

Joining “the mathematician’s delirium to the poet’s logic”: Constrained Writing and Interdisciplinary Teaching in the Canisius College All-College Honors Program

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Abstract

This paper describes our team-taught interdisciplinary mathematics and literature course, which invited students to consider Raymond Queneau’s challenge: “Why shouldn’t one demand a certain effort on the reader’s part? Everything is always explained to him. He must eventually tire of being treated with such contempt.” We studied works by Perec, Berge, Queneau, Stoppard, Robbe-Grillet, Borges, and Calvino, among others, choosing texts where mathematical concepts are subjects or structuring elements of the literature, and ideally both. From a literary critical perspective, the course highlights the play of language rather than the primacy of meaning. The work of our students demonstrates best the nature of the course as well as the understanding and joy the students got from it, and thus we quote extensively from their writing. Overall, the course was enjoyable and productive for both students and its professors: the students learned; we learned, both from each other and from the students; and a good time was had by all.

When interdisciplinary course proposals were solicited by the All-College Honors Program at our college, we imagined it would be both enjoyable and productive to introduce students to a wide range of mathematical concepts

with applications to and overlap with literary constructs. From the students¹, we hoped for active engagement with the challenges of unfamiliar textual structure, encouraging them to take seriously (but not too seriously) Raymond Queneau's challenge: "Why shouldn't one demand a certain effort on the reader's part? Everything is always explained to him. He must eventually tire of being treated with such contempt." Primarily juniors and seniors from a wide range of majors, our students were stunned and amazed by these possibilities; the course is popular and well-regarded for the unexpected insights and convergences we highlight.

The first thing we want to communicate to our students is that mathematics and literature interact in wonderfully weird and humorous ways. As co-instructors, we find these texts exciting, and we are delighted and intrigued by the play of language we each discover through our different disciplinary lenses. Our own personal enjoyment is key for our teaching in the context of the All-College Honors Program. The course counts as fulfillment of both a literature and a mathematics seminar; generally, the program is heavy on humanities and short on mathematics. So, for students who do not feel particularly math-inclined, they imagine the course as a way to take their medicine with a dose of literary sugar. This, of course, works in reverse for the math-inclined students for whom another literature class is a necessary evil. Either way, they imagine killing two birds with one stone. Rather, we encourage them to laugh at the same jokes in two ways.

When selecting materials, we choose texts where mathematical concepts are subjects or structuring elements of the literature, and ideally both. From a literary critical perspective, the course highlights the play of language rather than the primacy of meaning.² With the focus on mathematics as

¹We would like to thank the following students who gave us permission to use their work in this essay: Christopher Eppolito (math and philosophy major), Taylor Klun (biology pre-med major), Sarah Urban (statistics major), and Nicholas Veronica (journalism major).

²Capezzi introduces only as necessary the literary theory suited to the structures and themes of the course texts. We offer students the basics of these concepts as tools for closely reading the patterns of each text, rather than school them in the literary history of their development and relationship to linguistic and social critique. Thus, we emphasize both structuralism and post-structuralism concepts. When appropriate, we assist students to recognize and understand the various grammars underlying the form and meaning of the texts. Also when appropriate, we assist them to see when such grammars are being purposely manipulated and called into question through techniques such as *différance*, self-referentiality, and iteration. The mathematical structuring enables us to look both

both metaphor in and construct of the literary object, analysis is simultaneously highly productive and rich with detail. Our work is particularly gratifying when convergence between the disciplines occurs, when, for example, iterative algorithms encounter iteration with a difference, as in Tom Stoppard's *Arcadia*. Iteration, in fact, became a major theme in the course.

While we could not expect all students to understand either advanced critical theory or advanced mathematics, we could anticipate, however, a range of perspectives and knowledges enabling students differently but thoughtfully to access the various constructs we bring to the course texts. To demonstrate their understanding, students write standard analyses and short research papers. Importantly, on several occasions they also write texts using constraints (poems organized by π , flowcharts), learning firsthand the joys of creating original versions of different constrained writing forms. Below we include samples of student writing which we think best illustrate the nature of the course as well as the understanding and joy the students got from it.

We begin (and end³) the seminar, which we named Mathematical Literature and Literary Mathematics, with the OULIPO literary movement, allowing us to introduce the axiomatic approach and its applications to writing. While drawing on a range for texts from *The OULIPO Laboratory* and related documents available on the internet, we have students read and intensively analyze works by Georges Perec and Claude Berge, as well as the results of several poem generators based on mathematical principles. Perec's *The Art and Craft of Approaching the Head of your Department to Submit a Request for a Raise* enables a discussion of flow charts, computers, and Turing's proof of the insolvability of the Halting Problem, while Berge's short story "Who Killed the Duke of Densmore" leads to an investigation of graph theory, interval graphs, and Hajos' theorem. Poems, of course, are always constrained by meter and rhyme, including those where the writer consciously rejects those constraints. However, poems structured by eye-rhymes or by the digits of π serve to remind students both what they already understand and offer surprisingly fruitful variations.

When we introduced his *The Art and Craft of Approaching Your Head*

at sign systems and at signifiers. All of these texts demand the "informed reader" who comprehends a standard structure and can see the play of grammar and meaning within and against the structure.

³In a gesture of circling back, we conclude the course by dallying with excerpts from Perec's *Life: A User's Manual*, highlighting digressions on knight's tours and Graeco-Latin squares.

of *Department to Submit a Request for a Raise* (conveniently abbreviated for the American audience as *The Art of Asking your Boss for a Raise*), we explained that Georges Perec, as a member of the Oulipo group and so devoted to exploring the nexus of mathematics and experimental literature, was working as an archivist for a medical research library. When Jacques Perriaud of the Computing Service of the Humanities Research Center in Paris challenged “a writer to use a computer’s basic mode of operation as a writing device,” Perec did, as well as employed Perriaud’s own example of the procedure used in a large corporation to ask for a raise.

We explained that in the distant past of the mid-1960s, most programs were designed using flowcharts; since computers were the size of a room, programming was taught only in technical and engineering colleges and universities, and time on a computer was very expensive. So as to highlight the important textual structures mimicking computer programming, we drew students’ attention to how his biographer David Bellos describes Perec’s scheme:

He chose to write *in extenso* the progress of an imaginary computer-mind as it iterates a set of choices in pseudo-real time. He also chose to simulate the speed and tireless repetitiveness of a computer program by abandoning all forms of punctuation as well as the distinction between upper- and lower-case letters. The result is an almost unreadable fifty-page text that looks like (but actually is not) a single, breathless sentence. (Bellos, Introduction to *The Art of Asking your Boss for a Raise*, xii)

In class and following from the conditions under which Perec constructed his text, we discussed flowcharts and noted that the ultimate sin for a computer programmer is to send the computer into an endless loop. It would thus be extremely useful to have a program that would check a piece of code for any endless loops. This search for an “endless loop,” related to Russell’s Paradox in logic, is called the Halting Problem and in 1936 Alan Turing proved that no such program exists, and so each student was responsible for avoiding the endless loop on his or her own.

One student in particular, a journalism major and sports enthusiast, did an excellent job mimicking Perec’s style and avoiding the endless loop, as well as reflecting upon his performance. In Perec’s version, the key phrase “it’s one or t’other” indicates branch points in the flowchart. Our student chose

the phrase “because I can’t wear nothing and I really should wear a football t-shirt since I have one” to play a similar role in his story. He explains:

I wrote my story just like *The Art of How to Ask Your Boss for a Raise*, all in one brutally long sentence. There is some punctuation in there because Microsoft Word apparently didn’t realize I was trying to be artistic and threw a few of those marks in there anyway. Interestingly enough, it didn’t give me the green grammar squiggle for a run-on sentence.

Below is an excerpt (with some unedited punctuation additions/errors created by Word):

so keith from down the street invited me to his super bowl party and it sounds like fun and I like free food but I really cant decide what shirt to wear because I have one t-shirt that says giants and one t-shirt that says patriots and I don’t have a particular fondness toward either one but I cant wear nothing and I really should wear a football t-shirt since I have one so I guess the first thing I ask is who is going to be there because if there are going to be girls there that will totally change things from if there are just guys there because if girls are there I might like one of them and I should try to impress her by wearing the shirt of the team she wants to win because I cant wear nothing and I really should wear a football t-shirt since I have one so if she likes the giants then it’s the giants and if she likes the patriots then it’s the patriots but its more likely she wont care in which case I need to determine if I really have a shot with her anyway the odds aren’t good and id probably know by now anyway but that’s only if theres girls there that I like because if I don’t have any interest of if its just the guys then I don’t need to impress anyone

Following this exercise, the student concludes: “As much as I hated reading the book that never stopped, I really didn’t mind writing it.” We consider this high praise from the editor of the student newspaper.

Our introduction to online poem generators gave students access to Que-neau’s *Cent Mille Millions de Poèmes*, the $N + 7$ Machine, as well as Pilish, and these structures fascinated many students. For another assignment, one

student, a philosophy and mathematics dual major, chose to write a poem using the digits of π as a structuring device. As he explains:

Standard pilish is a very specific constraint; the n th word of the work must contain exactly the number of letters that the n th digit of that irrational, transcendental number π dictates. However, this may be difficult to fulfill when a number of digits in a row are small, and impossible when the n th digit is a 0; standard pilish has the built-in provision that a ten letter word is used for each occurrence of 0, and words having more than ten letters take the place of two digits in the expansion of π . However, thirty-three words into the poem, one [meaning this student writer] discovered that one has little knowledge of ten letter words. Undeterred by these happenings, one determined a new regulation for pilish; henceforth, what had originally been intended as a bombarding of fictitious constructs concerning a catechumen and exorcists intumesced into a lament⁴. The new version of pilish differs from standard pilish in a single way: ten letter words are not allowed, and each '0' in the decimal expansion of π corresponds to an 'O' in the poem. It was from this new constraint that one came up with the idea of a lament.

We include below the Pilish poem in its entirety, which contains no 10-digit words but many 8-digit, 9-digit, and even 11-digit ones.

Pi: a Lament

Why? I mean, a savvy commoner's pi induced angry men (mathy monsters, miniscule mortals) discharge, "the 'pi' you demonize from abject pi hating into the one dementia aid of Senator Santorum's 'three!'"⁵ O to woefully wondrous aids (a rapturous bishop's a groovy spelunker, yes?) testament unfolding yon blabber-mafia! I!!!"

O angry extortioner, me!

O undiluted fashion! When tradeoffs make this wrath impending on you!

⁴Note the clever use of numerous 10-letter words in his explanation.

⁵Referring to an infamous double entendre headline during the 2012 Republican Primary: "Santorum comes from behind in Alabama three-way".

O garnish everyone a better life!
 O ending un-examined living! Ay!
 O veracity: unadorned, unremitting, truthful! Goatee of exegesis!
 O thy duty circling! To lords one logo bespangling! (giggles?)
 O undone futures, travelers, fractals! In a word: mourning.
 O forecast dreary truth, I: one, to fraction, to sum?
 O denial: 'three's good.' RADICAL!
 O judiciary! the senators math lost! Hooray!
 O luminance, truth usurp!
 O tumor forsooth; do-in the '3' Alabama is freed! Our math's overruled gits!
 O founders, a pi restored! More hotheads? Loopinesses! I deleted that wrong!
 O on homework, earn A!
 O on, onwards!
 O a loyalist's day, holiness, truth. To mathematics!

We think it very clear that our student not only understood the Polish constraint but that he may have exceeded the desired level of hilarity in his production.

In the middle of the course, we address, among other texts, *Arcadia*, a play productive both mathematically and in terms of literary analysis. Interestingly, Stoppard is considered the patron saint of the OUTRAPO, the theater version of the OULIPO, and the literary structure of *Arcadia* is organized by and dependent upon iteration, chaos theory, and fractals. It provided many rich opportunities to discuss Fermat's Last Theorem, Newtonian determinism, and entropy. *Arcadia* has received significant critical discussion, and, though our students wrote some fascinating analyses of the play, we will not dwell upon it overlong here. Below we provide only a brief excerpt from an analytical essay by a statistics major:

Stoppard uses Thomasina's pursuit to discover the meanings behind the iterated algorithm and the second law of thermodynamics as a parallel to her character. Similar to Valentine, Thomasina finds order in knowledge and education. She thrives on learning new things and discovering them on her own. However, during this time period, society has a different view on

how young women should behave. For young women such as Thomasina, society finds order in marriage and properness, and disorder in knowing ‘too much.’ Society would find Thomasina’s attitude and brilliance as chaotic and improper. In scene three while professing her hatred for Cleopatra, Thomasina says, ‘I never knew a heroine that makes such noodles of our sex’ (Stoppard, 42). However, as the play progresses and Thomasina ages, she too becomes infatuated with love, for Lord Byron and then for Septimus, just as a young girl ‘should.’

This shift from being outspoken and critical to submissive to the desires of society comes from Thomasina’s knowledge. She understands that throughout history society has bred young women to fall in love and be married off without much education or knowledge, and there is nothing that can be done to undo this. Just as heat goes to cold but cold cannot go to heat, Thomasina realizes that no matter how much she fights society, she will end up being married off despite her wishes.

Our student has a refined understanding of how Stoppard has made mathematical and scientific principles both a subject as well as a structuring element of his text and thus produced an overlapping relationship between humor and pathos.

If the OULIPO and Stoppard are overtly and self-consciously structuring their texts according to mathematical principles, several experimental fiction writers of the 20th Century take a different turn. These marshal a critique of rationality by organizing their texts to emphasize the limits of certain mathematical concepts for defining reality. Circle-packing problems and the fourth dimension come up in discussions of Robbe-Grillet’s *Jealousy*. Stories by Borges also are fertile ground for exchanges about computation, infinity, and the Infinite Monkey Theorem (“The Library of Babel”); probability (“The Lottery of Babylon”); and maze solution algorithms (“The Garden of the Forking Paths”). And finally, Italo Calvino’s *If on a winter’s night a traveler* brings us to paper folding, book imposition, and kaleidoscopes. While providing accuracy of description, these writers employed mathematical strategies as a way to undercut any full account of the inter- and intra-personal tensions circulating through each text.

As an example of mathematics taken to the edge of reason, Jorge Luis Borges produces an intriguing interplay of mathematics and story in “The

Lottery of Babylon.” The mathematics of lotteries is a simple application of probability theory and expected value, and so we described for students the basic concepts for humble games of chance, working out numerous examples. But when Borges’ lottery evolved, “Someone tried something new: the interpolation of a few adverse fortunes amongst the many favourable,” we could explore the changes in the outcome of a lottery when the parameters vary. Further, textual references to Zeno’s Fallacy and Pascal’s Wager led to a discussion of the theory and meaning of probabilities. The entire text is written in the passive voice with conflicted reported understandings of the source of the game, though the stakes and the relevance are always clearly available to characters and to readers. The story reinforces, however, the notion of life as a game of chance, with the final arbiter shrouded in mystery despite a clear sense of the logic of the game.

One student, a pre-med biology major, after explaining very well the workings of probability, defines the central conundrum of this text:

[T]he poor still felt excluded because they could not afford to participate in the Babylon lottery. In response, the lottery became free and mandatory for all Babylonians. The lottery became the Babylonian’s reality, in which their lives were governed by the random outcome of the drawing. A simple drawing could elevate an individual to the council of wizards, or subject an individual to mutilation or death. Their lives were in the hands of the Company, and all they could do was hope that, by chance, they would have a winning ticket that led them down a favorable path. As a result, ‘it made the Company accept complete public power,’ and the Babylonians had no say in how their lives would unfold (68). [Yet the] story also suggests that there was always a sense of higher authority among the Babylonians, even when it was known to not exist.

Both random chance and ultimate control collide in Borges’s story, and students generally understood that formation well, though they are as puzzled by its source and significance as any of the Babylonians (and us).

Overall, the course was enjoyable and productive for both students and its professors. In many ways, it was the perfect educational experience: the students learned; we learned, both from each other and from the students; and a good time was had by all. We look forward to the next iteration of this course in spring 2014.

References

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