a co-director of Matematikkbølgen and of the Math Creativity and Competency Center in Norway. He gives courses for teachers, students and the public, designs math rooms for schools and develops mathematical games and learning products. Mike presents mathematical ideas in creative ways, including poetry, literature, art, music, video, software, drama, and other performances, and is author of over 100 publications spanning a range of mathematical genres. Mike is known for his *Naked Geometry* art series and book, and his quarterly column on Mathematics and Creativity in *Tangenten* magazine. Last year he was named as a "Math and Science Hero" by the minister of education in Norway. For the past eight years Mike presented artwork and poetry at the Bridges conferences. More information on Mike's projects can be found at http://mike-naylor.com

Decision Tree

Decision Tree — Should I do it? Should I not? — by Mike Naylor

And keep my conscience clear and bright.

Next time, who knows? I just might!

I guess I'm doomed to live this way.

Maybe on some other day!

It wasn't worth it, I would say.

But that's a tiny price to pay!

Tomorrow I will stay away.

They didn't catch me yesterday!

I'll do what I know is right

Now the chance has slipped away

Now I'm full of guilty thoughts

I'll just hope I don't get caught

"I shouldn't do it," so I thought.

I went and did it anyway.

Mike Naylor

The Last Crumb

We'd invited them all, but who thought they'd all come!
To Zeno's First Conference on Infinite Sums.
We'd gathered together in Aleph-Null square,
And an infinite number of people were there!

The people were hungry, they'd been there all day,
And Mrs. McMurtle had lost the buffet.
It rolled off the mountain and all that we found
Was one chocolate chip cookie that fell on the ground.
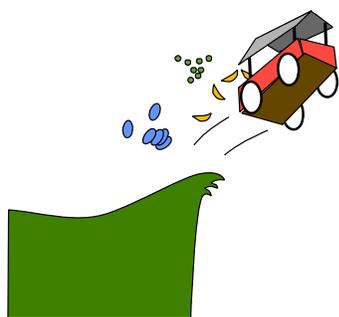
George, the main speaker, asked me for the news,
And I said "I'm afraid that it's simply no use.
"One cookie is all that survived the buffet,
"And one cookie will not feed these people, no way."

George looked at the cookie and George looked at me,
And George shook his head and said "I disagree.
"Let me look in my suitcase and find something quick,
"I think I have just the right tool for this trick."

Then he pulled from his suitcase a very strange thing,
A tool with a handle and one tiny string.
"Have you ever seen something like this in your life?
"It's a Pennington Ultra-Fine Portable Knife."

He told me, "This tool was especially made
"With a single-dimensional string for a blade.
"This knife will cut anything, smaller than small,
"So we'll just keep on slicing 'til we feed them all!"

He looked very pleased but I sadly said "No...
"There's an infinite number of people, you know.
"If you cut up that cookie, I don't care how small,
"There's not enough pieces, you can't feed them all."

"Well, I guess we'll just see," he replied with a laugh,
As he carefully sliced our last cookie in half.
He yelled, "Form one line, and prepare to move fast!
"There's only one cookie, one cookie - our last!"

He gave me a stopwatch and said, "Would you mind?
"I'd be ever so grateful if you'd watch the time
"For I'll double my speed as I slice up each one
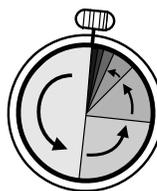"And in just sixty seconds the job will be done."

He gave the first half to a man with green hair
Who danced away quickly and flipped through the air.
George looked at the half that was left and said "Yes,
"I will halve this again, into quarters no less!"

A googly-eyed man bellied up with his plate
But George said "Be patient, you'll just have to wait
"For just thirty seconds – not one second more
"Then I'll give you one fourth of that cookie for sure."

Now I was puzzled, and worried, and how!
"George now you've done it, you won't make it now.
"You've given up half – half our cookie is gone!
"And with all of these folks it will take far too long."

But George said "Don't worry, you'll soon understand."
As he handed a fourth to the googly-eyed man.
With a flick of his Pennington ultra-fine blade,
The fourth became eighths with the cut that he made.

The next one in line was a girl with one shoe.
"Fifteen seconds," he said, "then I'll have some for you."
He looked at his watch and he looked up at me.
"Timing is everything, as you will soon see.

Mike Naylor

"If I took, say, one second to hand out each bite,
"Then we'd be here forever plus half of the night.
"But I'll slice down my time as I slice up each one,
"And in just sixty seconds the job will be done."

He gave her one eighth, which she dropped in her shoe,
And he sliced the remaining piece neatly in two.
A monkey bounced up with his hat and a cup.
"One sixteenth is yours when eight seconds are up."

As he gave the next piece he looked over at me,
"I needn't start slow but it helps, you agree?
"I'm about to get busy, I hope you don't mind,
"There are so many people and such little time!"

A juggler came forward and just as he'd reckoned,
Four seconds later got one thirty-second.
Up stepped a boy from the far-frozen North,
Who two seconds later got one sixty-fourth.

In only one second the next guest was fed,
A man with a large tambourine for a head.
Quickly and neatly George split up the rest,
And in just half a second he fed the next guest.

A lollipop girl and a mandolin man,
A witch made of match sticks and empty tin cans,
A teacher, a doctor, a man with an owl,
A woman dressed up in a large paper towel.

A monk and a mermaid, a pink centipede,
The faces were coming with dizzying speed.
A fireman, a waitress, a pig with a drum,
Faster and faster and faster they'd come.

George kept on cutting, and to my surprise,
The pieces were down to molecular size!
His hands were a blur, as the faces sped by,
Here and then gone in the blink of an eye.

The air crackled with static and sizzled with heat!
The people whizzed by with incredible speed!
The ground shook and trembled - a deafening roar!
Then a Flash! And a Boom! And then ---

nothing more.

George lay on the ground with his feet in the air
And a smile on his face as smoke rose from his hair
"You did it!" I said, "Yes, you did it, no doubt!
"By splitting in half, why, you'll never run out!
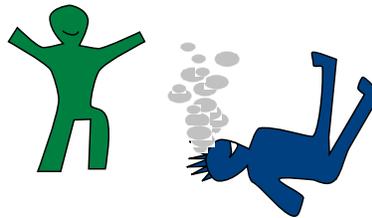
"You could do it again, for as long as you please,
"Forever and ever and ever - with ease!
"Now I know you are tired, but do one more thing
"Please cut me a slice with that ultra-fine string."

"Oh goodness," he said, "It's too late, you can't dine.
"There would have been plenty had you slipped in line.
"I'm sorry," he said, "but you see it's all gone.
"I don't have infinity pieces, plus one."

I chuckled, "That's funny! But you and I know,
"Surely something's remaining, it couldn't all go.
"Even though that last crumb might be so very small,
"Just by cutting in half you cannot cut them all."

He looked at me strangely, "It's gone, there's no more,
"But please have a look if you'd like to be sure."
So I peered in his hand, and he gave me a wink,
And you know what I saw?

Well . . . what do YOU think?

Mike Naylor

Water's Edge

Water's Edge, by Mike Naylor

I walk along the water's edge like many times before, Counting each and every step along this rocky shore. I keep my paces steady as I play this quiet game, And each and every time I find my count is just the same. But onSaturday instead of going straight along the beach, I walked a little closer to the stones that i could reach. I counted out the measure as I stepped 'round every stone, And when I reached the end I found my measure it had grown. On Sunday I took off my shoes so they would not get wet, And walked along the water's edge as close as I could get, Up and down the riverlets that wind along the shore, And found the measure now was so much greater than before. Today I stand at water's edge and look down at my toes, And wonder what this edge is and exactly where it goes. How many little hooks and crooks and curves there really are, That if I followed nearer still I'd travel oh so far. Now peering even closer I can see there is no bound, With every tiny grain of sand the water flows around. I see there is no answer to the task I'd set for me, For the measure of the water's edge is as endless as the sea...

Run, Hero, Run!

Run, hero, run!
Mike Naylor

Hero, hero, hero
Hero, hero... run!
Hero, run hero.
Hero run run!
Run, hero hero
Run, hero, run!
Run run hero
Run run run!

Author's Note: The poem *Run, Hero, Run!* was inspired, and is structured, by the binary numbers 0 to 7.

Tom Petsinis

Tom Petsinis was born in Macedonia, Greece, and immigrated to Australia as a child. He is a novelist, playwright, poet, and mathematics lecturer at Victoria University, Melbourne. Tom has published seven collections of poetry, including *Naming the Number*, *Breadth for a Dying Word, My Father's Tools* and *Four Quarters,* which won the Wesley Michel Wright Poetry Prize. Of his five plays *The Drought* won the Wal Cherry Playscript of the Year Award and was short-listed for the Victorian Premier's Award. His four works of fiction include the novels *The Twelfth Dialogue* and *The French Mathematician*, nominated for both the New South Wales and South Australian Premier's Award. His work has been translated into a number of languages. *Quaternia*, Tom's new novel featuring mathematics, was recently published. Forthcoming work includes the novel *Plato's Number*. http://tompetsinis.com/

Pascal's Tooth

Renounce mathematics. I vowed again
To set my faith on paradox, not proof –
Yet spirit could not numb a wisdom tooth
Tormenting me with exponential pain:
I relented, soothed by a circle's roll.
Released from my crucifixion to bone
I embraced the horizon, heaven's dome,
The cycloid of an inviolate soul.
For weeks I flew, forgetful of my sin,
Pursuing figures with ideal curves
To wonderful ends, strengthening my nerves
For the penitential line back to Him.
Renounce mathematics! I found the truth,
Exploring with my tongue the rotting root.

Tom Petsinis

Spheres

Words will never come as naturally as this:
Four in February, fluent with nonsense rhymes,
(Though still unable to articulate the time)
She dips her plastic ring into the mixture
And breathes until an iridescent sphere grows.

I follow the shimmering image of the earth:
This mirror, thinner than a thought, floating in space,
Reflecting the sun, the yard, a father and child,
A small hand approaching the object of its fun.

Will I ever breathe such form into my poem?
Reach out with a palm that accepts earth's transience?
Or laugh to high heaven as creation explodes?

Tom Petsinis

Division by Zero

She could've been our grandmother
Warning us of poisonous mushrooms –
To stress her point she'd scratch
The taboo bold with crimson chalk.
It should never be used to divide,
Or we'd be howled from lined yard
To pit were cruel paradoxes ruled.
Her warnings tempted us even more:
Young, growing full in confidence,
We'd prove the impossible for fun –
Nothing she said could restrain us
From showing two is equal to one.

Tom Petsinis

Zeno's Paradox

One with the shadow of this olive tree
I am also recreating myself –
Just as the ocean contracts to a shell
On which it counts every seventh wave,
Or as wind curves the albatross's wing
To set a limit on its own freedom,
Or dreams refine themselves as pure logic
To prove a solution doesn't exist.

And if I've walked half my allotted life
To reach the tip of this peninsula,
My death is there, sharp as the horizon,
A dream approached but never realised.

When I think of infinite division
Nature is made more eternal through me.

I will never reach the end of this line.

Eveline Pye

Eveline Pye worked as an Operational Research Analyst for Nchanga Consolidated Copper Mines, in Zambia, for ten years, and was a Statistics Lecturer at Glasgow Caledonian University, in Scotland, for over twenty years. Her mathematical and statistical poetry has been published in a wide range of literary magazines, newspapers and anthologies. In September 2011, *Significance Magazine*, the joint publication of the Royal Statistical Society and the American Statistical Association featured her work in education and published a selection of her poems as part of their *Life in Statistics* series. She was poetry editor for New Voices Press and worked for the Federation of Writers (Scotland). A collection of her poems about Zambia, *Smoke that Thunders*, was published by Mariscat Press in 2015. Examples of Eveline's mathematical poems may be found online at:

http://onlinelibrary.wiley.com/enhanced/doi/10.1111/j.1740-9713.2011.00510.x

Celestial Navigation

a three-dimensional universe
icosahedron
suspended from the ceiling

a surge of electricity
orange becomes yellow
casts a bright shadow

a tiger moth is drawn inside
this triangular world
sunbulb at its centre

its chitin wings slowly singe
and it burns
in the bliss of incongruence

Eveline Pye

The Empassioned Statistician

War-like as the robin, territorial, blooded,
her reputation bleached pencil-pale
to create a sweet-sounding nightingale,
an icon of care in the carnage of Crimea.

No milksop angel offering only
deathbed solace, Longfellow's lady
of the lamp sat *in the glimmering gloom*
classifying the dead, drawing up tables.

The robin's song is not loud, it has no
fancy trills and whistles; Florence
talked the simple truth of numbers.
Statistics saved a legion of soldiers.

Author's Note: Florence Nightingale was the first woman to be granted membership of the Royal Statistical Society.

Eveline Pye

Taijitu

The world folded me in two
ran a sharp thumbnail down the crease
then tore me apart.

There you are, it said, this half
can be scientific, the other artistic:
problem solved.

A brain bisected feels no pain
sends no signal to the spinal cord;
the silent distress of absence.

A lifetime later, I hear
voices in the whispering gallery:
the staircase of my skull.

Number poetry, yin-and-yang
come free in lucid dreams,
grow closer until

the wounded parts of me
curl in a bliss of synergy: each
holding the seed of the other.

Eveline Pye

Three

If my garden of numbers
        grew in arithmetical series
                then beyond the lawn

would be geometric
        my pink pencil would fill
                space with paper roses

clematis would climb
        the lover's arch
                bounded by thistles

we would grow
        away then together
            graft each onto the other

thistle clematis rose
        assisted reproduction
                a child with three parents

Vera Schwarcz

Vera Schwarcz is a China historian and poet. Her interest in links between science and poetry grew out of the life and work of her husband, a noted cell biologist who passed away in 2014. Vera received her BA from Vassar College, MA from Yale University and Ph.D. from Stanford University. For the past four decades she taught at Wesleyan University in Connecticut, USA. She is the author of nine books about Chinese intellectual history, including *Bridge Across Broken Time: Chinese and Jewish Cultural Memory* (Yale University Press, 1989) which was nominated for the National Jewish Book Award. She has also written four books of poetry, *A Scoop of Light*, *Chisel of Remembrance*, *Ancestral Intelligence*, and most recently, *The Physics of Wrinkle Formation* (Antrim Press, 2015). For more information about her work, see http://between2walls.com/

Abstract Equilibrium

If a computer played
"Texas hold'em" poker,
it is very likely to think up
a polynomial equation
which restores the famously
abstract Nash equilibrium.

Machines can simulate
a two player game,
not live it, as we did.

Ours had more variables,
less equanimity in nights
of soft-spoken argument,
and even more silent
love. We had agreed

long ago to collude agreeably
with death's uncertainties.

Vera Schwarcz

Flexural Warping

We bend into the winds of change
much like atolls in deepest seas.

Volcanic eruptions lift
or depress us in keeping
with flexural endowments
mathematicians could not
calculate before.

The rupture point of iron,
buckling of ship structures
are not our lot, we warp
and shear along axes
of the soul.

If we were all one thing,
steel or silk, our tensile
and flexural numbers
would match.

Made of human and Godly stuff,
we bend or break according
to formulas encoded in the will.
Wounds and scratches are nothing
but desire's detritus left
to remind us: You have
endured and won.

Vera Schwarcz

Beyond the Nanosecond

Newton launched projectiles
in human time, had no way
of knowing how to measure
a nanosecond—

that billionth of a second, too long
today when vacuum can speed
optics to a picosecond, a trillionth
of a second, itself too slow
when we touch the boundary
of timespace.

A semiconductor, excited enough,
carries an electric charge in a few
femtoseconds.

If I can bend my mind
around this quadrillionth
(one millionth of a billion)
of the wink of an eye,
it may also be possible
to slow down time,
savour this winter's
freezing sorrow.

Aided by memory's friction,
I would linger over each
of our regrets, our rejoicing.

Hurled forward into nights
and days without you,
I long for moon months
not nanoseconds to measure
mourning's icy tides.

Vera Schwarcz

Vector Species

Life hangs on a thin line
not always mathematical.

Think of the *Anopheles* mosquito
sporting both size and direction,
from head to tail designed
for malaria, its pupa gilded
with versatile autosomes.

In the past, mosquito vectors
could be controlled, and we
escaped alive. Now we know
precisely how they evolved
inward, calibrating to human
ecology, a 2.5 milligram arrow
aimed at the point where mind's
prowess and body's weakness meet.

Manfred Stern

Manfred Stern holds a Ph.D. degree in mathematics from the Mathematical Research Institute of the Hungarian Academy of Sciences, Budapest. During the academic year 1985-86 he was a lecturer at Asmara University, Eritrea. He is the author of the monograph *Semimodular Lattices* (Cambridge University Press, Hardback 1999, Paperback 2009), and of the book *God said: Let Newton be ... Mathematical, Physical, Didactic and Empty Poems* that appeared in German (Dr. Kovač publishers, Hamburg 2015). This book contains his own mathematical poems as well as translations of poems, including a number of limericks published together with their English originals. He also edited a book on Georg Cantor written by the late Hungarian mathematician Andor Kertész. As a freelance translator he translated 22 books from English, Finnish, French, Hungarian, Italian, and Russian into German. http://www.manfred-stern.de/

Dust and Sand

Georg Cantor invented his dust,
Which for us is a must and a lust.
He's become quite a hero,
For his dust measures zero,
Yet exceeds old Sandreckoner's thrust.

Translated from the German by the author

Author's Note: The author thanks Chandler Davis for improving the English version of this limerick.

Manfred Stern

Georg Cantor: I am the ℵ and the ω

What Georg Cantor in Halle dared
Was a great event—undebated.
Set theory his genius created:
Sets can be exactly compared.

Math has more than a single infinity.
With Cantor we may boldly say:
The night of infinities is not all grey,
Sets may have different cardinality.

Their powers need not be equal! See:
The new message Cantor had sent,
Even if we think: "This cannot be!,"

Ordinals, cardinals—numbers without end.
Cantor's star shines brighter than Vega
"I am the Aleph and the omega!"

Translated from the German by the author

Manfred Stern

The First Digits of π

The parsonage retained its ancient splendour.
The garden's green awakens in the sun.
A bird chirps in the branches

A secret with no explanation!

Soon the day is running out
And justifications must be devised,
Doubts dissipated gently,
Leaving nothing but truth:

The secret is transfiguration!

The parsonage stimulates imagination.
I love the green abundance of its garden,
It's an entire world to me,
A world that is consistently well ordered,
The goal of my long wait.

Years followed years,
For me soon comes the winter.
But the parsonage remained unchanged,
Its yard and garden seem oblivious to seasons.
Whether it stays this way – we may
Or may not see. An end will come to it
Or a new life begin, when
we shall rise again
To say again good-bye.

I don't yet feel part of the old fraternity,
Singing joyful Hosannas for eternity.

Translated from the German by Sarah Glaz and the author

Poems by
Past Bridges Conferences' Featured Poets
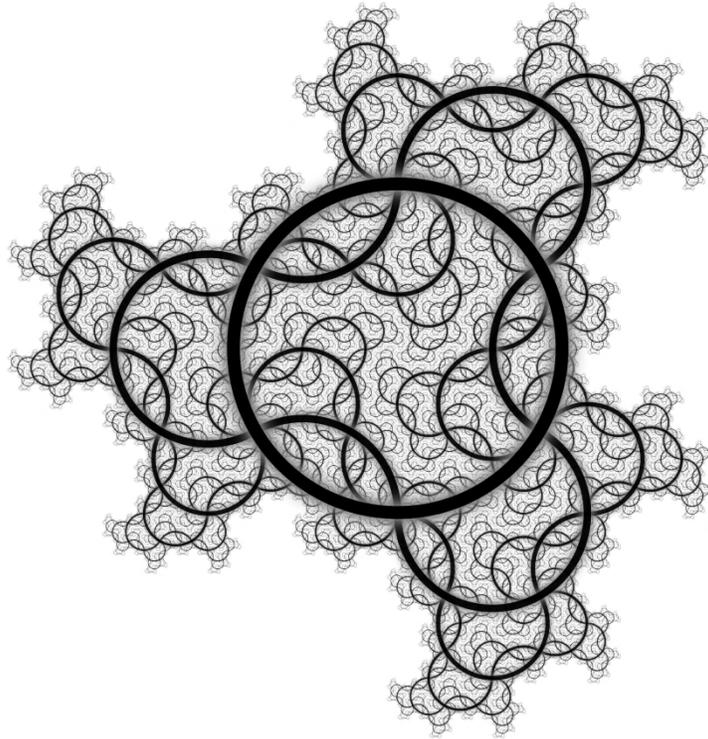
Mathematical Poetry Readings
2011 — 2015

Michael Bartholomew-Biggs

Michael Bartholomew-Biggs lives in London and is Emeritus Reader in Computational Mathematics at the University of Hertfordshire. His research and consultancy specialisms are optimization and optimal control, mostly applied in the aerospace industry. Since his mid-life diversification into poetry, his work has appeared in many magazines and anthologies and he has published seven poetry collections — including *Uneasy Relations* (Hearing Eye, 2007) which attempts to unite the two halves of his brain. His collection, *Fred and Blossom* (Shoestring Press, 2013), is set in the world of aviation in the nineteen-thirties. His chapbook, *Pictures from a Postponed Exhibition* (Lapwing Press, 2014) features paintings by the Australian artist David Walsh. He is poetry editor of the online magazine *London Grip* and organizer, with Nancy Mattson, of the North London reading series *Poetry in the Crypt*.
http://mikeb-b.blogspot.co.uk

A Beginner's Guide to Optimization

Optimality

Keep the rules and lose:
or win because you break them.
Checkmate or stalemate?

Lagrange multipliers

These are our shadows,
dual personalities,
who know what we don't –

the consequence of
pushing our boundaries or
shrinking horizons.

Complementarity

Face it: one must go.
This town just ain't big enough
for the both of us.

Saddle point

You thought you'd arrived
till the valley arched its back
like a startled cat.

Slack variables

Like those labourers
outside the vineyard, they need
opportunities.

They are positive:
whatever the vacancy
they're equal to it.

Global solution

It's the only place
to be – if you can find it.
(If not, you won't know.)

Michael Bartholomew-Biggs

Calculated Risk

A memoir of airport security in the 1990s

It was 6 a.m. at Heathrow when
their machine was woken up by mine.
Turn it on, the stern attendant said,
and prove it's what it seems to be:
a harmless necessary calculator.

Feeling rather pleased to be accused
of something I was sure I had not done
I rattled buttons to evaluate
suspicion and obtained precisely nothing –
a single open zero with no count-down.

Permitted to proceed beyond the gate,
I felt my reservations multiply
as fast as bits of ticket were subtracted.
A formula for demonstrating innocence
in terms of integers may miss the point.

If a terrorist can look like me,
carrying a genuine appliance
while ingeniously keeping Semtex
in a pack of anti-smoking gum,
what's lurking in that fat man's plastic bags?

One might argue anyone intending
to blow us all to headlines would not bother
buying quite so many duty-frees.
But the more I try to reckon up the odds
there's less and less I find I care to count on.

Marion Deutsche Cohen

Marion Deutsche Cohen holds a Ph.D. degree in mathematics from Wesleyan University and teaches at Arcadia University, where her course, *Mathematics in Literature*, is very popular with the students. Author of twenty-six books of poetry and prose, Marion published in her first volume of poetry, *The Weirdest Is the Sphere*, a mathematical poem dating back to age seven. Her later mathematical poems were collected in her volume, *Crossing the Equal Sign*. Marion's most recent book is, *Still the End: Memoir of a Nursing Home Wife.* Her latest poetry collections, *Lights I Have Loved,* and *Parables for a Rainy Day,* appeared in summer 2014. She lives with her husband in Philadelphia, where in addition to poetry and mathematics, she enjoys food, thrift shop expeditions, and visits from her grown children and grandchildren. http://www.marioncohen.net/

"Sometimes I think I'd rather count in this world than sing in the next"

The Old Arithmetician counted leaves on trees. I count colors in a print fabric
and scallops on a decorative dish. But our all-time class favorite is stairs. Not
stars but stairs. Mostly stairs going up, not down, and some of us count other
things that don't need to be counted.

But we need to count them, we need to distinguish each from the one preceding
and the ones following. We need to ensure that they're not all the same.

Author's Note: The title of this poem is a quote from the story "An Old Arithmetician" by Mary E. Wilkins
(Cinnamon Roses, Hodders & Stoughton, 1908) http://wilkinsfreeman.info/Short/OldArithmeticianE.htm

Marion Deutsche Cohen

Math Research, Age 4

One day I set out through the Queen Anne's lace.
There was no end to what I set out on.

After a while the grass got sharp.
And the white field became like outer space.
Later still it rained
slobbering the sharp wet grass against my legs.
Destination faded into rumor
and so did home.
I was stranded in the middle.

But I was not lost.
The way back was the straight line behind me.
I was only *stuck*
on the straight line before me.
I knew the way back.
It was the will I couldn't find.

Francisco José Craveiro de Carvalho

Francisco José Craveiro de Carvalho graduated from Coimbra University, Portugal. He later wrote a Ph.D. thesis in Geometry, under the supervision of Stewart Alexander Robertson, at Southampton University, U.K. His mathematical publications include joint work with his former supervisor. While on sabbatical at Leeds University, Francisco came across the poem "Einstein" by Katharine O'Brien. This event sparked his interest in the connection between mathematics and poetry and led to his publication *ainsÓniadefibOnacci*, an anthology of O'Brien's poems translated into Portuguese. He has also translated into Portuguese poems by Sandburg, Hirshfield, Clement, Pastan, Dove, Kerouac, Lehman, McCabe, Guillevic, Tranströmer and others. English translations of his own poems appeared in a number of venues including *Topological Commentary: A Springer-Verlag Poster* (Volume 10, 2005), and *The Bridges 2013 Poetry Anthology*.

Negative Numbers

Because he understood mathematics,
he thought he can teach
other children.

One day in class he shared his
solutions to simple cases of
first order equations.

Shame set his face on fire when
the teacher scolded him
for showing off.

We grow as we go. He learned how
to handle negative numbers
early in life.

> *Translated from the Portuguese by Sarah Glaz and the author*

Francisco José Craveiro de Carvalho

Geometry

> A circle
> comes complete
> with its
> own grave.
> > *"Geometry" by Richard Brautigan*

If I understand
Brautigan's thought
correctly,
every closed curve
comes complete
with its
own grave.
This is best seen
in a circle
because a circle is perfect.

Translated from the Portuguese by Sarah Glaz and the author

JoAnne Growney
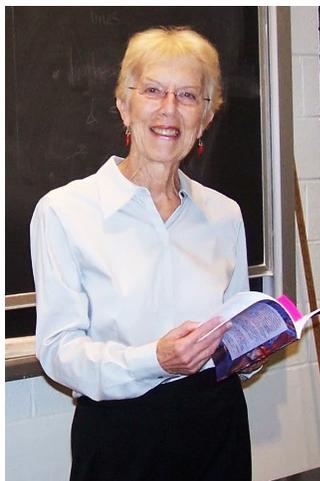
JoAnne Growney has loved poetry since she found *A Child's Garden of Verses* by Robert Louis Stevenson on a family bookshelf. Her own poetry collections include *Red Has No Reason* (Plain View Press, 2010) and *My Dance Is Mathematics* (Paper Kite Press, 2006). While a professor at Pennsylvania's Bloomsburg University, she integrated relevant poetry into her mathematics classrooms, and the collection begun there has developed into a blog, "Intersections -- Poetry with Mathematics" at http://poetrywithmathematics.blogspot.com. Besides this blog and several articles connecting poetry with mathematics, JoAnne has been active in collaborative projects with visual artists, poets and mathematicians, and in translation of Romanian poetry. Located in Silver Spring, MD she offers writing workshops for mental health clients, writes poems and prose, and encourages her grandchildren to love both mathematics and poetry.

Fool's Gold

Not a cashmere sweater for the moths to eat,
nor a Picasso print to hide a dent in plaster.
No more scarves or earrings or a bread machine,
no crystal perfume vials or precious inlaid boxes.
Please, no plants I might allow to die.
Note this birthday with numerology.
Select and give a number. I like large primes—
they check my tendency to subdivide
myself among the dreams that tease
like iron pyrites in declining light.

Consider seventeen. Its digits will
turn heads when I wear it large and crimson
on a grey T-shirt. Watchers will wonder
whether I pay tribute to the ancient Flood
that started and drew back on seventeenths
of Hebrew months, or if I count invasions
of northern India by the warlord Mahmud,
or if, like early Muslims, I base the world
on it—the sum of one, three, five, and eight—
mystic corner of a magic square.

JoAnne Growney

Pigeons in Their Pigeonholes

*Remember that **n** always will denote a positive integer. —Anonymous (math professor)*

Dear friend, don't be misled—while the *Pigeonhole Principle*
seems informal, it represents a very general situation.

> If we have **6** pigeons and **5** holes, and if each pigeon
> enters a hole, then at least one of the holes
> will contain more than one pigeon.

> If we have **n** holes and **more than n** pigeons, and if each pigeon
> enters a hole, then at least one of the holes
> will contain more than one pigeon.

We can have more fun
if we move on from pigeons.

> If a mail-carrier has more letters to deliver
> than there are mailboxes on the mailroom wall,
> then at least one box will get more than one envelope.

In any sequence of thirty words in *The Washington POST*
at least two words will start with the same letter.

> In a group of five hundred people,
> at least two share a birthday.

At any happy hour with two or more people,
at least two will have the same number of friends.

> Yesterday, after lighthearted days of counting pigeons and
> solving puzzles, I found two poems about pigeons
> by Mila Aguilar. Her birds were caged and
> had clipped wings and will never get home.

> > And then I thought about how mathematics
> > is such a clean sharp picture
> > of one side of things.

Author's Note: Mila D. Aguilar (b 1949) is a Filipina poet, revolutionary, and video documentarian. I found her "Pigeons for My Son" and "Freed Pigeon I Shall Be" in *Wall Tappings, Women's Prison Writings* (Feminist Press, 2002).

Philip Holmes

Philip Holmes is Emeritus Professor of applied and computational mathematics and mechanical and aerospace engineering and member of the Neuroscience Institute at Princeton University. He studied engineering at Oxford and Southampton Universities, U.K., and taught at Cornell University from 1977-1994. He works on nonlinear dynamical systems and collaborates with biomechanicians and neuroscientists. Philip has published four poetry collections, including *The Green Road* (1986) and *Lighting the Steps* (2002), all with Anvil Press, and, with Florin Diacu, *Celestial Encounters* (Princeton University Press, 1999) — an historical account of the origins of chaos theory. He is a member of the American Academy of Arts and Sciences and of the Hungarian Academy of Sciences, and a Fellow of the American Mathematical Society, the American Physical Society and the Society for Industrial and Applied Mathematics. http://www.princeton.edu/mae/people/faculty/holmes/

Intermediate Values

Coming from then continuously
to where I find myself, I must
have passed through every point between –
uncountably many presents – each one
lost in the instant it passed.

But what's grasped at all is known
because of that endless flux underfoot,
not on account of here or now. We see
only what is presently remembered,
not what's present, which will,

come time, pass partly to memory. Absent
that mind's landscape, minutes would be
a blur of weather. With it, today's lack of form
can come to mark us, dividing then
from here, thing from nothing.

So past imperfectly constructs the present:
all that's lost, as now will surely be,
sustains us, though it hold little ground, is gone
sooner than a word spoken, dust blown away,
the glass drained and its ring dried on the table.

Philip Holmes

Gaps

Take a line and take away
the middle third, and then
the middle thirds of two thirds
left behind, and middle thirds

of those four ninths remaining.
Go on and on: what's left at last
is utterly disjoint – beginnings,
ends – each point divided from

the next, but oh! so close,
infinitely numerous
as what you started with
and carefully have pried apart.

Will there be time to measure up
this dust of unremembering?

* *

Take a line and take away the middle third,
and then the middle thirds of two thirds
left behind, and middle thirds of those four
ninths that still remain. Reiterate:

what's left at last is utterly disjoint –
beginnings, ends and more – each point
divided from the next and yet uncountable
and numerous as what you had before.

Take a life and take the most part out,
for so it happens; only the best-rehearsed
of memories remain: a voice transformed
among the absences, a face, a hand.

You brought me here, but there was more:
dust that blows away, gaps that captivate.

Gizem Karaali

Gizem Karaali is associate professor of mathematics at Pomona College. She earned a Ph.D. from University of California, Berkeley, in 2004. Her research lies in the representation theory of Lie superalgebras, super quantum groups, and algebraic combinatorics. Her scholarly interests include humanistic mathematics, pedagogy, and quantitative literacy. Gizem is a founding editor of the *Journal of Humanistic Mathematics* and associate editor of the *Mathematical Intelligencer*. She has organized panels, paper sessions and poetry readings, and presented invited addresses to diverse audiences. She has a National Security Agency Young Investigator Award, is a Sepia Dot (2006 Project NExT fellow), and serves as secretary of SIGMAA-QL and as program chair of the MAA SoCal/Nevada Section. In her spare time she likes traveling, reading and writing, and playing with her two young children. http://pages.pomona.edu/~gk014747/

A Mathematician's Villanelle

When first did I learn to cherish the bittersweet taste of mathematics?
Mental torture, subtle joy, doubt and wonder, me in meaning
Must have come later, after the games, the limericks, the lyrics.

Strange ceremonies awaited me, mystical hymns, magic tricks,
After the first gulp of water, the first bite, the first bloodletting.
When first did I learn to cherish the bittersweet taste of mathematics?

See the little girl, easily bored, not up for much brain gymnastics.
But words streamed, letters flew by, in full color my spring
Must have come later, after the games, the limericks, the lyrics.

Euclid rises on stage, other ancients follow, a lock clicks.
Number rivers join letters, friends turned lovers, a promised ring.
When first did I learn to cherish the bittersweet taste of mathematics?

You were there, my beginning, my middle, my end, my memories mix,
That time was finite, your wisdom old, my eyes weak, my mind a nestling
Must have come later, after the games, the limericks, the lyrics.

You held my hand, taught me to play, build with new bricks.
Then I was alone, except now with a group, a field, and a ring.
When first did I learn to cherish the bittersweet taste of mathematics?
Must have come later, after the games, the limericks, the lyrics.

Gizem Karaali

Math and Metaphor

I.

Let *x* be a real person who could not learn to love
Let *N* be the open neighborhood around *x* which remained empty
Let *f* be my need to be understood by you as a function of time in tears per hour

Can I learn this calculus of limits or will you remain stuck with your limiting beliefs?

II.

Let *F* be the free group on two activists
Let *S* be the hopeful subset that intends to grow into a normal subgroup
Cosets dancing all around us we try to see infinity

Can I figure out the algebra of our future from the tea leaves of your past actions?

III.

No.
It
Turns
Out
No.
No means no.
Never.

IV.

With puzzling intensity we lived
From forest fires to desert storms,
Erratic oscillations between your love and my fear.

V.

Amidst a thunderstorm
A two-letter curse word burnt my lips.
Thus ended the love affair of math and metaphor.
In a shambles both went home.
Math took up drinking.
Metaphor took in a new lover.

Larry Lesser

Lawrence (Larry) Lesser**,** professor of mathematics education at The University of Texas at El Paso, enjoys finding ways to integrate his long-standing loves of poetry and songwriting into his mathematics education outreach, teaching, and research: his current NSF grant is developing and assessing effectiveness of interactive statistics songs. His math songs have won awards in national educational songwriting contests, attracted international media coverage, and yielded presentations for national audiences (MAA, CAUSE, NCTM, MoMath). His poems/lyrics venues include: *Journal of Mathematics and the Arts*, *The Mathematical Intelligencer*, *Journal of Mathematics Education*, *Journal of Humanistic Mathematics*, *Humanistic Mathematics Network Journal*, *American Mathematical Monthly*, *MAA Focus*, *Math Horizons*, *Journal of the Association of Mexican American Educators, Mathematics Teacher*, *Noticias de TODOS*, *BorderSenses Literary Magazine*, *Teaching Statistics*, *STATS*, *Amstat News*, CAUSEweb.org, and *Talking Writing*. More information is at: http://www.math.utep.edu/Faculty/lesser/

Margins

I.

Fermat claimed the margins
of an ancient Greek
text could not contain
his remarkable proof

of a theorem
centuries would finally yield
the wiles to prove
by other means.

II.

Intersectionalities
bring uniqueness near, a long
way from the average
man of Quetelet.

III.

The surgeon took more and more
pancreas:
never finding clarity,
he took it all.

Larry Lesser

Dogs Know

A dog-eared *College Mathematics Journal* lies
open to a paper called
"Do dogs know calculus?"
where the author's canine travels land
and water to reach most quickly
the ball thrown
into Lake Michigan.

I don't live near a lake,
I don't know
if my dog knows calculus, but I suspect…

My dog knows algebra, making
series between me
and the door I head for
to take him
for our morning walk.

My dog knows statistics,
sniffing out trends
in data left
on lawns.

My dog knows probability by following me,
knowing food
most likely
falls from me.

My dog knows geometry, solving
the packing problem
when there's at most
one place to join the whole
family on the TV couch.

My dog knows trigonometry, tracking
periodic rhythms
of moon
and heart.

Kaz Maslanka

Kaz Maslanka received a BFA in sculpture from Wichita State University, where he also studied music, mathematics and physics. He has been pioneering mathematical poetry for over thirty years and was nominated for a pushcart prize in poetry. His polyasthetic work maintains an international presence through exhibitions and museum collections around the world, as well as through his award winning blog, *Mathematical Poetry,* http://mathematicalpoetry.blogspot.com/. Kaz lives in San Diego, California where he works both as an artist and as an engineering group leader designing parametric CAD models for aerospace technology. He is on the board of directors of San Diego's *Sonic Arts Studio* and serves on the advisory boards of the *Bronowski Art and Science Forum* and the project, *DNA of Creativity*, sponsored by San Diego Visual Arts Network.

Golden Fear

Kaz Maslanka

The Pedagogy of Moonlight

Author's Note: The image of *Pedagogy of Moonlight* is a photo shot in the very early morning's moonlight at an old abandoned schoolhouse in the Cedar Swamp area along the west bank of the Delaware river a few miles east of Townsend, Delaware, along route 9. There was a thunderstorm off in the distance and a breeze evident in the clouds. The muses whispered:

$$Pining\ the\ Infinite = \frac{(Lost\ Mathematics)The\ Wind\ of\ Time}{Obscure\ Sorrow}$$

Dan May
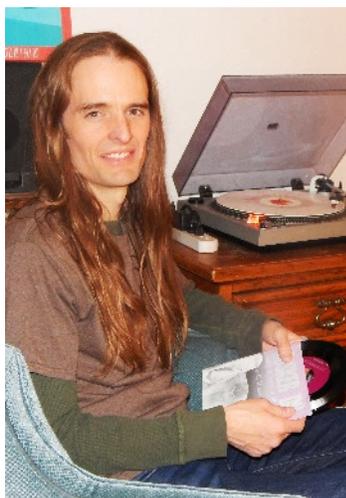
Dan May is an assistant professor of mathematics at Black Hills State University in Spearfish, South Dakota. His Ph.D. research focused on Mutually Unbiased Bases, an area which incorporates topics from linear algebra, group theory and finite geometry. His recent research interests include the connections between poetry and discrete mathematics, and the combinatorics of card games such as *Set* and *Spot It*. Dan has been spending his last several summers working with Bridge to Enter Advanced Mathematics (BEAM), a summer residential mathematics program for underserved students from New York City public middle schools. He has also received Title II grants to create and teach in-service workshops for South Dakota middle school teachers. Dan moonlights as a musicologist, and has presented several seminar talks on a variety of musical genres at his university. www.bhsu.edu/danmay

These Are Your Tools

These are your tools: a compass and a straightedge.
With them, you can bisect an angle, or
Drop a perpendicular.
You can locate the center of a circle.

But you believe everything just comes down to symmetry:
An intuitive flip here,
A casual rotation there
And the thing is done.

Unfortunately the proofs we seek are constructive,
And some things are just not possible:
We can't bisect this distance
Any more than we could trisect an angle.

We construct equilateral triangles,
But are we equal to the occasion?
We can't square the circle,
But maybe we can square with each other.

Dan May

adore

we adore weather.
january silver sky
and leaves for the spring.

you adore these leaves –
red and yellow keys leaving
circles in the mud.

i adore the drone –
sounds in circles forever
sear my silver brain.

we adore the keys
to the dark drone overhead
opening our weather.

i adore all beats,
the word that leaves me apart,
a drone in a hive.

you adore silver
keys rattling on a chain.
listen – your heart beats.

we adore circles.
we can weather it each time –
it never beats us.
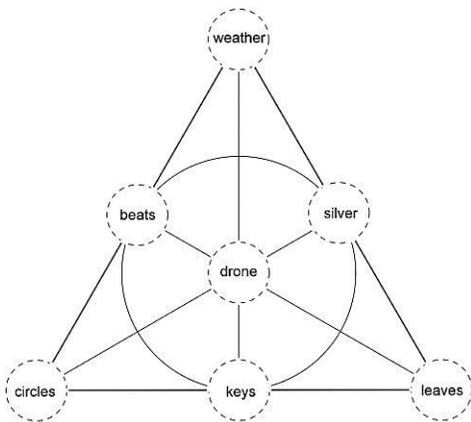
Author's Note: The poem *adore* is structured by the Fano plane, which is represented by the figure to the left. Each of the poem's seven repeated words corresponds to one of the seven points of the Fano plane. The seven stanzas correspond to the seven lines of the Fano plane: the three sides of the triangle, the three altitudes, and the inscribed circle. According to the geometry of the Fano plane, any two of the repeated words appear together in exactly one stanza, and any two stanzas share exactly one of the words between them. More information may be found in: *Galaxies Containing Infinite Worlds: Poetry from Finite Projective Planes*, by D. May & C. H. Wika, Proceedings of Bridges Baltimore, 259-266, 2015.

Deanna Nikaido

Deanna Nikaido is a graduate from Art Center College of Design Pasadena, California with a degree in Illustration and the author of two collections of poetry, *Voice Like Water* and *Vibrating With Silence*. *Voice Like Water* was selected in the Small Press Bookwatch, July 2009 by Midwest Book Review. Her poems have appeared in several anthologies and journals and she is a recipient of the 2010 summer Bookinday Writing Fellowship in Tuscany, Italy and the 2012 summer fellowship in Bahia, Brazil. She was a literacy coach for Bookinday, teaching poetry and book publication to students, and was a Maryland Regional Coordinator for the national recitation program, "Poetry Outloud." Currently, she practices Jin Shin Jyutsu, a Japanese healing art, and is working on a children novel in verse and her third collection of poetry. www.deannanikaido.com

Broken Yellow Line

When Sarah's son graduated with his Masters in Mathematics he said, "Now I know what I *don't* want to do." Sometimes you have to carry a ball all the way into the end zone to know that how it feels is not where you want to be at all. To know victory at something that does not win your heart will eventually defeat you. We have all changed our minds about something midstream or regretted that we didn't. That broken yellow line some people recognize between commitment and failed perseverance; the acceleration needed to get around the obeyed limits, ignoring signs and degrees, the barometer of what gut tells you.

Yesterday while driving the back roads, I caught the cows looking in. The clouds drifted between my shoulders as I knelt in a field behind a stone, waiting for the chameleon of quiet to make me a sunrise. I watched my lists shred, my priorities un-number, crossed paths with those shadows in the field – the ones I'm giving wings to.

Deanna Nikaido

Trouble with Word Problems

Once asked to solve the arrival time of two trains
traveling at different speeds
toward the same destination—I failed.
Mathlexia my friend said.
But sitting in either of those two trains
staring out the window
I knew time was at the center of all my arrivals
and that distance was not linear.

I couldn't solve circumference by its formula
given the radius or
find the hypotenuse of a triangle
given the values for *a* and *b*.
There were not enough words.
No one explained to me
that *pi* was a swirling river or that
fibonacci sang inside the invisible bones of trees
I sat in to untangle myself.

At fourteen I started speaking in poems
solving my own equation.
My answers radiating from
a heart I could not prove
knowing the distance
between any two lives
traveling toward the same stillness
erases itself.

Stephanie Strickland

Stephanie Strickland has published eight books of poetry and ten works of trans-medial, electronic, digital literature. *Zone : Zero,* book + CD, includes the poem *slippingglimpse* which maps text to Atlantic wave strange attractors. *V : WaveTercets / Losing L'una* is accompanied by the *Vniverse* app for iPad, written with Ian Hatcher and available free at the Apple store. A poem generator written with Nick Montfort, *Sea and Spar Between*, has garnered critical notice. Recent digital poems include *House of Trust* with Ian Hatcher and *Hours of the Night* with M.D. Coverley. The books *True North* and *Dragon Logic* both feature mathematical poems. A member of the Board of Directors of the Electronic Literature Organization, Strickland edited *Electronic Literature Collection Volume 1.* For more on her work, go to http://stephaniestrickland.com/

The Romans Captured Archimedes

who was pondering a problem, tracing
circles in his garden. The problem

for them: Archimedes's *Sun
Reflector* firestorming galleys plucked

from Their Sea by his *Claw-
Tongs-On-A-Pulley*. Rome killed

Archimedes, sacked his city: won.
Archimedes, thinking *Levers*,

thought, "If I stood
outside it, I could lift the Earth,"

a goal. Its first, giant, step: mounting
shoulders both ancient and high, Isaac

alone, Isaac
so bitter, Isaac the chronic,

dogged contender, escaping from Plague,
Isaac Newton weighed the sun.

Stephanie Strickland

0 Shortcut to What?

0	*Nothing that is not there and the nothing that is.*
	Wallace Stevens, "The Snow Man"

Out the door every
day along High Street
to Sloane. Only the grave
there still and the grave gates, Egyptian,
red soft sandstone. Every
day. Truth not flowing down
from a source; but, an exact
accord that makes the whole
simpler than the parts;
those bodies lost all winter
in the snow. The storm
in the night so great,
so erasing the man

so immemorably standing in it, at sea in it,
and the woman in batiste weeds of white at sea
in it on her widowed watching walk.

Gibbs spoke only once
in a Faculty Meeting, during
protracted, tiring debate on elective courses:
should there be—more English, more Classics? More? Or less.
They were astonished to see him rise, after thirty-two years,
though familiar with the high, pained-sounding voice: a man of snow
assessing. Not to be distracted, or dispersed into longcuts,
not to be turned from the whole entire empty mist
hanging in the cold air, not to miss—or
intrude on the nothing that was
there.

Escaping
in every emotional way,
Gibbs, hidden at home, creating the loneliness
he needed to assume just one responsibility—for which no thanks,
much complaining of it, some wonder. Lost, in the clouds of snow gathering
in CT over *Transactions & Proceedings* of the local Academy of Sciences,
the one un-evasion he accepted: shortcutting elegance by uncouth
statement that is efficient in every respect. The reward for
getting past the failings of language? To be found
un-readable. Gibbs rose. He said: *Mathematics
is a language.* And sat down.

Amy Uyematsu

Amy Uyematsu, who taught high school math for L.A. Unified Schools for 32 years, is a sansei (third-generation Japanese American) from Los Angeles. She has published five volumes of poetry: *30 Miles from J-Town* (Story Line Press, 1992), *Nights of Fire, Nights of Rain* (Story Line Press, 1998), *Stone Bow Prayer* (Copper Canyon Press, 2005), *The Yellow Door* (Red Hen Press, 2015) and *Basic Vocabulary* (Red Hen Press, forthcoming in 2016). Amy is the recipient of the 1992 Nicholas Roerich Poetry Prize. Her work is featured in many journals, anthologies, and blogs, including "Poetry Outloud," a national program to promote poetry in American high schools. Prior to teaching mathematics, Amy was active in Asian American Studies at UCLA, and in 1971 she coedited the anthology *Roots: An Asian American Reader.* www.poetryfoundation.org/bio/amy-uyematsu

Juan's Numbers

1. Thirteen

As in Culver City 13, Venice 13,
Playboy and Echo Park and Sotel 13,
Juan and his allies grin if the answer
falls on their favorite number
13 as in "m" the thirteenth letter
"m" as in "la Eme" for Mexican Mafia

Juan keeps changing schools
kicked out for fighting
or getting jumped by rivals
he has to ride a downtown bus
can't even hang out
on his own front sidewalk

For all his noisy bravado
he's still not hardcore
math sucks! he complains
but he never cuts class
lucky for Juan it's his mom
who still makes him fear for his life

2. Four Hundred Fifty

Less than 10 points separate Juan
from walking the stage
diploma in hand
he needs a score of 450
to prove to state bureaucrats
he knows enough math

But Juan knows no one cares
if he got pushed up to high school
barely knowing how to add
how in hell can he show them now
that he can calculate
the slope of a line

This is his last year to pass the test
and Juan knows his numbers
inside school and out
just don't add up
I'll be lucky if I live to be 30
a statistic no teacher can deny

Amy Uyematsu

Zap # 19

as a retired math teacher
I guess it figures I notice
that today there are 3 technicians
instead of the usual 2
and I have 12 more sessions
with 6 of them designated
as "breast boosters"
my mind sidetracking briefly
to booster shots and bustiers
I'll have 31 zaps in total
but my friend will have 35
which somehow feels more complete
31 sounds like a miscalculation
but then again 31 is half of my 62 years
so maybe it's meant to be
like those who think
things always happen for a reason
I enjoy the 2-paneled photograph
on each radiation room ceiling
and my assigned daily time
is a jazzy 12:12
once I finish I open my car
to the smell of jasmine
from the 5 small vines
I bought for
the backyard wall
the white blossoms are
small 5-pointed stars
and in the style
of my Japanese ancestors
I will plan my garden
in the pleasing asymmetry
of 1-3-5 odds.

Acknowledgements

For interested readers,
additional collections of poems with strong links to mathematics

Bridges 2014 Virtual Poetry Reading, Sarah Glaz (editor), Mike Naylor (host), Steve Stamps (video editor), http://bridgesmathart.org/past-conferences/bridges-2014/2014-poetry-day/ , 2014.

Bridges 2013 Poetry Anthology, Sarah Glaz (editor), Tessellations Publishing, Phoenix, AZ, 2013.

Strange Attractors: Poems of Love and Mathematics, Sarah Glaz & JoAnne Growney (editors), CRC Press/ A K Peters, Wellesley, MA, 2008.

Numbers and Faces: A Collection of Poems with Mathematical Imagery, JoAnne Growney (editor), Humanistic Mathematics Network, Claremont, CA, 2001.

Verse & Universe: Poems About Science and Mathematics, Kurt Brown (editor), Milkweed Editions, Minneapolis, MN, 1998.

Songs from Unsung Worlds: Science in Poetry, Bonnie Bilyeu Gordon (editor), Birkhäuser, Boston, MA, 1985.

Against Infinity: An Anthology of Contemporary Mathematical Poetry, Ernest Robson and Jet Wimp (editors), Primary Press, Parker Ford, PA, 1979.

Imagination's Other Place: Poems of Science and Mathematics, Helen Plotz (editor), Thomas Y. Crowell, New York, NY, 1955.

Songs of Science: An Anthology, Virginia Shortridge (editor), Marshall Jones Co., Boston, MA, 1930.