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Mathematics and Literature: Allies, not Enemies[1]

Many people seem to think that mathematics and literature are two diametrically opposed fields of knowledge. Without fully unpacking the origins and controversy surrounding this presumption, it is worth emphasizing that many scholars have sought connections between these fields. Several sample scientific articles and books can confirm this observation:[2] Donald O. Koehler's article entitled *Mathematics and Literature*, published in 1982; the multi-authored article *The Bridge to Mathematics and Literature*, published in 2013; and an extensive volume entitled *The Palgrave Handbook of Literature and Mathematics,* published in 2021. The handbook, edited by three authors, features essays written by both literary scholars and mathematicians who examine multiple dimensions of the connections between literature and mathematics.

Sarah Hart's book *Once Upon a Prime: The Wondrous Connections Between Mathematics and Literature* continues this search for the various connections between literature and mathematics. The author is currently a professor of geometry at Gresham College in London and the first woman to hold this position. In addition to her interest in mathematics, she has also been passionate about literature for many years. In her introduction, she makes a statement about the closeness of the two sciences, which has been documented by many scholars in the past. She writes, "Mathematics is often viewed as being quite separate from literature and other creative arts. But the perceived boundary between them is a very recent idea. For most of history, mathematics was part of every educated person's cultural awareness" (p. 2). Also, in the introduction, Hart notes, "My goal in this book is to convince you not only that mathematics and literature are inextricably, and fundamentally, linked, but that understanding these links can enhance your enjoyment of both" (p. 2). From this statement, it can be inferred that the author addresses her book to lovers of both literature and mathematics. Therefore, both mathematicians and literary scholars may be interested in *Once Upon a Prime*, as well as simple lovers of reading and amateur math enthusiasts. It is to such readers that she would like to pass on part of her passion, which she professes for both these fields. The quoted sentence also reveals a certain feature of the author's rhetoric, visible throughout the book. She often addresses the reader directly as "you," which creates a sense of intimacy with the reader throughout her arguments.

[1] Sarah Hart, *Once Upon a Prime: The Wondrous Connections Between Mathematics and Literature*, Mudlark, London 2023, pp. 290. All quotes come from this book.

[2] The articles and books named in this paragraph are also listed in the bibliography.

Hart's book immediately captures a reader's attention as she writes with great passion and scientific acuity. The structure of the book employs careful logic within its three main divisions. The first part, entitled "Mathematical Structure, Creative, and Constraint," looks at the way the structure of writing mimics mathematical forms. In other words, the author demonstrates hidden mathematical structures of literature, or, to put it yet in another way, she shows how mathematics influences literary structures. For example, she reveals the permutational structure that governs poetic forms like sestinas. (Sestinas are fixed verse forms consisting of six stanzas of six lines each. The words that end each line of the first stanza are used as line endings in each of the following stanzas).[3] Also, she finds arithmetical infrastructure underlying a contemporary novel like Eleanor Catton's Booker Prize-winning novel, *The Luminaries*. In this chapter, Hart introduces readers to writers from the group called Oulipo, who conducted various literary experiments in their works. She presents works such as Raymond Queneau's *One hundred million million poems* or the novel *La Disparation* by Georges Perec, written without the use of the letter "e." Readers can also learn about lesser-known literary works, such as Gabriel Josipović's short story *Mobius the Stripper*, whose structure refers to the Möbius strip. (It is not a mistake – the title of the story says Mobius, not Möbius). The work is a kind of circular story, and Hart finds a similar structure in Julio Cortázar's famous short story *Continuity of Parks*. According to the author, each literary text has a specific structure with specific components, which makes it similar to mathematical structures.[4] This observation is one of many scattered throughout the book, in which the author finds parallels between literary texts and mathematics, which, of course, corresponds to the intention of her book.[5]

The second part of Hart's book, entitled "Algebraic Allusions: The Narrative Use of Mathematics," turns the reader's attention to mathematical symbolism. Hart begins by investigating some magical numbers, like 3, 7, 9, 12, and 40, which recur quite often in folklore and fairy tales. It was this subsection, entitled "Fairy-Tale Figures: The Symbolism of Number in Fiction," that I found most interesting. It contains some captivating ideas and observations. At the same time, it is not oversaturated with complicated mathematical operations. I am sure that even many experienced literary scholars could find something remarkable for themselves in this subsection.

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[3] In German literature, for example, Andreas Gryphius used sestinas in his poem *Verleugnung der Welt*.

[4] "All writing has structure from the get-go. Language itself is built of component parts, each of which has patterns. Letters make up words, words form sentences, sentences form paragraphs, and so on. This is already a structure, analogous to the hierarchy of point, line, plane in geometry. At each stage, further structures can be imposed. Paragraphs, for instance, can be joined together to form chapters. The decision is not whether to structure your work; rather it's what structure to use" (p. 41).

[5] One more interesting and easy-to-understand example from this chapter includes this reflection on proofs and poems: **"**A mathematical proof, for example, if it's any good, has a lot in common with a poem. In both cases, each word matters, there are no superfluous words, and the goal is to express an entire idea in a self-contained, usually fairly short, and fairly structured way" (p. 16).

For example, as the author notes, in fairy tales, the youngest of the three brothers often behaves differently from his two older brothers and comes out best. Why? She explains, "The narrative reason for this is obvious — we require two repetitions to get to know the pattern, so that the breaking of the pattern in the third iteration can surprise or amuse us." (p. 116).[6] Later in this chapter, a longer subsection is devoted to James Joyce's *Ulysses* (pp. 139–146). As the author claims, "there are mathematical references scattered throughout the book" (p. 142), which are briefly analyzed by the author. Hart also reminds the readers that in honor of the Irish author, there is a number in mathematics called Joyce's number (p. 146). Her analysis is convincing and written in accessible language to help readers recall some aspects of Joyce's novel that they may have forgotten.

The last part of Hart's book, entitled "Mathematics Becomes the Story," sees mathematics explicitly integrated into literature through conceptual ideas and "mathy" protagonists. The author explains the content of this chapter, saying, "In Part III, I'll show you how mathematics can become the part of the story – with novels featuring overtly mathematical themes and sometimes even mathematicians as characters" (p. 9). In this part, it is worth paying attention to the convincingly written subchapter entitled "The Real Life of Pi: Thematic Mathematics in the Novel." The author begins this subchapter by reviewing the mathematical aspects of Yann Martel's novel *The Life of Pi*. She presents these aspects simply and logically. But there are also intriguing interpretative remarks in her arguments. For instance, she notes that the "random-seeming sequence of digits in π echoes the curious and unpredictable currents of the sea, as Pi and Richard Parker later float on the endless ocean" (p. 214). Hart also observes the interesting connection between the name of the protagonist of the novel and the number of 227 days he spends at sea; π is equal to 3.1415, and 22 divided by 7 equals a remarkably close number, 3.1428. In the same subchapter, readers can also gain some mathematical knowledge related to Borges's famous short story *The Library of Babel*. There is even a book devoted entirely to the mathematical aspects of this story: William Goldbloom Bloch's book entitled *The Unimaginable Mathematics of Borges' Library of Babel*. In the final part of this subchapter, the author discusses Lewis Carroll's famous novel *Alice's Adventures in Wonderland* and its sequel, *Through the Looking-Glass*. In the last subchapter of the whole book, entitled "Moriarty Was a Mathematician: The Role of the Mathematical Genius in Literature," Hart explores the character Professor James Moriarty, the "Napoleon of crime" and nemesis of Sherlock Holmes. However, the author also finds some features of a mathematician in the personality of Sherlock Holmes. At the end of the book, next to the chapter with footnotes, we find an index of names and titles and an additional list of books in the chapter entitled "A Mathematician's Bookcase." In this chapter, the author explains, "I've gathered here a collection of some of the

[6] At this point, however, it is worth recalling a perverse short story entitled *Die drei Söhne* (1980), written by the Swiss author Franz Hohler. In this story, the third brother, the youngest, has the lousiest personality and the whole story ends quite badly for him. Hohler admits that he wrote this tale to counter the typical stories about three sons.

books on my shelves that we have discussed – with a few bonus recommendations thrown in for good measure" (p. 271).

Once Upon a Prime is a valuable book, sometimes fascinating and even illuminating. The author's arguments reveal her deep passion for both mathematics and literature, even if some fragments of her book may require patience and attention in reading. The book as a whole does not require extensive knowledge of mathematics, although such knowledge will certainly be useful during reading. As for the shortcomings, the author can, at most, be charged with formulating several debatable statements from the point of view of a literary scholar. For example, she claims, "And poetry? It's simply the continuation of mathematics by other means" (p. 36). In another statement, she says, "Mathematical symbolism and metaphor are present in every kind of literature, from the humblest of fairy tales right through to *War and Peace*" (p. 170). But such minor issues do not change the overall positive evaluation of Hart's book. Overall, *Once Upon a Prime* is a masterful *tour de force*, filled with fascinating mathematical and literary delights.

Bibliography

Bloom G.W., *The Unimaginable Mathematics of Borges' Library of Babel*, Oxford University Press, Oxford 2008.

Christy D., Payson C., Carnevale P., *The Bridge to Mathematics and Literature*, „Mathematics Teaching in the Middle School" 2013, Vol. 18, No. 9, pp. 572–577.

Hart S., *Once Upon a Prime. The Wondrous Connections Between Mathematics and Literature*, Mudlark, London 2023.

Koehler D.O., *Mathematics and Literature*, "Mathematics Magazine," 1982, Vol. 55, pp. 81–95.

Tubbs R., Jenkins A., Engelhardt N. (eds.), *The Palgrave Handbook of Literature and Mathematics*, Palgrave Macmillan, London 2021.