Poetry Puzzles

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Abstract

In this workshop, participants learn different ways of combining poetry with standard logical and numerical puzzles, so that the solution to the puzzle unscrambles the words in a poem. Participants will begin by learning how to solve such puzzles so that they are able to create their own puzzles to encrypt their poetry. Participants are encouraged to bring one or two shorter poems to work with, although suitable poems will also be provided. The goal of the workshop is for participants to take away skills to create new poetry puzzles, and begin their own explorations into using new types of puzzles to encode poetry.

Introduction

Most poets crave a wider readership. In pursuit of this, they give public readings, publish volumes and submit poetry to literary journals. This is an endeavour with limited payback, as the readership tends to be poets reading and listening to other poets. For mathematical poets especially, it can be an even greater challenge to expand a readership that is arguably more fractured.

In this workshop, we explore pairing poetry with logical and numerical puzzles such as *Sudoku*, that are enjoyed by legions of fans with a logical bent. As with any segment of the population, a significant proportion of these fans are not in the habit of reading poetry regularly, but they might be enticed to read a poem that is linked to a puzzle they have recently solved. At the very least, the novelty may give poetry some renewed traction, at best, it may bring new readers to poetry.

The French literary group *Oulipo* (*Ouvroir de littérature potentielle*) have been using combinatorial structures to create literary works and potential literary works since the 1960s. Most often, such structures are used to generate, partially generate or impose restrictions on a literary work. This is the case with the *sestina* (and its modern *Oulipian* variations) in which the last words of the lines in each stanza are reordered by a precise and fixed permutation as the poem progresses from one stanza to the next.

In this workshop, participants learn how to use combinatorial structures to encrypt poetry that is freely generated. Although some restrictions may be required to fit the nature of the puzzle, we will also discuss options for working around these restrictions.

The Poetry Puzzles

We now introduce two samples of the types of puzzles that will be illustrated in the workshop. The first puzzle is based on a Latin square, an $n \times n$ grid of *cells* in which each row and column of cells contains each integer from 1 to n exactly once. In this *Sudoku*-like puzzle, the numbers in some of the cells are provided, and the puzzle is solved by filling in the missing numbers using logical reasoning and the rule of the Latin square. The filled-in square is uniquely determined by the clues given. In the poetic version, each cell also contains a word from a poem. Once the puzzle has been solved, the words of the poem have been unscrambled. The first line is found by reading the words paired with 1 from left to right, the second line by reading the words paired with 2 from left to right and so on. In Figure 1, the solution to the Latin square puzzle will unscramble the poem entitled *The Guarded Heart*.

If we adhere strictly to the rule of one word per cell, then the encoded poem must be a *square* poem. In this context, the term *square* means that the number of words in each line matches the number of lines. However, this restriction can be relaxed somewhat, since some cells can contain more than one word,

particularly when the words are minor ones (such as “of” or “the”). Alternatively, some cells can be left empty so that the only restriction is that the poem contain *n* lines and no single line exceeds *n* words in length.

4 Life’s	Shackled	Fixed	**2** Stone
Eyes	Chambers	**1** by	Alone
Heart	Cup	of	Inwards
2 Cold	Ever	Drunk	Fear

Figure 1: *Latin square poetry puzzle, The Guarded Heart.*

The second puzzle is an adaptation of a numerical puzzle called *Kakuro*. In *Kakuro,* the numbers 1 through 9 must be placed within the cells of a (possibly) irregular grid in such a way that no number is repeated in the same contiguous column or row and the sum of the numbers in each column and row must match the sums given at the top and left [1]. Numerous sample puzzles can be found at [2].

In our poetic adaptation, the rules of *Kakuro* are modified so that each of the numbers 1 through *n* appears in one and only one cell in the entire grid. The unique solution unscrambles the poem by ordering the words according to the numbers with which they are paired. Unlike the Latin square puzzle, the *Kakuro* puzzle more easily permits the lines to be of any length, although the design and solution of the puzzle becomes more complicated as the number of cells increases. Since there’s no inherent way to mark the ends of lines, commas can be used. Figure 2 gives an example of a *Kakuro* poetry puzzle for $n = 10$.

		6	**24**	
	13 / **15**	of red	bed	**10**
17	tethered	this	better	tastes
25	to	glass	your	when I’m

Figure 2: *Kakuro poetry puzzle, La Vie en Rose.*

Solving the Puzzles

For the benefit of those who are not familiar with these types of puzzles, the workshop will begin with how to solve them, with an emphasis on how the clues are designed to lead to a unique solution. Once this foundation has been laid, participants can use what they’ve learned to create their own clues. We now outline a few steps in the solutions of the puzzles from Figures 1 and 2 to give a taste of their solutions.

To solve a Latin square puzzle, we begin with cells that can be easily deduced from the initial entries. For example, the cell containing the word *fixed* (row 1, column 3 in Figure 1) contains a 1 already in its column and a 2 and 4 in its row. This leaves only 3 as a possibility for the entry in this cell. Following such reasoning, we fill in the Latin square one cell at a time. Each newly-filled cell can lead to new clues until the square is eventually entirely filled with numbers. The solution to this particular Latin square is shown in Figure 3.

Note that there is only one way to complete the square so that each integer from 1 to 4 occur exactly once in each row and column. The unscrambled poem is now revealed.

The Guarded Heart
Heart shackled by fear
Cold chambers of stone
Eyes ever fixed inwards
Life's cup drunk alone

4 Life's	1 Shackled	3 Fixed	**2** Stone
3 Eyes	2 Chambers	**1** by	4 Alone
1 Heart	4 Cup	2 of	3 Inwards
2 Cold	3 Ever	4 Drunk	1 Fear

Figure 3: *Solution to Latin square poetry puzzle*.

The *Kakuro* poetry puzzle shown in Figure 2 is not solved purely with logic, but also by enumerating the possible ways in which we can achieve the sums given at the top and left of the rows and columns. To solve this particular puzzle, we begin by looking for sums that are unusually low or unusually high, because these are the most restrictive. For example, the second column must contain three distinct integers between 1 and 10 that sum to six. The only possible combination is 1, 2 and 3.

We now examine the first row, and we see that we need two integers that total 13. There is no such sum that uses a 1 or a 2, since the largest integer in the grid is 10. Therefore, the first row must contain a 3 and a 10, in that order.

The last column contains two numbers that sum to 10. There are only 4 such combinations, $1 + 9$, $2 + 8$, $3 + 7$ and $4 + 6$. We can rule out the first three possibilities since we know 1, 2 and 3 already appear in column 2. Thus, column 4 must contain a 4 and a 6. At this point, what we know is shown in Figure 4.

		6	**24**	
	15 \ **13**	3 of red	10 bed	**10**
17	tethered	1 or 2 this	better	4 or 6 tastes
25	to	1 or 2 glass	your	4 or 6 when I'm

Figure 4*: Partially-solved Kakuro poetry puzzle*.

By continuing to apply similar reasoning, we are able to arrive at the unique solution to the *Kakuro* puzzle, which is shown in Figure 5. The solution enables us to unscramble the poem.

La Vie en Rose
This glass of red
tastes better
when I'm tethered to your bed.

		6	24	
	15 \ 13	3 of red	10 bed	10 \
17	7 tethered	1 this	5 better	4 tastes
25	8 to	2 glass	9 your	6 when I'm

Figure 5: *Solution to Kakuro poetry puzzle.*

The Poetry

While the primary focus of the workshop will be the design of the puzzles, we will also discuss the type of poetry that works best. In general, shorter poems are easier to work with, although we'll present some puzzle designs that accommodate longer poems. As a rule of thumb, the poetry unlocked through a poetry puzzle should not be more difficult to interpret than the puzzle was to solve, so that the reader can regard the unlocked poem as a reward rather than a further challenge.

Participants will be encouraged to create their own puzzles with a particular poem in mind, and may work from one of their own previously-written poems, or from one of the poems provided for this purpose. Participants may also work on their poetry as they create their puzzles and all participants will be encouraged to share their insights on how to experiment with writing shorter forms for the benefit of poets who tend towards writing longer verse.

Conclusion

Ideally, workshop participants will leave inspired to think about new ways of creating poetry puzzles. For those who delight in solving puzzles, it's hoped that the solving of the puzzles will lead to the reading of the poems, which in turn will act as an enticement to read more poetry.

References

[1] J. McLoughlin. "The Contest Corner." *Crux Mathematicorum*, vol. 43, no. 5, May, 2017, pp. 184-186.

[2] Kakuro Cross Sums. http://www.atksolutions.com/games/kakuro.html.