Natalie Berkman, *OuLiPo and the Mathematics of Literature.* Oxford: Peter Lang, 2022. xiv + 324 pp. Annex, bibliography, and index. $72.95 U.S. (pb). ISBN 9781789977806; $72.95 U.S. (eb). ISBN 9781789977820.

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Natalie Berkman's purpose in this book is to investigate in a sustained manner the articulation of mathematics and literature in the practice of the Ouvroir de Littérature Potentielle, or "Oulipo," a group founded in 1960 in Paris. At the time of its inception, Oulipo counted ten members, among them writers, mathematicians, editors, university professors, and at least one chemical engineer. Today, the group includes forty-one members (counting, as Oulipo does, the deceased, reasoning that death has no real dominion over the group). As Berkman frames her subject, she mentions that she wishes to address three principal questions. First, is Oulipo's use of mathematics "serious"? Second, is it feasible? Finally, what can it teach readers untrained in mathematics about mathematical thought? For Berkman senses that the lessons Oulipo can provide are especially timely ones, in view of the rise of digital humanities, for instance. Yet she also suggests considerations that are more urgent still, at least insofar as our ailing academic culture is concerned: "Oulipo proposes its own response to the divide between the humanities and STEM fields and can help bridge that gap today in the university" (p. 21).

In her introduction, Berkman announces that she will pursue three approaches, organized around literature, history, and digital humanities, respectively. She adds that she will be concentrating mostly on the history of Oulipo from its foundation to 1981. Setting the stage for that examination, she reminds us that the affiliation of mathematics and literature is not a new phenomenon, but to the contrary a venerable one, extending far back into the history of culture, and surging forth in key moments. She speaks of the sestina, the fixed poetic form practiced by the medieval troubadour Arnaut Daniel. Based on structural iterations of the number six, it was a form that was very dear to Raymond Queneau, who, along with François Le Lionnais, is generally acknowledged as Oulipo's co-founder. In the life of that form, spanning eight centuries thus far, Berkman invites us to see an "intertwining tale of mathematics and literature" (p. 6). The adjective she uses is all the more apposite, for the intertwining shape of the sestina puts on display the very kind of dynamic that Berkman encourages us to recognize in the tradition of mathematical literature.

Subsequent chapters of the book are organized according to mathematical discipline. A first chapter is devoted to set theory; subsequent chapters focus on algebra, combinatorics, algorithms, and geometry. Berkman is amply aware that these categories are not mutually

impermeable, and that there will be some overlap in her discussions. Indeed (and perhaps inevitably) some of those instances of overlap constitute particularly intriguing moments; and some of Berkman's digressions from the straight path of her argument provide substantial food for thought. Her account of the Collège de 'Pataphysique is stimulating, not only by virtue of the fact that the Collège was a precursor to Oulipo and in a sense birthed the latter group, but also because the Collège gave a home to avant-garde thought and practices, favoring a genial and ludic spirit that came to animate Oulipo's work. As Berkman rehearses the history of mathematical formalism from Euclid to our time, she invokes Nicolas Bourbaki, behind which pseudonym a group of mathematicians connected with the École Normale Supérieure in Paris in the 1930s proposed to reconfigure mathematics from the ground up, based on set theory. That account is an inherently interesting one for those readers who might have been unaware of Bourbaki. In a similar vein, when Berkman turns to the notion of literary formalism and tells the story of the rise of structuralism, she does so with admirable verve. It may be a story that we have heard before--how Ferdinand de Saussure's linguistic theories collided with principles of Russian formalist inquiry, what Claude Lévi-Strauss learned under Roman Jakobson's tutelage at the New School in the forties, and so forth--but Berkman tells it in a consistently engaging way.

Not everyone will be equally convinced by every argument that Berkman advances, to be sure. When she contends that, "while mathematicians study abstract mathematical objects (such as numbers or shapes), any sort of abstraction can be viewed as mathematical thought" (p. 23), some readers may feel that certain abstractions are not inherently mathematizable. More broadly speaking, if *everything* is mathematical in character, does that term have any specificity, can it designate phenomena in a differential way? Yet the vast majority of the claims that Berkman stakes in this volume involve considerations that are well founded. This is true even when she is working in long focus, encouraging us to think about the very idea of shape, for instance, or about the behavior involved in the act of counting.

For Oulipo is always attentive to shape, she argues, and its members are always counting. The sestina is a matter of shape, after all, and a matter of counting as well. It could furthermore be thought of as both combinatoric and algorithmic. And it most assuredly displays a geometry that is all its own. Queneau once famously remarked that to be a poet one has to know how to count to twelve; and if from there to George Perec's use of the Greco-Latin bi-square of order 10 seems like a vertiginous leap, it is nevertheless true that both gestures are fundamentally questions of shape and counting. For his part, Queneau was willing to count to one hundred trillion-- potentially at least--when he wrote his *Cent mille milliards de poèmes* (1961), a collection of ten sonnets, any line of which can be substituted for its opposite number in any of the nine other sonnets. Following that principle, there are ten possibilities for the first lines of these sonnets, one hundred for the first two lines, one thousand for the first three, and eventually ten to the fourteenth power for all fourteen lines. Clearly, this is not a text that mortal readers should approach without a good deal of commitment, because, reading at the rate of eight hours a day, two hundred days a year, it would take more than ten million centuries to read all of the sonnets that this literary machine potentially cranks out. A more enthusiastic individual, reading twenty-four hours a day, every day of the year, would still need 190,258,751 years to finish this text. Ars longa, vita brevis. If other Oulipian works are demonstrably combinatoric in character--one thinks of Jacques Roubaud's $\in$ (1967), Italo Calvino's *Il castello dei destini incrociati* (1973), or Georges Perec's *La Vie mode d'emploi* (1978)--none is simpler in its appearance nor more far-reaching in its consequences than Queneau's little volume.

Shape and counting are thus key elements in Oulipo's nascent aesthetic, and they are afforded both logic and purpose by the notion of constraint, Berkman argues. She imagines constraint, locally and usefully, as a set of compositional rules freely imagined and rigorously observed by the writer, arbitrary in the first instance, yet serving to clear away the arbitrary as the text governed by constraint gradually takes shape. That process can be more or less obvious, and in some cases visual, like it is in rhopalic verse, sometimes called "snowball," in which each line of a poem is greater (or lesser) by an integer (a letter, a syllable, a word) than its predecessor. Sometimes that process can be more clandestine, as it may be for instance in a text based on a Fibonacci sequence, in which each successive number results from the addition of the two preceding numbers. "It is not a literary tendency that pushes authors to structure their stories," Berkman declares, "but rather a human tendency for abstraction. This quality allows one to translate reality, understand it, and to speak about it with others" (p. 261).

In her chapter on algorithms, Berkman remarks that some of the members of the early Oulipo were fascinated by computers and the possibilities that they represented for literary creation. She suggests that it was precisely the determinism of those machines that seized the Oulipians' imaginations, even while they recognized the technological limitations that characterized the performance of computers in those days. She speaks about the Oulipian and computer scientist Paul Braffort, who founded a group entitled Atelier de Recherches et Techniques Avancées (ARTA), in order to investigate the potential of computers with regard to literature. Moreover, she contends persuasively that "Oulipo's computer experiments represent some of the first digital humanities work, falling under the category of exploratory programming and producing electronic literature" (p. 221). Yet she also notes that as Oulipo matures, it tends little by little to abandon the kind of strict and concentrated attention to mathematics that its founders envisioned for the group, which enabled Oulipo to be more flexible and adaptable than it would otherwise have been, and also to "remain relevant in French literary and intellectual life" (p. 268).

Just as Oulipo's focus evolves over time, so too does Natalie Berkman's purpose shift just a bit in this book. By the end of her study, the three questions that she postulated in its liminal pages have been sharpened and clarified in significant ways. Why did Oulipo use mathematics? now stands as the first question. How did Oulipo use mathematics? now figures as the second. What is the effect of that usage on the reading experience? she asks in the third instance, effectively and productively putting us back into the equation, and gently asking us what we might do with the kinds of ideas she has been discussing.

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