

# Using Mathematics to Make Poetry

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## Abstract

Guided by an experienced teacher, this Bridges workshop invites experiments with word-arrangements using mathematical forms and strategies—encouraging formation of patterns that become poems. Some activities involve altering prior texts using mathematical operations while others create new texts with patterns of number or geometry. Participants need no prior experience in poetry writing — writers and non-writers alike will be encouraged to play with language; moreover, teachers seeking to combine mathematical ideas with poetry in their classrooms will find useful possibilities here. Connections to mathematical topics (such as permutations and the Catalan numbers) will be included; however, the primary goal of this workshop is to give participants experiential awareness of ways that mathematical concepts and structures can influence the beauty and effectiveness of words.

## Workshop Activities – Background Information

As with mathematics, poetic discovery may begin with experimental mixing of symbols and ideas—both new and old—in an effort to discover truth and to say it in a fresh and meaningful way.

The discoverer of Vitamin C was Hungarian biochemist Albert Szent-Gyorgyi -- who won the 1937 Nobel Prize for Medicine. Szent-Gyorgi offered this summary of the creative process: *discovery* is seeing what everyone has seen and thinking what no-one else has thought. Poets and visual artists join mathematicians and research scientists in that quest to see and say something new. The way that one thought leads to new thoughts and on to a big idea is nicely illustrated in this little poem, "The Roasted Swan Sings," by Mark Baechtel. [5], [14]:

### The Roasted Swan Sings

*after the Carmina Burana*

The arrow in its flight  
becomes the turning spit;  
the axis of the world  
if we but thought of it.

This workshop will offer participants strategies for turning word-play into poems, applying mathematical techniques “to discover what no one else has thought.” These are the sorts of activities we will engage in together:

1. Create a poem by substituting new nouns into an existing poem. For example, replace each noun in Robert Frost’s “Fire and Ice” [3] with a noun 7 words later in a particular dictionary; here are the first two lines of Frost’s poem and a new version of these lines:

Some say the world will end in fire  
Some say in ice.

Some say the wound will end in ire,  
Some say in lice.

2. Permute the nouns of an existing stanza to form a new stanza. For example, in the first three lines of Carl Sandburg's "Precious Moments" [15] we can interchange each odd-numbered noun (counting from the beginning) with the even-numbered noun following it to obtain:

Bright vocabularies are transient as rainbows	Bright rainbows are transient as vocabularies
Speech requires blood and air to make it	Blood requires speech and work to make it
Before the word comes off at the end of the tongue,	Before the air comes off at the tongue of the end,

3. Build words into geometric shapes:

Here is a syllable-based triangle:

one  
 added  
 forever  
 joined by zero,  
 matched with opposites—  
 these are the integers.

And a letter-based triangle:

I  
 am  
 one  
 when  
 sleep  
 seizes,  
 several  
 whenever  
 wide-awake.

A syllable-square:

Any flat map  
 we draw we may  
 color with four  
 colors only.

And a letter-square:

SAFE  
 AREA  
 FEAR  
 EARN

4. Create a portrait – of yourself or a close associate, of your childhood home, of a scene or event -- using numbers. Or start with a particular number important in your life and create a list of the ways in which it matters to you. Or take a number and tell the significance of each of its digits; for example, with  $\sqrt{2} \approx 1.41421 \dots$  we might begin thus:

1 is the number of me, when I am entire.  
 .  
 4 is the number of my children,  
 1 is the number of books I can read at a time,  
 4 is the corners of a rectangle,  
 2 is the chairs on my porch,  
 1 is how many calluses I have from holding a pencil too tight.  
 . . .

5. Describe the "personality" of a mathematical object; for example, we have from Guillevic [8] these opening lines for "Acute Angle":

Failing to make it as a circle	One can always become an angle.
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Each distinct mathematical attribute adds a different quality to the poem in which it is used. The poet's task is to find not only good words but a form that enables best expression.

### Historical Note

Many clever strategies used to create poems were first devised by the OULIPO (*Ouvroir de Littérature Potentielle* -- roughly "Workshop of Potential Literature"), founded in France in the 1960s by a group of writers and mathematicians. Ongoing (with new members) in 21<sup>st</sup> century, the OULIPO group continues to meet and to invent procedures for creating new literature. (See [9] and [11].)

### References and Further Reading

References [1] and [5] offer background for some mathematical topics that may be involved in structuring and classifying poems – topics such as partitions and permutations and (for counting rhyme schemes) the Catalan and Bell numbers.

- [1] Marcia Birken & Anne C. Coon, *Discovering Patterns in Mathematics and Poetry* (Editions Rodopi, 2008).
- [2] Dominique Fitzpatrick-O'Dinn, *Table of Forms*, <http://www.spinelessbooks.com/table/tableofforms.html> (accessed 15 February 2011).
- [3] Robert Frost, *The Poetry of Robert Frost: The Collected Poems*, (Holt, 1979).
- [4] Sarah Glaz & JoAnne Growney, Eds., *Strange Attractors: Poems of Love and Mathematics* (A K Peters, 2008).
- [5] JoAnne Growney, Blog, "Intersections – Poetry with Mathematics," <http://poetrywithmathematics.blogspot.com> (accessed 15 February 2011)
- [6] JoAnne Growney, "Mathematics with Poetry," *JOMA* (October, 1962), <http://mathdl.maa.org/mathDL/4/?pa=content&sa=viewDocument&nodeId=1262> (accessed 15 February 2011).
- [7] JoAnne Growney, Webpage, "Poetry, Mathematics, Art, Translation," <http://joannegrowney.com> (accessed 15 February 2011).
- [8] Guillevic, *Geometries*, Englished by Richard Sieburth (Ugly Duckling Presse, 2010).
- [9] Harry Mathews & Alastair Brotchie, Eds., *Oulipo Compendium, Revised Edition* (Atlas Press, London, 2005).
- [10] Mathemetrics Spree, <http://poetry.about.com/library/weekly/aa062602a.htm> (accessed 15 February 2011).
- [11] Warren F. Motte, Jr. *OULIPO: A Primer of Potential Literature* (University of Nebraska, 1986).
- [12] Permutations Generator, <http://users.telenet.be/vdmoortel/dirk/Maths/permutations.html> (accessed 15 February 2011).
- [13] *plus* magazine, <http://plus.maths.org/content/> (accessed 15 February 2011).
- [14] J.W.Potter, D. Rieves, G. Stein, Eds., *Cabin Fever* (The Word Works, 2003).
- [15] Carl Sandburg, *The Complete Poems of Carl Sandburg: Revised and Expanded Edition* (Houghton Mifflin Harcourt, 2003).