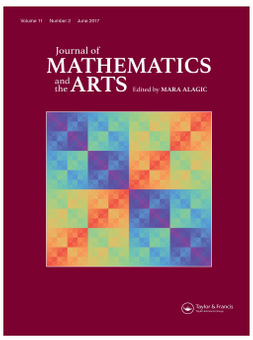

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Ode to numbers: poems by Sarah Glaz, by Sarah Glaz

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BOOK REVIEW

Ode to numbers: poems by Sarah Glaz, by Sarah Glaz, Simsbury, Connecticut, Antrim House, 2017, 112 pp., US $19.00 (softcover), ISBN-13: 978-1-943826-40-7

I choose a place
  according to the quality
                of light
– from "Luminy Light"

How do we choose our pursuits, our passions? And what if two apparently mutually exclusive vocations pull us in opposite directions? These questions infuse Sarah Glaz's new volume of poetry, *Ode to Numbers*, with a delicate tension and restless seeking. Although this is Glaz's first published volume of poetry, her work has appeared in a variety of sources, and she has been at the heart of a vibrant scene of mathematical poetry for years [2,3,4]. *Ode to Numbers* demonstrates why. Thoughtfully arranged as a sort of impressionistic autobiography, the pieces in this collection investigate personal exploration, professional triumph, travel, mathematics history and familial heartbreak. A specialist in the theory of commutative rings [5], Glaz examines these diverse topics through a broad mathematical lens. She accomplishes a dazzling, twofold feat of poetic paradox: her poems explicitly about mathematics are imbued with an emotional depth that may surprise readers expecting dry math history, while her more personal poems feature mathematical metaphors which bring the emotional core of the poem into sharp focus. The mathematical is personal; the personal is mathematical.

Broadly, mathematical poetry can be divided into three categories: poems with structure somehow prescribed by mathematics, poems which are literally about mathematics and poems which use mathematical imagery or metaphors to portray topics not explicitly mathematical [1]. *Ode to Numbers* features all three. Among the examples from the first category is '$\sqrt{2} = 1.41421\ldots\ldots$,' in which the number of lines per stanza is dictated by the digits of the decimal representation of the square root of two. 'On the Way to New Jersey in Winter of 2000' is a Fibonacci sequence poem, beginning with the lines

I
look
out of
the window
of the slow moving
train to catch the unexpected.

and continuing such that each line's syllable count is equal to the corresponding Fibonacci number. '13 January 2009' is an example of a 'prime number poem' in which words are repeated according to the Fundamental Theorem of Arithmetic in a way that is challenging and irresistible [2]. Glaz's mathematically structured poems are inviting examples of form which can provide welcoming entrées to writers itching to compose mathematical poetry for the first time.

Ode to Numbers also includes many poems literally describing mathematical topics. These include the beliefs of Pythagoras, the irrationality of the square root of two, negative numbers, the death of Euclid, the fundamental theorem of arithmetic, the early history of calculus, the number *e* and Goedel's incompleteness theorems. Instructors of classes ranging from middle

school algebra through advanced logic could enhance their courses by incorporating some of these mathematically rich poems. The lengthy 'Calculus' and 'The Enigmatic Number *e*' breathe life into a subject (first-semester calculus) that can be experienced as dry and colourless by the novice student. Students can actually learn mathematics from 'The Enigmatic Number *e*,' including Euler's infinite series formulation of *e* and Bernoulli's limit definition of *e*.

But the majority of poems in *Ode to Numbers* are of the third category: the book largely consists of rhetorically narrative poems which use mathematics to illuminate various seasons in the poet's life. Even throughout the section of poems explicitly about mathematics, Glaz drops hints of personal transformation. Goedel's incompleteness theorems produced a mathematical crisis which forced mathematicians to accept certain limitations of our discipline. Glaz's desperate hope surrounding these limitations – 'We prayed that this was not the end of the road – / that there was more of it to travel.' – foreshadows the personal crises of identity that will be explored in later poems. Tellingly, the final poem in *Ode to Number's* section of explicitly mathematical poems is 'Hardy.' The poem is ripe with the pregnant repetition of the phrase 'used to be,' deftly implying that the poet has changed – she no longer finds the same meaning in mathematics: 'It used to be mathematics once – / both quest and goal – / the only place of rest my mind had known.' This gradual shift from mathematical thinking to poetic thinking is reminiscent of the sorites paradox, an exploration of which can be found in Alice Major's poem 'Sand reckoning: Eubulides' paradox' [7].

True to the approximately chronological autobiography of *Ode to Numbers*, Glaz recalls her youth in Europe over the collection's first few poems. The opening lines of the book's first poem, 'Close to the Origin,' are indicative of the tone of these poems: 'The day stretches its lazy golden arms / interminably long and elegant / like x and y axes.' She evokes the open space, the opportunity of childhood, from the vantage of an adult who understands that youth's greatest resource is the interminable length of days – a length that perhaps felt more like an annoyance at the time. This axis metaphor illustrates her conception of time as a child. The explicit role of mathematics in familial heartbreak is introduced in 'Love Story' – a theme that will later recur to profound effect.

The middle of *Ode to Numbers* depicts a mathematician in the prime of her career, at the height of her mathematical powers. Glaz is our guide on an exhilarating ride through the process of actually doing mathematics – searching out new mathematical questions ('A Woman in Love'), finding and nurturing a new mathematical obsession (mathematical creativity is framed as a type of fertility in 'A New Research Project'), and the glory of what the mathematician sees upon reaching her goal. In 'The Journey,' she marvels at the wildflowers metaphorically adorning the clearing of her mathematical discovery: 'blue is for lemmas, orange for corollaries, / red is for propositions, pink for remarks, / and purples – saved for theorems – crisscross the field.' It is a beautiful, synesthetic depiction of mathematics. The poem also captures the restlessness that moves the soul of a mathematician; the work is never really done. Describing the 'majestic and somewhat sinister' trees which 'sway and murmur of dark secrets,' Glaz writes:

> And silently, when you acknowledge
> you have exhausted all present resources,
> know each blade of grass and every bloom
> as intimately as you know your lover's skin,
> they lure you with the promise of a quest –
> to venture forth into the dense shadows once again.

In this visceral sequence of poems describing her mathematical journey, Glaz has strikingly chosen to place a great professional triumph (depicted in 'Commutative Coherent Rings')

near the beginning of the story. This choice facilitates an unflinching examination of what can follow success – distraction ('In My Study'), disappointment ('Mathematical Models of Rejection') and failure ('I Climbed the Himalayas'). But glimmers of hope are sprinkled throughout – via poetry. The urge towards poetry grows as mathematics perhaps loses just a bit of its luster. When Glaz writes in 'No Matter What I Do' 'My garden is neglected; / I grow poems instead.' We feel the painful process of transformation that lies at the heart of *Ode to Numbers*. Eventually she fully embraces her poet self, but not without a bit of self-flagellation in 'Late Arrival' where she laments the 'the faded hieroglyphics of ambition' (an evocative description that will rattle any mathematician who has ever gone back to review a long-abandoned project). This transformation exacts another great toll on the poet. The father she had so achingly implored in 'Love Story' is rebuked in 'Man among Men:'

Father – this is not for me –
fight your own battles –
I cannot become the son
you never had
and always wanted.

In 'Eventually It Arrives,' the poet wearily turns away from her struggles with these imagined brothers (who are equipped with the father's climbing gear for the ascent) and concludes:

Your daughter hand-over-hand
claws her way up the hill
through thorny bramble
and jagged rock
slow and alone
unaided by you.

Her backpack holds theorems.
That is how it is.

This is paradoxically and simultaneously an exhausted shrug and an empowered liberation. 'Eventually It Arrives' may also allegorically reflect obstacles faced by female mathematicians in a field historically dominated by men. And a sense of divided consciousness is never too distant; 'Tallahassee, 2004: Puzzles' asks 'If I were not divided / who would I be?' in a manner reminiscent of JoAnne Growney's poem 'Which Girl Am I?' [6].

Retrospection becomes the focus of the book's final five poems, collected under the heading 'Euclid' 5th Postulate.' That postulate's language, its 'straight line falling on two straight lines' and tantalizing promise of a meeting – but only 'if produced indefinitely' – suggests mysterious connections that a poet cannot help but be drawn to. The postulate pledges a destined intersection, but the Byzantine curlicues of its traditional translation make us wonder: what other forces are compelled to intersect? Glaz offers several dichotomous answers. Health and sickness intersect in 'Forward to Beginning:'

The difference between
a polyp and a tumor
is like the difference
between a polynomial
and a continuous function.

Opportunity and restriction intersect as we age, but 'Doors' slyly suggests that they have been the same thing all along. The past and present intersect at the origin of *now* in *Ode to Number's* final poem 'Reflection about the *t*-axis,' which employs a mathematically satisfying typographical chiasmus. The reappearance of axes in the final poem is a poignant circularity

alluding back to *Ode to Number's* first poem: in early life, an axis represents the 'interminably long' reach of time, but much later in life an axis serves as an immutable division between our lengthening past and our shortening future.

While many of *Ode to Number's* closing poems explore the kinds of long-anticipated intersections promised by Euclid's Fifth, a few do quite the opposite. The great convergence of mathematics and poetry, explored so deeply throughout the book, becomes a divergence in the poem 'Euclid's 5th Postulate.' The poet admits 'Today I only drive the engine of words, and it is / getting harder to watch neglected numbers jump /over tracks and barriers like wooly sheep.' With a touch of remorse, she laments that 'The other train is lost for good deep in the woods, / a sorry wreck abandoned where the tracks converged.' In 'Love Story' (much earlier in the collection), the poet had asked 'Father, do you love your little girl?' and 'Father, is it algebra / you wish for supper, / or higher mathematics?' and 'How long can one wait?' The answer? 'A lifetime if necessary.' This earlier poem casts the poet's discomfort at abandoning mathematics into devastating relief.

'Euclid's 5th Postulate' is not the only place where Glaz laments the choice of poetry over mathematics. But perhaps the intermingling of these two highly abstract disciplines was, for her, inevitable. To choose mathematics, or poetry, or both, is to choose a lifetime of searching, always chasing those few moments when everything falls into place like magic. *Ode to Numbers* abounds in such magical moments. Sarah Glaz considers the possibility that maybe we are not merely the sum of every previous decision we have made about our identities – maybe a truer self is defined by the forking paths of change we choose to follow. Her exploration of this personal unknown is life-affirming and bold.

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