

Bridges Conferences

Mathematics, Music, Art, Architecture, Culture

Bridges 2013 Poetry Anthology

Enschede

Towson

Coimbra



2011 – 2013

Bridges 2013 Poetry Anthology

Enschede
Towson, Coimbra



A collection of poems with strong links to mathematics
by the poets featured at Bridges 2011 – 2013 poetry readings

Sarah Glaz, Editor



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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 first Bridges Poetry Anthology, a collection of poems with strong links to mathematics written by the poets featured at the Bridges conferences from 2011 – 2013.

This year's Bridges conference, at Enschede, The Netherlands, 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 poetry readings at Bridges are of more recent vintage. In 2010, I had attended my first Bridges conference—held in Pécs, Hungary—and fell in love with this extravagant math-art festival and the delightful city in which it took place. There was only one thing I wished it offered more of—a more substantial math poetry component. To remedy the situation I volunteered to coordinate a poetry reading for the following year. My suggestion was wholeheartedly embraced by Reza Sarhangi, president of the board of the Bridges organization, and the following year we held our first such event at Coimbra, Portugal. The present anthology grew out of this and the two poetry readings that followed.

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. The reader may notice and enjoy idiosyncrasies of spelling and expression specific to the various English-speaking regions, which go far beyond: “You say tomatoyto, I say tomatoyto...”. 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, and philosophy; engineers; higher-education administrators; librarians; professional artists, writers, translators, and poets; primary and secondary school teachers, and more.

At the first reading in Coimbra, we were welcomed by the Portuguese mathematician, poet and translator Francisco José Craveiro de Carvalho. Francisco read a number of mathematical poems written by well-known English-speaking poets, which he had translated into Portuguese, as well as a number of English translations of Portuguese poets. This anthology contains English translations of his own

poems. Francisco also gave us the poem that became our motto—lines by Portuguese poet Fernando Pessoa, which appear at the top of the previous page.

Another unusual translation into English was a poem by the Iranian poet Forough Farrokhzād read by Saeed Ghahramani. Michael Hillmann’s translation of Forough’s poem is reproduced in this anthology with a commentary by Saeed. It is an introduction to one of the best-loved Persian poets who should be better known to the English-speaking world. The Bridges Coimbra poetry reading also featured poems by Tatiana Bonch-Osmolovskaya, Emily Grosholz, JoAnne Growney, and Amy Uyematsu.

This first reading set the tone and general outline of the program of all subsequent readings. The first hour and a half is devoted to longer readings by a number of distinguished invited poets. This is followed by an open microphone session of half an hour or so during which Bridges participants can read their own poems. The program proved to be flexible enough to allow for late additions of invited poets for shorter readings. It also allowed me to read one or two of my poems in the transitional time between the featured poetry reading and the open microphone session.

The second reading, held at Towson University, Maryland, continued to attract a stellar cast of poets. Because of its location in the United States, we were lucky to feature many prominent North American poets. Invited poets who read at Towson and whose work appear in this anthology were Tatiana Bonch-Osmolovskaya, Marion Deutsche Cohen, Emily Grosholz, JoAnne Growney, Philip Holmes, Geof Huth, Alice Major, Kaz Maslanka, Deanna Nikaido, and Stephanie Strickland.

I look forward to the upcoming reading at Enschede. Happily for us, the proximity to Great Britain brings with it the exciting mathematical poetry of Michael Bartholomew-Biggs and Eveline Pye. Joining them at the reading and represented on these pages is the equally exciting work of Tatiana Bonch-Osmolovskaya, Carol Dorf, Emily Grosholz, and Alice Major.

This volume is organized in two sections. The first section contains poems written by the poets invited to read at Bridges Enschede; while the second is devoted to poems written by Bridges Coimbra and Bridges Towson invited poets who could not participate in this year’s conference. 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 am indebted to all the poets and translators whose poems appear here for their work, and to George Hart for the cover image. I thank all the poets, and in particular Emily Grosholz, JoAnne Growney and Alice Major, for patiently going over parts of the anthology and making good suggestions for improvements. Thanks are also due to Reza Sarhangi, Craig Kaplan and Nathan Selikoff for input on the book’s visual aspects. Many thank to Robert Fathauer, at Tessellations Publishing, for the beautiful cover design and for all the work, thought and care he put into producing this book. Last, but not least, I thank my husband, Joe Glaz, for sharing the experience of all the Bridges conferences with 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 Enschede Featured Poets**



**A Mathematical Poetry Reading
Sunday, July 28, 2013**

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. Since his mid-life diversification into poetry, his work has appeared in many magazines and anthologies and he has published six poetry collections—including *Uneasy Relations* (Hearing Eye, 2007) which attempts to unite the two halves of his brain. His next collection, *Fred and Blossom*, is due from Shoestring Press in 2013. Mike is poetry editor of the on-line magazine *London Grip* and co-organizer of the North London reading series *Poetry in the Crypt*. <http://mikeb-b.blogspot.co.uk/>

Numerical Analysis Quasi-Haiku Sequence

TAYLOR'S THEOREM

If we knew it all
for just a single moment
we'd hold the future.

MEAN VALUE THEOREM

If we know in part
then, like stopped clocks, our forecasts
will be right – just once.

SUPERLINEAR CONVERGENCE

Acceleration:
the tell-tale heartbeat quickens
with adrenaline
rush like another
fall of the House of Usher.
Exhilaration!

LINEAR CONVERGENCE

Each repetition
closes on the vital point:
Pit and Pendulum?

STAGNATION

When will it converge?
Each dead step, like Poe's raven,
cackles "Nevermore!"

ABSOLUTE ACCURACY

Zero is zero:
no getting away from it –
let alone with it.
One hundred per cent
or nothing. Any miss is
as bad as a mile.

ILL CONDITIONING

Catastrophists say
one butterfly's wingbeats can
switch drought to monsoon.
Catastrophe spreads
through some computations from
one decimal's doubt.

Michael Bartholomew-Biggs

Teaching Practice

Suppose that in the first row
of a year-ten maths class
there exists a student with a folder
whose cover sports, in colour,
an A4 fully-frontal nude.

Is it necessary and sufficient
to use only body language
to eliminate this element?
Or should there be a formal proof
to justify its cancellation?

I'd like you all to pause
and try this as a worked example.
Substitute yourself
into the standard formula
and see what answer you obtain;

and then attempt the problem once again,
with extra data. Let g , the student's gender,
equal female; with s , the model's sex,
quite positively male. Now in this case
does your result come out to be the same?

Michael Bartholomew-Biggs

From the Sequence “Fred & Blossom”

— based on a true story from the 1930s

Fred is a young would-be aircraft designer and flying instructor who falls heavily for one of his pupils — Blossom, the wife of Viscount Ratendone. He endeavours to do the decent thing and emigrate, but does not stay abroad for long and on his return he and Blossom begin a life together which includes starting — from scratch — a business designing light aeroplanes...

SO HOW DO YOU DESIGN AN AEROPLANE?

Look for precious little help
from birds except that silhouette
of teardrop body; tapered wings
outspread around its one-third length;
a tail that fans out aft for balance.
No way to replicate their hollow
bones or feathers’ flexibil-
-ity and *be* a breathing structure light
enough to flap itself to flight

So like a child you have to learn
from other people’s work. There’s much
the miller or the yachtsman knows
about the shape and trim of sails
to stop them breaking when they borrow
from the wind sufficient force
to force flat heavy stones to turn
or drive a boat across the waves
skipping like a spinning pebble.

Beneath its pencil-shaded skin
your paper aeroplane requires
a skeleton of ribs and spars
so ask a carpenter about
the properties of wood and how
to reconcile the yin and yang
of weight and strength. A shipwright knows
how hull and keel support the mast
when canvas catches air in curves.

Michael Bartholomew-Biggs

You have to choose from aerofoils
catalogued by lift and drag
find the size for fin and rudder
fix an angle of attack
ensure the elevators' power
provides sufficient pitching moment
check the stress at spanwise stations
in the end it all boils down
to calculations calculations...

Fred and Blossom soon gain a reputation for designing efficient light aeroplanes. One important accolade is a favourable report on their use of split flap technology by C. G. Grey, editor of *The Aeroplane* magazine and a man of forthright opinions. The following prose poem is a 'treated text' using only words from the article —although not always in the intended order ...

CENTRES OF GRAVITY 1934

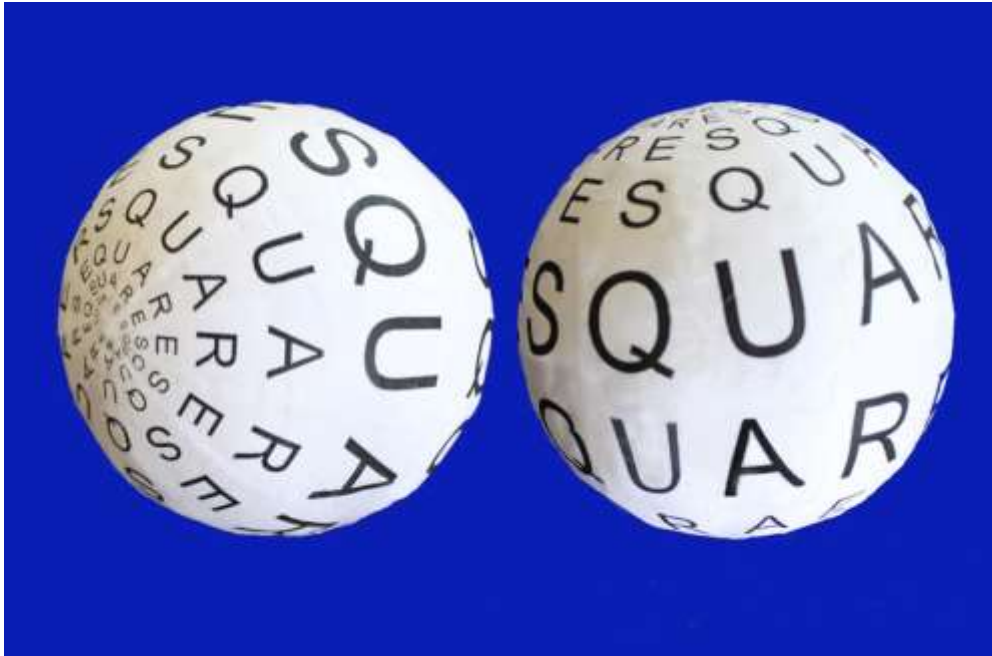
Mr Miles' particular split flap across the fuselage under side will cause a commotion wherever it is seen. Wherever it – the machine – is seen becoming nose heavy the flaps prevent it. The flaps prevent it with no tail trimming – for there is none on the machine. There is none needed on the machine, as in other types, for the flaps get over the difficulty by sheer good luck. By sheer good luck – so Mr Miles says – a down load is put on the tail when the flaps are depressed.

The writer has watched Mr Miles taking off and landing a couple of yards farther on over and over again all around the aerodrome. The writer has seen Mr Miles put the nose down at 900 feet and sink under perfect control all the time. I have seen Mr Miles flying circuits with his hands up over his head. And I agree with Mr Miles when he says no sane person who exercises ordinary intelligence can possibly get into trouble with flaps.

The person on the machine trimming the aerodrome has watched the underside of Mr Miles (when Mr Miles is flying overhead). He is becoming depressed. He has seen the sheer difficulty of taking off – for no ordinary person who flaps can get flying in a couple of yards (or miles). Mr Miles says no person who exercises can possibly get depressed. When a person is down, he can get his tail up in no time with 900 circuits around the landing on heavy feet! No intelligence is needed, so good luck! (I agree it will cause a commotion.)

Tatiana Bonch-Osmolovskaya

Squaring the Sphere



S Q U A R E S Q U A R Q U A R E
S Q U A R E S Q U A R Q U A R E
S Q U A R E S Q U A R Q U A R E
S Q U A R E S Q U A R Q U A R E
S Q U A R E S Q U A R Q U A R E
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S Q U A R E S Q U A R Q U A R E
S Q U A R E S Q U A R Q U A R E

Tatiana Bonch-Osmolovskaya

Two

$\frac{1}{2}$

A traveler starting from town A wishes to arrive to town B.
The ancient ones said to complete a journey we should at first complete half of the way,
Then half of the rest, then half of what remains, and half of the rest again...
The other ancient one points out the journey of ten thousand miles begins with the first step.
Would it be shorter if both of us started from the opposite ends at the same time?
Lao-Tse, knowing the answer, keeps silence.
Zeno went away hunting hares, or turtles, or young boys.
A traveler starting from town A wishes to arrive to town B,
Where another traveler starts the journey at exactly the same time.
Half of the task is done.

$\frac{1}{4}$

You start from your place and I start from mine.
In my direction you're taking a step and I'm taking a step in yours.
A letter you write to me and I write you a letter.
A call you make and I make a call.
On your side, a cat is looking through the window and a dog is staring at sea horizon on mine.
Optical fibre flows are abundant with invisible echoes of voices and silent reflections of faces.
Pebbles are deaf and dumb.
Still eighteen thousand kilometers between us.

$\frac{1}{8}$

Moon lakes are full of shining sand.
I raise my eyes to the night sky
Meeting your glance in millions of sand faces
In two and a half seconds
You are meeting my glance
When you raise your eyes to the full moon.
The way around turns out to be the shortest.

$\frac{1}{16}$

The Sun looks at itself in the mirror of seascape.
The sea looks at the Sun with eyes full of tears.
Dreams look at each other in mirrors in their dreams.
I look at a candle you are dreaming of.
Dance of the flame on a waving surface.

$\frac{1}{32}$

<...>

...

To the end of the journey, the series is two.

Tatiana Bonch-Osmolovskaya

By the Father's Order Sent to the School of Mathematics I Perceive the Beginning of Transcendence

—a number π poem

As I am spinning round,
A ring of signs turns in front of my eyes.
Best to stop on three.

It was easy in the beginning,
But watermelons ripen full of juice.
I cannot describe their fullness.

Call seven young girls together,
Give them twenty-two ribbons.
Their suffering would not come close to mine.

A cart rolls along by a flat road
Among fields flooded with water and light.
The wheel leaves a track in the dust.

From one season of sakura's blooming to
another
I count the number of seconds.
Time has turned around itself once again.

From the teacher's pile I took a brick
And threw it into a pond.
Calmly he ordered me to recite the sizes of
circles.

My fellow worm,
You gnaw through an apple,
But can you wind yourself around it?

A donkey rotates mill's wheels
In a bright day as well as in a storm.
He alone knows how long his path is.

At last the months of studies are over.
Teacher's wife has baked an apple pie.
A piece gets stuck in my throat.

I woke up at home at midnight.
A full moon in the window
Is peering at me, or is it a ghost?

Mother gathered back into a clew the thread
That I unwound and entangled
Explaining numbers to a kitten.

At a dinner table I rolled up a rice ball.
The hand stopped halfway to mouth –
The same ghost looked into my eyes.

I brought a hen and a sack of rice to the
teachers' door.
Three years have passed. I've learnt primary
numbers,
But still have not perceived transcendence.

A flock of geese crosses the autumn sky:
Three birds, another one, four more, one again,
five...
I will not raise eyes from the book.

Author's Note: Each hokku-like strophe represents one of the features of the number π : its approximation by 3, by 22/7, by 3.1415, π in measuring the length of a circle, the volume of a sphere, consonance of the word 'pie', approximately $\pi \times 10^7$ sec in a year, and so on.

Carol Dorf



Carol Dorf is fascinated with the boundaries between disciplines— mathematics and poetry— prose poetry and lineated poetry. For the past fifteen years she's taught mathematics at Berkeley High School, and led an occasional poetry workshop. Before that she taught poetry as *California-Poet-in-the-Schools*, at Berkeley City College and in other venues. Recently she's tried to bring her loves together by introducing poetry into the mathematics classroom, and teaching poetry writing to mathematics teachers. Her poetry has been published in many journals and several anthologies. She is poetry editor of the online magazine *Talking Writing*.

<http://talkingwriting.com/why-poets-sometimes-think-in-numbers/>

Prescription 1:

In the light of the moon we identify
coordinates, only to see them wash
away in the orange sunrise. To find
the lost requires more than GPS
or map, compass and sextant.
In the shimmer of our peripheral
vision they are the same, reading
an old book, or chopping vegetables.
In a better world, we could take
the compass and a straight edge
draw daisies, or circles around time
to hold everyone in a circle singing,
hands around each other's waists.

Note: First published in *Antiphon*.

Carol Dorf

Dear Ivar,

I read your book on the unexpected.
Like most poets, I opposed mathematics
when I was young, seeing it as the converse
to feeling. The previous statement is false.

When I was very young I loved counting
and zero and even numbers. At sixteen,
I wanted to imagine calculus as a novel
of limits and motion. Yet by college,
I had learned mathematics could not correspond
to poetry in a one-to-one intensity.
Would your book have mattered to me, then?
Most likely, I would not have read it.

Today, I am sending this fan letter. Thank you
for explaining catastrophe and instability.
I spent so many years writing my way
through them. And boundaries, I kept insisting
they were psychological or geographic,
unwilling to see them as breaks
between states of matter. Your words
matter to me, a language as precise as poetry
to delineate universe and being.
Sincerely,

Carol Dorf

On Definitions

With all the ways time loops
in the quantum foam
definitions slide away

Her mother
could have said
"a life defined by sorrow"
but it might have been
sparrows or tomorrow
which is a problem
when tomorrow loops
around today

Her physics teacher
would have said
"don't confuse
your quantum world
with your mechanical space —
no one
hoists anvils
under an imaging machine"

though isn't that the point
there is "no one"
on that infinitesimal
scale so

we define life
in the particle zoo:
Quarks —
up and down
bottom and strange
Leptons —
neutrino, electron
muon and tau

Imagine the first
instants of the universe

where light
and gravity
interact in long waves
when metaphors
turn upon themselves
before they intersect
in hyperbolic geometries

Note: First published in Antiphon.

Carol Dorf

Plotting Hours of Daylight

Already there's a perceptible change of light and darkness, the rush of time that speeds up around the equinox — and one doesn't feel quite ready for the change. That's how we always imagine infinite, as though we believe the proof that maps all the real numbers into the space between zero and one.

She holds out her hand, and we expect a gift, but instead it is a small frog, the toxic slime about its skin shiny in this light. How did she become immune? One smiles, as running is not an option and then a bell rings and it's time to go to class; we are all in that infinite high school where every moment presages disaster, and we always want to tell more to our friends than will ever be safe.

Between light and dark, twilight, which always used to frighten me, because the approach of night was more of a problem than darkness itself. When I switch off the light shadows lengthen and lose form, the way the lost are everywhere filling the corners of the room, calling out: "Look at me, stop that purposeful forgetting."

There's pressure to rejoice in winter as though crystals encompass perfection. I used to fear the melt. Where were you then? The way we walked hand in hand, spooned together through night, like the infinite colors of another country.

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 and enjoys getting involved in almost any kind of poetry related activity. Sarah translated Romanian poetry, wrote articles on the connections between mathematics and poetry, experimented with poetry in the mathematics classroom, and co-edited the poetry anthology, *Strange Attractors: Poems of Love and Mathematics* (AK Peters, 2008). Sarah's poetry appeared or is forthcoming in: *Convergence*, *The Ghazal Page*, *Journal of Humanistic Mathematics*, *Recursive Angel*, *Talking Writing*, *American Scientist*, and other periodicals. She is an associate editor for *Journal of Mathematics and the Arts*. <http://www.math.uconn.edu/~glaz/>

Calculus

I tell my students the story of Newton versus Leibniz,
the war of symbols, lasting five generations,
between The Continent and British Isles,
involving deeply hurt sensibilities,
and grievous blows to national pride;
on such weighty issues as publication priority
and working systems of logical notation:
whether the derivative must be denoted by a "prime,"
an apostrophe atop the right hand corner of a function,
evaluated by Newton's fluxions method, $\Delta y/\Delta x$;
or by a formal quotient of differentials dy/dx ,
intimating future possibilities,
terminology that guides the mind.
The genius of both men lies in grasping simplicity
out of the swirl of ideas guarded by Chaos,
becoming channels, through which her light poured clarity
on the relation binding slope of tangent line
to area of planar region lying below a curve,
The Fundamental Theorem of Calculus,
basis of modern mathematics, claims nothing more.

While Leibniz—suave, debonair, philosopher and politician,
published his proof to jubilant cheers of continental followers,
the Isles seethed unnerved,
they knew of Newton's secret files,
locked in deep secret drawers—
for fear of theft and stranger paranoid delusions,
hiding an earlier version of the same result.

Sarah Glaz

The battle escalated to public accusation,
charges of blatant plagiarism,
excommunication from The Royal Math. Society,
a few blackened eyes,
(no duels);
and raged for long after both men were buried,
splitting Isles from Continent, barring unified progress,
till black bile drained and turbulent spirits becalmed.

Calculus—Latin for small stones,
primitive means of calculation; evolving to abaci;
later to principles of enumeration advanced by widespread use
of the Hindu-Arabic numeral system employed to this day,
as practiced by *algebristas*—barbers and bone setters in Medieval Spain;
before Calculus came the Σ (sigma) notion—
sums of infinite yet countable series;
and culminating in addition of uncountable many dimensionless line segments—
the integral \int —snake,
first to thirst for knowledge, at any price.

That abstract concepts, applicable—at start,
merely to the unseen unsensed objects: orbits of distant stars,
could generate intense earthly passions,
is inconceivable today;
when Mathematics is considered a dry discipline,
depleted of life sap, devoid of emotion,
alive only in convoluted brain cells of weird scientific minds.

Note: First published in Humanistic Mathematics Network Journal.

Sarah Glaz

Late Afternoon at the Workshop on Commutative Rings

Il Palazzone, Cortona, Italy, June 2006

*The nature of a faithful content ideal
of a Gaussian polynomial over a commutative ring
a source of excitement for a number of years
proves to be locally principal
The first idea relayed from mind to mind
at last reached perfect formulation*

Vino rosso O Vino rosso
Brindisi Salute Chin-chin To our quest!
Inebriated in Pienza and Montepulciano
Cortona Firenze and San Gimignano
Amarone del Valpocello Sangiovese di Romagna Calisto
Chianti Classico Riserva Akronte Saltapicchio
Silken on the palate like a Puccini aria
on the lips of Maria Callas

13 January 2009

12=2²x3 Aduk is dying for Aduk is dying in the white of winter
11 The coldest month
10=2x5 Aduk is dying in the falling snow
9=3² The white of winter for Aduk is dying
8=2³ Aduk is dying for the white of winter
7 The drift of time
6=2x3 Aduk is dying in the white of winter
5 The falling snow
4=2² Aduk is dying for Aduk is dying
3 The white of winter
2 Aduk is dying
1 .

Author's Note: The poem's structure follows The Fundamental Theorem of Arithmetic, which states that every positive integer greater than one may be expressed in a unique way as a product of powers of distinct prime numbers. Top poem was first published in *Strange Attractors*; bottom poem was first published in *Recursive Angel*.

Sarah Glaz

A Pantoum for the Power of Theorems

*The power of the Invertible Matrix Theorem lies
in the connections it provides among so many important
concepts... It should be emphasized, however, that the
Invertible Matrix Theorem applies only to square matrices.*
—David C. Lay, “Linear Algebra”

The power of a theorem lies
In the connections it provides
Among many important concepts
Under a certain set of assumptions

In the connections it provides
We are always able to find
Under a certain set of assumptions
Some that fell through the cracks

We are always able to find
Neglected aspects of ourselves
Some that fell through the cracks
Left unexplored by mathematics

Neglected aspects of ourselves
(The power of a theorem lies)
Left unexplored by mathematics
Among many important concepts

Emily Grosholz



Emily Grosholz is the author of five books of poetry, most recently *The Abacus of Years* (David R. Godine Publisher, 2001), and *Feuilles; Huit Poèmes: Edition Bilingue Français-Anglais*, with Farhad Ostovani (William Blake & Co., 2009). She is professor of philosophy at the Pennsylvania State University and a member of the University of Paris Denis Diderot research group REHSEIS/SPHERE. Emily has been an advisory editor for the *Hudson Review* for over twenty-five years, and joined the editorial advisory board of the *Journal of Humanistic Mathematics* two years ago. She studied mathematics at the University of Chicago, and philosophy at Yale University, so that her research focuses on the history and philosophy of mathematics. She lives with her husband and children in State College, Pennsylvania. <http://philosophy.la.psu.edu/faculty/profiles/grosholz.shtml>

Hourya

The enormous, high-ceilinged apartment near Trocadéro
Echoes, though it is full of books, intaglio'd furniture, and flowers,
As if reflecting the old house in Rabat, now seized and lost,
And the great, oceanless dunes ranged beyond the city walls
That bear the trace of wind sifting, but not of mind.

You write the history of mind, entering its formal labyrinth
With only the silk thread of demonstration to lead you on.
So Hilbert guides you, Poincaré, Weyl, Noether, Cavaillès.
So Emmy Noether grieved for Hilbert's house, her home and circle,
Stranded on the outskirts of Philadelphia, where she died.

So Göttingen fell, the greatest commonwealth of mind
Europe ever knew, dismantled by the agents of the Reich
Who sized up living mathematicians as Catholics, women, Jews.
So Cavaillès was shot against a wall, so Emmy Noether,
Exiled from her algebraic home, succumbed to memory. *Don't you.*

Note: First published in the *Hudson Review*.

Emily Grosholz

Proportions of the Heart

In classical flower arrangement,
Masako says, three major stems occur.
The *shin* stands thirty degrees from vertical.
The *soë*, forty-five degrees,
Is just three-quarters of the *shin* in height.
The *hikaë*, three-quarters of the *soë*,
Points outwards, low, at seventy-five degrees:
Most often this one is a flower.

Even the purple brambles from the field,
Cut by Masako, fall in whole ellipses,
And twigs repeat their angles on the branch.
So may you and I and our small flower
Flourish in the constraints
Space and number pose on families,
And make our tracery around the center
Of certain loss more beautiful, and sure.

What a classicist I have become,
Impelled by the broad hand of revelation,
That is, by life itself.
Masako's creatures fill our country house
Like novel theorems from the *Elements*:
Out of fixed proportion, beauty rises
Unlike any that I used to summon
In rented rooms from floppy big bouquets.

A single sweep of branch, unflowering,
Another upwards twist,
And there's the shape of nothing caught in air,
Somehow the proper counterpart of one
Or two explosive flowers.
Don't be afraid, she says, her fingers hidden
Inside the vase, to put more details in,
As long as they don't interrupt the lines.

The heart's most elegant, extravagant
Designs arise, I see,
From careful choice and rapid computation.
In half an afternoon, Masako fills
Our baskets large and small, and the clear vases.
Two leans from one, and three from one and two,
And suddenly altogether they compose
Their ratios to self-sufficiency.

Note: First published in New Virginia Review.

Emily Grosholz

Café on the Rue Gay-Lussac,

*near the abandoned storefront of the
Galérie Orphée (Paris), around the corner
from the École Normale Supérieure*

Exhausted, footsore, sweetening my coffee
only with sugar, suddenly I see
that memory has lost its long allure.
I used to spend whole days remembering,
expecting backwards, painting my shabby hopes
with lipstick and mascara, *trompe-l'oeil* glamor.

Oh Paris. Now it's only another city
where restaurants are dear, the gutters full
of rain and smithereens, the clerks deployed
on every front to say, *Ah non, madame,
c'est impossible. Vraiment, je regrette.*
Where Notre Dame is blanked by scaffolding.

All those imaginary dimensions heaped
above my little life, like extra storeys
hidden behind the gray-blue Mansart roofs,
clouds crowning Sacré Coeur, sheaves over rings,
co-tangent spaces kissing their manifold:
how finally they collapse. Goodbye, goodbye.

How finally future overshadows past
at half a hundred. What was she expecting,
that girl I was? Oh honestly, I forget.
Memory scatters in the sky like sparrows,
or sinks like rain in gutters, where the drowned
underground river-falls of Paris vanish.

Emily Grosholz

Reflections on the Transfinite

Reading about the tower or great-boled tree
Of ordinals, I think how Cantor grew
Wiser and more insane, trying to save
His tree of Jesse from the pruning shears
And kitchen gardening of Kronecker,
Although I share the latter's feeling for
The natural numbers, those deceptively well
Ordered, step-wise creatures, which appear
Transparent as they mount, but all in all
Among themselves are most unknowable.

Dreaming about the cardinals at midnight,
The alephs flaming like a candelabrum,
I see you in a shadowy attic-room
Installed among Diogenes Laertius,
Nachgelassene Schriften, commentaries
On Aristotle, Plato, and the latest
Fashionable fact-schredders out of Paris.
So cloudy is the place you designate
In the fraught hierarchies of my world
That I can hardly prove you, but suppose
You are not just a postulate I made.

You are the great collection of desires,
Forever incomplete, unsatisfied,
Toward which all finite sequences in time
With little steps so trustfully aspire.
Though you outrank them all, see how they run
Like atomies of fire toward the sun,
Sent over the abyss with no alarm
To make the leap across into your arms.

Note: First published in the Kenyon Review.

Alice Major



Alice Major has published nine poetry collections and a book of essays, *Intersecting Sets: A Poet Looks at Science* (University of Alberta Press, 2011). Among her awards are the Pat Lowther Award for poetry and the Wilfrid Eggeston Award for non-fiction. 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 artistic director for the Edmonton Poetry Festival. In 2012 Alice was inducted to Edmonton's Arts and Culture Hall of Fame. <http://www.alicemajor.com/>

For Mary, Turning Sixty

In *The dictionary*
of curious and interesting
numbers, sixty
gets a whole page.

*"Sixty is the eighth 'highly composite' number -- the first
number with 12 divisors."*

Highly composite, certainly.
All those divisors snipping up her time.
Children. The fractious freelance clients.
The publishing of other people's books.
The churches. The students. The friends, and
her books – their pages adding up
slower than she'd like. Dividing her experience
among characters, and multiplying
herself by her imagination.

"Sixty is the base of a sexadecimal system of counting."

Mary will be glad
to know it still includes
sex.

*"In astronomy, the very ancient division of the zodiac
into twelve parts fits a sexadecimal system very well,
and a decimal system not at all."*

Alice Major

Mary always did fit better with her stars
than with decimated dimes and dollars.
Gemini – the star twins near the boat moon,
clair de lune. In antiquity,
their rising was a favoured talisman
for sailors. This morning's horoscope advises her:
'Ignore those who tell you to stand pat. Emphasize
universal appeal, welcome chance
to travel." As if we needed
to tell her.

*"We still divide an hour of time or an angle of one degree
into sixty minutes, and each minute into sixty seconds. These
are the only common measurements that have not been metricated."*

No, it would be difficult to metricate
Mary. You need uncommon
measurements – a system for numbering
laughter, for counting friends,
an arithmetic of love.

The minutes tick away. She's
only too aware how they divide
the whole page of our days
into a pile of confetti, something
to run your fingers through, amazed
how it can hold so much
in so small a space.

But confetti also has its role in jubilation.
We conclude that Mary is indeed
both curious and interesting
and is about to turn sixty
upside-down.

Alice Major

klein bottle

love is all surface
klein bottle plane
surface without
end wrapped
round curve
of shoulder around thigh
surface penetrating
surface world
made two-manifold
too manifold world
without end surface without
seam and it seems
I could go
nowhere else

Zeno's Paradox

We've solved the paradox.
Motion is possible. The arrow's flight ends
even if its fractions interlock
to infinity – half a distance, yet again
half, and half We know this series sums
to a finite thunk and shudder.
And we know
the thrumming calculus of life comes
to completion. I am half-way through
my count of years — half-way to knowing
all I will know. Yet something stalls
in the air, an infinitely subtle slowing.
Of whatever I have learned when the arrow falls
silent, one last sliver will be lost.
A final distance will remain uncrossed.

Alice Major

Three-Body Problem

Two bodies present no
insoluble equations.
Their motions elegant, simple,
they will orbit each other forever
tracing a perfect ellipse
around the shared heart.

But add the smallest satellite –
weight of an unborn child, lovers
in the most transitory
of conjunctions,
the weight of a memory
circling in the dark –

and no one can calculate
when the instabilities begin,
when ellipse may evolve
into spiral, into tangent,
into the geometry
of heartbreak.

Eveline Pye



Eveline Pye worked as an Operational Research Analyst for Nchanga Consolidated Copper Mines for ten years and has been a Statistics Lecturer at Glasgow Caledonian University, in Scotland, for twenty years. Her mathematical and statistical poetry has been published in a wide range of literary magazines and anthologies. In 2011, *Significance Magazine*, the joint publication of the Royal Statistical Society and the American Mathematical Association, featured her work in education and published a selection of her poems. She is a Chartered Statistician and a supporter of the British *GetStats* campaign, which aims to improve general understanding of statistics. <http://laurahird.com/showcase/evelinepye.html>

Solving Problems

How do you know the right thing to try? he says,
jabbing paper with his finger. Good question,
I say, playing for time as I have no answer he wants
to hear. Solving these equations is part intuition,
but first, you learn to manipulate x 's and y 's until
decisions are made in your fingers, not your head –
like typing an access code at the ATM, changing gear
in the car or signing a cheque – until it all becomes
muscle memory – the same way Reubens painted
hands, again and again or Keats scribbled rhyme
after rhyme – and then you go with the flow
and, if you are lucky, there is a sweet, sweet moment
as the plum falls into your eager hands, and if not,
you try, and try – on and on until your head bursts.

Note: First published in the Significance Magazine.

Eveline Pye

Numerical Landscape

Like a tracker, I smell the earth
on my fingers, listen for the slightest
echo as I stare out at a world
where bell-shaped curves loom

as mountains and negative exponentials
foretell dangerous descents, imminent
disaster. All around, cliff edges crash
down to restless seas while a solitary

outlier shines in the southern sky: a freak
of random sampling or a guiding light?
Are others buried deep, confounded
by experimental design? On my path,

a decision tree, so many branches spring
from its trunk, so many choices. Statistics
feels like poetry — endless searching,
never-ending uncertainty.

Eveline Pye

Statistics

A computer printout
A stack of paper
Like a shallow box
Filled with facts
Inviting me
To join them

I slide my fingers
Between overlapping sheets
And browse between the columns
Letting numbers lead me
Into dark tunnels

Until pictures appear
On cave walls and
Trends emerge
Out of random rock

A journey into uncertainty
Borehole deep
Below superficial knowledge
I search for a richer vein

Note: First published in the Orbis Magazine.

**Poems by
Bridges Coimbra and Bridges Towson Featured Poets**



**Mathematical Poetry Readings
2011 and 2012**

Marion Deutsche Cohen



Marion Deutsche Cohen holds a PhD degree in mathematics from Wesleyan University and teaches at Arcadia University, where her course, *Mathematics in Literature*, attracts an arithmetic progression of students. Author of twenty books of poetry and prose, Marion published in her first poetry volume, *The Weirdest Is the Sphere* (Seven Woods Press, 1979), a mathematical poem dating back to age seven. Her later mathematical poems, collected in *Crossing the Equal Sign* (Plain View Press, 2007), were inspired by her work in graph theory. A chapbook, *Parables for a Rainy Day*, is forthcoming from Green Fuse Press in 2013. She lives with her husband and youngest son in Philadelphia, Pennsylvania. <http://www.marioncohen.net/>

A Mathematician Should Never Watch Action Films

A mathematician should never watch action films.
She has already swum through iron, run without roads, flown without sky
has already known too many directions
has already been reduced to a point.

She has had enough of thinking hard
enough of hoping that thinking will save her.

Marion Deutsche Cohen

What Drove Me Into Math

What drove me into math
Was not Fermat's Last.
I preferred the factoring of the difference of two squares.
And Cantor's stretched-out one-dimensional lace.
Also, the center of a circle is inside the circle.

What drove me into math
Was not the Mystery of the Unknown
But the mystery of the known.

Other early influences:
The point of light just happening to coincide with the visible corner of our livingroom
Those dark-red shapes when you close your eyes tight
And that spot, that nightmare
Of many bloody colors.

Note: Both poems originally appeared in: *Crossing the Equal Sign*, by Marion Deutsche Cohen, Plain View Press, Austin, TX, 2007.

Francisco José Craveiro de Carvalho



Francisco José Craveiro de Carvalho graduated from Coimbra University, Portugal. He later wrote a PhD 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 poems by Sandburg, Hirshfield, Clement, Pastan, and Dove.

http://novaserie.revista.triplov.com/numero_21/francisco_craveiro/index.html

Portrait of Max Dehn

This is the summer season
of the quiet year of 1899
in Göttingen.
In the background there is a river
or a stage-setting that creates a river.

Only we still know
that the young Max Dehn
will have to rush
out of the photograph
and get rid of his coat
high collars shirt and life
to try and get to and find himself
on a strange shore.

Translated from the Portuguese by Manuel Portela (Universidade de Coimbra)

Francisco José Craveiro de Carvalho

Emmy Noether at Bryn Mawr

The class had come to an end
midway through her
demonstration.

It happens.
Even when you plan
a clean break.

Students were leaving
unaware
that having
lost already home and country

Ms Noether's
next lesson
would be attended
by death.

Translated from the Portuguese by Sarah Glaz and the author

Note: Max Dehn (1878-1952) and Emmy Noether (1882-1935) were two of the many talented mathematicians who escaped Nazi Germany before the second world war, and were never able to obtain positions in accordance with their mathematical talent. Dehn made seminal contributions to geometry, topology, and geometric group theory; while Noether made ground breaking contributions to abstract algebra and theoretical physics.

Saeed Ghahramani



Saeed Ghahramani, a graduate of the PhD program of the U.C. Berkeley's Mathematics Department, was born and raised in Iran. He immigrated to the United States forty years ago and is currently the Dean of Arts and Sciences at Western New England University. He has published several research papers and three editions of a book all in areas of Probability and Stochastic Processes. In addition, he has always had a passion for poetry, and has published sixteen papers analyzing the poems of Persian classical and contemporary poets. One of his major works, *Mathematical Outlook in the Poetry of Hafez*, has been well-received in the literary circles, both in Iran and in the United States. A few years ago, he gave a talk about that work at the Bridges Meeting in Towson, Maryland. <http://mars.wne.edu/~sghahram/>

Forough Farrokhzād (1935-1967) is one of the greatest poets in the long history of Persian poetry. Born in Tehran, she was the third of seven children. After completing her ninth grade, she was sent to an all-girl school to study painting and sewing. Forough married at sixteen, became a mother at seventeen and divorced at nineteen. That was the first socially unacceptable act of her life. She lived as if she knew that her time on earth will be short and she had to play life on fast-forward. The boy Forough bore from her marriage was her only biological child, but she later adopted a boy from a leper colony outside the city of Tabriz, where she was making a documentary. Love and art, especially poetry, were inextricably woven into the fabric of Forough's life. She started writing during her marriage and continued through the series of love affairs that followed. The core of her poetry focuses on the experience of being a woman in Iran. She courageously trespassed boundaries and in a most eloquent and elegant way demanded from life both personal freedom and sensual gratification. She was the first Persian poet to write poems in colloquial, and the only poet in Iran to deal with sexual love explicitly. Forough died at age 32, when her car swerved to avoid collision with a school bus. Here are excerpts from Forough's conversations with the media and the poem by Forough I had read at the Bridges Coimbra poetry reading:

In Forough's own words:

"Poetry for me is like a window that opens up by itself whenever I turn to it. I sit there, I look, I sing, I shout, I cry, I mix with the images of the trees, and I know that on the other side of the window there is a space, and someone hears – someone who could exist two hundred years from now or three hundred years ago – it makes no difference, it is a means for communicating with being, with existence in its full meaning."

"I write poems because I need to. For me poetry is a need higher than the order of eating and sleeping, something akin to breathing. I mean that this need is something absolutely essential for me. I do not say it in the common lexical usage as when you ask someone, "Why did you buy a car?" and he says, "Because I needed it." Poetry has spread in me. There was a time when I viewed this phenomenon, along with other things, as an abstract thing and outside of myself. Now it has been a while that it has permeated me, that is to say, it has conquered me, and I am never apart from poetry...There was a time when I thought of my poetry as a hobby and a form of entertainment. When I'd get through chopping greens, I'd scratch the back of my ear and say 'Well, let me go and write a poem.' Later there was a time that I felt if I wrote a poem something would be added to me. And now it is some time that every time I write a poem I feel something is subtracted from me. I mean I carve something out of myself and hand it to others...Poetry for me consists of words living inside me – and the writing out of these words on paper in a living form. So one must avoid any kind of lapse or lack of motion or silence that causes the words to become lifeless. Suddenly you see that just as you are turning inward, the words, like ants coming out of their hole on a sunny day, come out one after another and line up with a logical order. This order of words, if at that same instant they could express your mental intent, will undoubtedly become a poem. This is how I write poems now. For some time now I don't go searching for words. Rather, I wait for words to find their own place, to come into existence. Then I invite them to an order, to a kind of harmony."

Saeed Ghahramani

Someone Who Is Not Like Anyone

by Forough Farrokhzād

I've had a dream that someone is coming.
I've dreamt of a red star,
and my eyelids keep twitching
and my shoes keep lining up together,
and may I go blind if I'm lying about this.
I've dreamt of that red star when I wasn't asleep.
Someone is coming,
someone is coming,
someone else
someone better
someone who is not like anyone,
not like Father,
not like Ensi,
not like Yahyâ,
not like Mother,
but is just like the person he ought to be.
And he is taller than the trees of the overseer's house,
and his face is brighter than the face of the Imam of the Age,
and he's not afraid even of Sayyed Javâd's brother
who has gone and put on a police uniform.
And he's not afraid even of Sayyed Javâd himself
who owns all the rooms in our house.
And his name,
just like Mother calls him at the beginning and at the end of prayers, is
O Judge of Judges!
O Fulfiller of Needs!
And with his eyes closed
he can recite all the hard words in the third grade book,
and he can even subtract one thousand from twenty million
without coming up short.
And he can buy on credit however much he needs
from Sayyed Javâd's store.
And he can do something
so that the neon Allâh sign which was green, as green as dawn,
will shine again in the sky above Meftâhiyân Mosque.

O...how nice bright light is,
how nice the light is,
and I want so much for Yahyâ to have a cart and a small lantern,

Saeed Ghahramani

and how I want to sit on Yahyâ's cart
in the middle of honeydew melons and watermelons
and ride around Mohammadiyeh Square.
O...how fun it is to ride around the square,
how fun it is to sleep on the roof,
how fun going to City Park is,
how good the taste of Pepsi is,
how good Fardin's movies are,
and how I like all good things.
And how I'd like to pull Sayyed Javâd' daughter's hair.

Why am I so small that I can get lost on the streets?
Why doesn't Father
who isn't so small
and who doesn't get lost in the streets
do something so that the person
in my dreams will speed up his arrival?
And the people in the slaughter-house neighborhood
where even the earth in their gardens is bloody
and even the water in their courtyard pools is bloody
and even their shoe soles are bloody,
why don't they do something?
Why don't they do anything?

How lazy the winter sunshine is.

I've swept the stairs to the roof
and I've washed the windows too.
How come Father has to dream only in his sleep?

I've swept the stairs to the roof
and I've washed the windows too.

Someone is coming,
someone is coming,
someone who in his heart is with us,
in his breathing is with us,
in his voice is with us,

someone whose coming can't be stopped and handcuffed and thrown in jail,
someone who's hidden under Yahyâ's old clothes,
and day by day grows bigger and bigger,
someone from the rain,

Saeed Ghahramani

from the sound of pouring rain,
from within the whispering of petunias.

Someone is coming from the sky
above Artillery Square on the night of the fireworks,
and he'll spread out the table cloth
and divide up the bread
and pass out the Pepsis
and divide up City Park
and pass out the whooping cough syrup
and pass out the slips on registration day
and give everybody hospital waiting room numbers
and distribute the rubber boots
and pass out Fardin movie tickets
and give away Sayyed Javâd's daughter's dresses
and give away whatever hasn't sold
and even give us our share.
I've had a dream . . .

Translated from the Persian by Michael Craig Hillmann

Note: A LONELY WOMAN: Forugh Farrokhzâd and Her Poetry, by Michael C. Hillmann (Three Continent Press and Mage Publishers, Washington, DC, 1987) is a source for this, and more, information on Forough and her poetry. Forough's poem in Persian, Someone Who Is Not Like Anyone, was originally published in Ârash Magazine, 1966.

JoAnne Growney



During her first career as a mathematics professor at Pennsylvania's Bloomsburg University, JoAnne Growney brought the arts, particularly poetry, into her classroom. Now she devotes her time to writing. Her recent poetry collections include *Red Has No Reason* (Plain View Press, 2010) and *My Dance Is Mathematics* (Paper Kite Press, 2006). Also she is author of several articles connecting poetry with mathematics and she produces a blog entitled *Intersections — Poetry with Mathematics*; links to these various resources are available at <http://joannegrowney.com/>. Additional activities include translations of Romanian poets and collaborative projects with visual artists, poets and mathematicians. In her current hometown of Silver Spring, MD JoAnne teaches an ongoing poetry workshop for mental health clients. With her pad and pen she roams about—seeking and constructing new poems.

Girl-Talk

*Remembering Toni Carroll (1942-2012) – mathematician,
computer scientist, humanitarian, activist, and friend.*

When two math-friends visit
the Baltimore Art Museum, on a day
when no non-maths are lurking nearby,
we may – with no fear of harming –
chatter our mathishness.

When we pass
Max Bill's *Endless Ribbon*
one of us may remark that the Möbius strip
is a math notion peculiarly popular
among non-mathematicians.

As we walk past tiled walls,
you can expect one of us to want
a photo of the mosaic pattern that shows so well
the symmetries of the square, a friendly group
one meets early in abstract algebra.

Both of us fight envy
of the Cone sisters who knew Gertrude Stein
and Matisse and Picasso. And one of us wonders
why some need two names while others
find fame with only one.

Michael Heizer's title,
Eight-part Circle, draws us outside.
Instead of a fragile curve, however, we find
a gathering of granite wedges –
"Eight parts of a disk."

My friend is smart and kind.
She tells me to relax my mathishness
and give the artists poetic license. Only Humpty
Dumpty
and other mathematicians want narrow,
exacting limits on what words mean.

JoAnne Growney

With Reason: A Portrait

Sophia Kovalevsky (1850-1891)

Because she was Russian . . .

Because she had abundant curly hair . . .

Because she loved mathematics . . .

Because she was born in the 19th century . . .

Because lecture notes for calculus papered her nursery walls . . .

Because her parents forbade her to leave home . . .

Because her sister died . . .

Because a woman could not travel abroad from Russia without her father or a husband . . .

Because ideas came to her in torrents . . .

Because she married a man she did not love . . .

Because her mind was powerful . . .

Because her passion was mathematics . . .

Because her mentor was Karl Weierstrass . . .

Because she extended Cauchy's theorem for partial differential equations . . .

Because she could not care for her daughter when exhausted by mathematics . . .

Because she investigated the refraction of light . . .

Because she knew Saturn's rings are unstable . . .

Because she understood fixed points completely . . .

Because she struggled with happiness . . .

Because she went to Sweden and the Northern Lights . . .

Because she was the first woman professor at a European University . . .

Because she wrote novels and a memoir . . .

Because her paper on the Rotation of a Solid Body about a Fixed Point won the Bordin Prize . . .

Because she continued Abel's quest to express Abelian integrals using elliptic functions . . .

Because her colleagues were not women . . .

Because she dreamed mathematics even in a lover's arms . . .

Because a poet wrote "To her whose star shines bright" . . .

Because she caught influenza, complicated by pneumonia,

at age 41 Sophia Kovalevsky died.

Author's Note: Russian names have masculine and feminine forms -- and the commonly used spelling "Kovalevsky" has a masculine ending. In Russia, Sophia's surname is "Kovalevskaya."

Philip Holmes



Philip Holmes is professor of applied and computational mathematics and mechanical and aerospace engineering and a member of the Neuroscience Institute at Princeton University. He studied engineering at Oxford and Southampton Universities, UK, and taught at Cornell 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*—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/>

Minding One's Business

I think I know that brain creates the mind;
but why is this so hard to see? Lips brush
and leave a taste encoded, or a touch.
Spikes fly from head to toe; we feel the
clutch of signals taken up, released:
a world of sense and memory from which
all action springs. But here's the scruple:
Is correlation cause? And where am I?

If not bound by muscle, then by nerve:
we've come to learn this much. Our bodies
hold the present in their pasts, afford a grasp
against the day's assault, the waste of light.
Yet it's provisional; the models slide away:
so many words to spare, yet none to mind.

Philip Holmes

Fractions From the Still

Beads form on the cooled glass and gather:
tracks leading out, words spoken or not,
listened for breathlessly, cracking apart:
an embrace that led here but no further.

A circle of gifts, a walk before night,
gestures rehearsed and sheltered by darkness,
passing away leaving scarcely a trace,
here at the table, under the light.

I'm one to make lists, who wants to know
where we're headed, when it's only the faults
and absences, collisions of chance
that brought us this far, and might lead us on.

What's not fixed will vanish in bright air;
what didn't happen is also what we are.

Geof Huth



Geof Huth's poetry consists of one-word poems, poems written in unintelligible scripts, poems painted onto canvas or assembled within boxes, poems spoken or sung and audio or video recorded during the moments of their creation, poems created within nature and left to disappear back into it, and even syntactic text separated into lines. His mathematical poems are usually visual and algebraic in construction. He writes about poetry in various venues, including his blog, *dbqp: visualizing poetics*, <http://dbqp.blogspot.com/>. His most recent book, *Aution Caution* (Redfoxpress, 2011), consists of a set of manipulated photo-poems. A previous book, *ntst: the collected pwoermds of geof huth* (If p then q, 2010), is a collection of 775 one-word poems.

231. Innumerable Thoughts

—to JoAnne Growney

in a number
of ways
I am
1

in the least
of ways
I am
0

in the manner
of the expression
I am found out:

$$1 * 50 * 365 + 8 + 231 = 18,489$$

I move toward ∞
but never to
it or even close

(I won a bet
that some words
were numbers too
for I ate many
at breakfast.)

$$18,489 - \text{whatever I've forgotten} \div \text{whatever I've made up} \approx 49\pm$$

Geof Huth

a Pentecost
of memories
(but not
quite 50, so
not quite me)

Life
and poems
are made
out of
counting

the pieces
the lines
the digits
the spaces

I saw
since
a child
myself
as

1 body
1 head
1 nose
(but 2
nostrils)
1 mouth
1 penis
(apologies)
2 eyes
2 ears
2 arms
2 hands
2 legs
2 feet
10 fingers
10 toes

that's about
as detailed
as a body

might be
broken down
for the pur-

poses of
counting
and making

sure each
piece was
in place

I might
be \leq well

but I am
 \geq productive

I am
wandering
here

in these
words
to you

I am
thinking
not through

but around
a few
thoughts

in the
vicinity
of insight

so I must
admit
to you

Geof Huth

that this
letter
≠ a poem

even though
I mean it
to be

for
a poem
without numbers

is a poem
without
meter

or meaning
or structure
or the lack

of structure
that the best
poems have

by being
completely
controlled

by an
unnamed
source

such as
how I am
always 1

Geof Huth

1234567898

1234567898

23456789987

3456789 9876

456789 98765

56789 987654

6789 9876543

789 98765432

89 987654321

999999999

88888888

7777777

666666

55555

4444

333

22

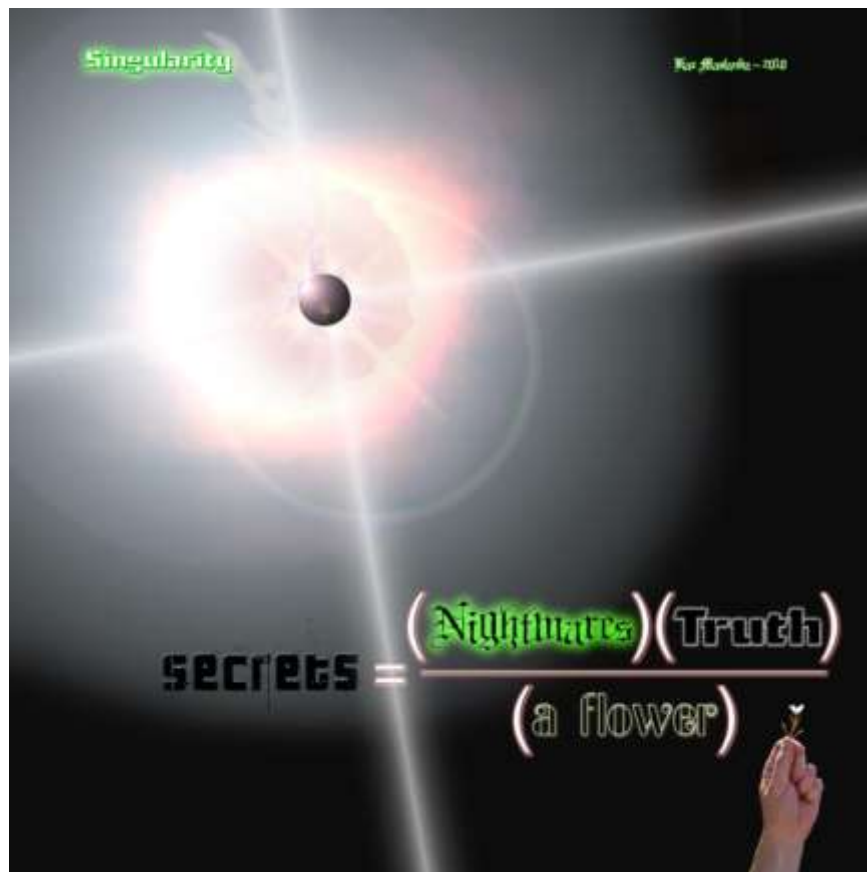
1

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 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.

Singularity



Kaz Maslanka

The Monastic Path



Deanna Nikaido



Deanna Nikaido is a graduate from Art Center College of Design Pasadena, CA 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. Deanna is currently a poetry/publishing coach and design specialist for Bookinday (BID) a non-profit, educational services company that fosters literacy skills, teaching students the fundamentals of creative writing through poetry and student-run publication. She is a regional coordinator for Poetry Out Loud Maryland, and sits on the board of Artblocks. <http://www.deannanikaido.com/index.html>

Solving Light

Show me a sign
that factors fear agreeably
over the denominator of my discomfort
so I reduce proportionately
all the weight
that keeps me from solving
this light bearing equation
called love.

Deanna Nikaido

Love By Numbers

Less Than One

The Art of the Infinite

The Theory of Everything

Jungles of Randomness

The Mystery of the Aleph

books she's never read

maybe it's because

she was never good at math

that the intrigue of loving someone who was

made flames she would go up in

a love by numbers

the way children connect dots

obeying the order of outcomes

their predictable formulas

a love of loving numbers so intense

that love itself becomes

the function

the constant

its variable

and all remainder

Stephanie Strickland



Stephanie Strickland is a print and hypermedia poet who studied mathematics at Harvard and enjoys reading (mostly about) it still. Her sixth book, *Zone : Zero* (book + CD), includes the interactive digital poem, *slippingglimpse*, in which text is mapped to strange attractors of so-called 'chreod' wave patterns in Paul Ryan's videos. Other digital work includes *V: Vniverse*, *Ballad of Sand and Harry Soot*, and a poetry generator written with Nick Montfort, *Sea and Spar Between*. Her next volume of print poetry, *Dragon Logic*, is forthcoming from Ahsahta Press in 2013. Her essays appear in *Leonardo Electronic Almanac*, *ebr*, *Isotope*, and elsewhere. A member of the Board of Directors of the Electronic Literature Organization, she edited the first volume of the *Electronic Literature Collection* with Kate Hayles, Nick Montfort, and Scott Rettberg. <http://stephaniestrackland.com/>

33 Symmetry Axes x 40 Orthogonal Triples; or, Free Will, Revisited

Are you kidding? Quarks, too, can choose?

Conway and Kochen, old dragons, well
vetted, claim—no—prove, if given a free hand to choose

their gear direction while quizzing quarks with questions,
taking their measure, then, too, whim-

driven & not determined, a particle's response. To be
precise—*the universe's response near* the particle un-
determined by the Whole prior history of World Time & Space.

In fairness, it's the theory's 'strong'
(min, spin, twin) form—could they claim more?

Imagine haranguing electrons,
just say no—

Imagine addressing zoomers *sans* apparatus. Up and at it,

again, are you, pairs of them grumble, maybe even hiss;
gauging us, too, in their stinging way.

Stephanie Strickland

Grothendieck

Grothendieck
sees everything globally from the beginning Hironaka
said *no coordinates no*
equations

roller coasters have no sudden on
a dime
change of direction however steep
no cusp
no crossing through themselves—

their shadows do : sharp projections of the smooth

pulling back
to the smooth
from tangle local
tumult disappears : only *global* lift
left

inside the crush cross point so multifarious—a many nenny
whorled

blow it up (gentle difficult
balloon work) make it
smooth

Amy Uyematsu



Amy Uyematsu is a sansei (3rd-generation Japanese American) from Los Angeles. She taught high school mathematics for over 30 years. During that time she also published three volumes of poetry: *30 Miles from J-Town* (1992), *Nights of Fire, Nights of Rain* (1998), and *Stone Bow Prayer* (2005). Amy is the winner of the 1992 Nicholas Roerich Poetry Prize. Her work has been published in many journals and anthologies and she was featured in "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*. <http://www.poetryfoundation.org/bio/amy-uyematsu>

Möbius Strip

A continuous one-sided surface that can be formed from a rectangular strip by rotating one end 180° and attaching it to the other end.
— American Heritage Dictionary

There's no way to know where I start. Or end.
What appears to be outside & so obviously
true is a trick, curving like a slow-moving figure eight
that somehow turns inside out. I can try
to force things apart – but at great personal risk,
for I'll sever myself in two, clean through the heart,
or hurl & spin out to the blue
only to boomerang right back.

Foolishly, I think myself closer to the basic secret
when I find something far too revealing, that demanding
voice I want no one to hear but me
as I reach further down, pull a gasp clean through –
all the way up from my toes
to my belly & throat – an ache
so real I can hardly breathe.

But I won't stop unfurling – not when a seductive turf
tempers and ripples before me. Then in a wink
I've vaulted away – only to find myself chasing
along my edges again, as I grope
for any tear in the surface, finger the air
for some invisible thread, come so near
as a hair's breadth from this riddle
with my name – born in a simple half-twist,
waving me in.

Amy Uyematsu

Infinity to the Nth Power

Then again, a very different sort of infinity may well be freewheeling you.
—Natalie Angier, *The Life of Pi, and Other Infinities*

Impossible to grasp yet I'm sure it exists,
sure as the fact that I won't be around by 2047—
which would make me a century old —
and my little grandsons close to middle age.
I know about infinity whenever I admire a passion flower,
feel myself pulled into its oddly perfect symmetry.
Or ponder snowflakes, shooting stars and soap bubbles.
Scientists tell us there are different kinds of infinities —
some are flat, others hunchback, inflating, explosive.
Mathematicians are the real jokesters when it comes
to playing with the mind — how counting from 1 to forever
is somehow smaller than the set of all values
between 1 and 2, or as I used to ask my students,
take half of a half of a half and never stop.
Some notions of the infinite can rattle the nerves —
like the possibility there are many earths
and someone exactly like you or me
with a totally opposite or identical life,
or there are galaxies of multiplying gods,
even planets that will never be at war.
And what about time? These last hours I count
in my brief life — the way grief can make time endless
and delight mere seconds which tickle and tease us
in unending supply. Old Man Pythagoras
was insecure about the whole matter —
deeming the finite masculine and good,
while infinity was feminine — both had to be
subjugated — as if either could.
I rather like being a woman who tries
to embrace the ever emerging infinite, especially
when it comes to love and my own unfolding
of wonder after wonder.

Note: Möbius Strip was first published in Corridors.

**For interested readers,
additional anthologies of poetry of mathematics and the sciences:**

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

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

Verse & Universe: Poems about Science and Mathematics, ed. Kurt Brown, Milkweed Editions, Minneapolis, MN, 1998.

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

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

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

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

