Lewis Carroll by the Numbers

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Lewis Carroll in Numberland: His Fantastical Mathematical Logical Life, An Agony in Eight Fits, by Robin Wilson. New York: Norton, 2008.

Lewis Carroll and mathematics is a bit like the weather—everybody talks about it, but very few people, or at least few literary critics, know what to do about it. Most literary scholars acknowledge that mathematics played a significant and highly influential role in Carroll's life—he was Mathematical Lecturer at Christ Church, Oxford, for twenty-six years. But by and large we are better grounded and more comfortable in discussing and analyzing Carroll's literary texts than his mathematical ones. We are much more at home in the world of words, rather than the world of numbers. But like Alice, Carroll moved seamlessly between two worlds; his Alice books, as well as *The Hunting of the Snark* and *Sylvie and Bruno*, were all influenced by the author's deep knowledge of and fascination with mathematics. Most literary critics acknowledge the connections, but often do little with them.

A few previous critical works defied the expectations. Like Carroll, Martin Gardner was a true polymath; he had a number of Carroll's mathematical texts reprinted, including *A Tangled Tale, A Book of Logic*, and *Pillow Problems*, with useful introductions. Gardner's *The Universe in a Handkerchief: Lewis Carroll's Mathematical Recreations, Games, Puzzles, and Word Plays* (1996) is perhaps the most useful study of Carroll's mathematical career and interests published prior to Wilson's *Lewis Carroll in Numberland*. However, Gardner focuses primarily on Carroll's recreational mathematics and does not address his work in algebra or geometry in great detail. Other works that provide interested readers with more detailed discussions of Carroll's academic career as a mathematician include Francine F. Abeles's *The Mathematical Pamphlets of Charles Lutwidge Dodgson and Related Pieces* (1994) and William Warren Bartley's edition of *Lewis Carroll's Symbolic Logic* (1977). Both volumes collect and reprint significant mathematical work by Carroll and are carefully annotated by the respective editors, but neither is intended for the mathematically challenged. Both books assume the reader has a solid working knowledge and understanding of mathematics. Neither one is English major–friendly.

Those curious readers who want a clear discussion of the mathematics Carroll taught and researched for most of his life, and the role that numbers played in his life and literary works, will find Robin Wilson's study both accessible and comprehensive. Wilson is Emeritus Professor of Pure Mathematics at The Open University, as well as Emeritus Professor of Geometry at Gresham College, London, where he held the oldest mathematics chair in England. Wilson provides an entertaining critical biography of a mathematician who wrote popular children's books, rather than taking the standard approach of viewing Carroll as a children's writer who was also a mathematician. The change of focus is illuminating, although at times it makes for challenging reading. While Carroll's children's books are filled with mathematical allusions, Wilson makes clear that this was a natural overflow from his primary interests, as Carroll was not a man who left his work at the office. In doing so, Wilson unpacks some of Carroll's more complicated mathematics texts, particularly those dealing with geometry and logic. While *Lewis Carroll in Numberland* is accessible to the nonmathematician, there are multiple sections that will appeal to those readers who enjoy challenging mathematics, such as when Wilson explains the mathematical terms that appear in the title of Carroll's most important algebra book, *An Elementary Treatise on Determinants, with Their Applications to Simultaneous Linear Equations and Algebraical Geometry*, published in 1867. Wilson kindly encourages readers to skip the seven-page section if they are not inclined to work through the formula. Simply realizing that Carroll was working on and publishing *An Elementary Treatise on Determinants*, along with *The Fifth Book of Euclid Treated Algebraically* (1868) and *Algebraical Formulae and Rules* (1870), between the publication of *Alice's Adventures in Wonderland* in 1865 and *Through the Looking-Glass* in 1871 provides a different way of looking at him.

Carroll, who had taught symbolic logic for a number of years at the Oxford High School for Girls, assumed *Symbolic Logic, Part I* (1896) would be "a fascinating mental recreation for the young," adding that "It may *look* very difficult, at first sight; but I have taught it, with ease, to many children" (Wilson 185; emphasis in original). *Symbolic Logic, Part I* is a series of clever syllogisms with pictorial methods for solving the logic problems. Carroll favored the use of more complicated squared drawings, in contrast to the more accepted circle diagrams introduced by John Venn in 1880 which we now identify as Venn diagrams. Carroll had high hopes for the popularity of *Symbolic Logic, Part I* and even began a sequel, *Symbolic Logic, Part II*, which was left unfinished at his

death in 1897. The book, however, received mixed reviews, with *The Cambridge Review* suggesting that "The author has attempted to enliven the subject with the playful humour which made 'Alice in Wonderland' so delightful; but in this case the logic seems to overpower the humour" (qtd. in Wilson 184). *The Cambridge Review* recommended *Symbolic Logic, Part I* for those suffering insomnia—a feeling shared then and since by many readers of Carroll's mathematical books, despite Douglas Hofstadter's *Gödel, Escher, Bach: An Eternal Golden Braid* (1979), which reintroduced Carroll as a mathematician to a new generation of readers.

At Oxford University much of Carroll's career involved the teaching of Euclid. Wilson explains that Euclid's *Elements* was one of the most influential mathematical texts from the classical world and the oldest continuously used mathematical textbook. During the nineteenth century, there were more than two hundred editions published. Carroll's preferred edition was Robert Pott's *The School Edition, Euclid's Elements of Geometry* (1859). During the Victorian period, Euclid was used to teach students how to reason and think logically, and thus comfortably fit the classical curricula of Oxford and Cambridge as suitable preparation for those who would join the clergy. But while Carroll greatly admired Euclid's *Elements*, he felt it contained some inconsistencies and gaps. Over the years, he produced more than two hundred short mathematical pamphlets, many of which were intended to help clarify or improve the text. However, during Carroll's academic career there was a gradual change in the traditional classical curriculum in response to demands for a more practical approach to mathematics, and a number of texts were proposed as alternatives. By 1871, an Anti-Euclid Association was formed for the improvement of teaching geometry. Wilson shows that Carroll became "the outspoken advocate for Euclid's *Elements*" (91); his most significant mathematical work, *Euclid and his Modern Rivals* (1879), was a spirited defense against thirteen rival texts. Attempting to reach a wider audience, Carroll composed his book as a four-act play, with the ghost of Euclid defending himself against all rivals. But while Wilson considers *Euclid and his Modern Rivals* "a tour de force, exhibiting Dodgson's intimate knowledge and deep understanding of Euclidean geometry" (95), it failed in its aim. By 1888, both Oxford and Cambridge agreed to accept proofs other than Euclid's for their examinations. A modern systematic approach to geometry has continued to hold sway and, as Wilson observes, few contemporary schoolchildren are aware of the Euclidean approach to geometry. Carroll's mathematical career had been attached to a fading discipline, thus limiting his influence in that field.

Similarly, opinions of Carroll's teaching were mixed. While he may have been one of the first academics to use recreational topics as vehicles for conveying serious mathematical concepts, geometry and logic could seem dull and irrelevant to his students, who were preparing to become clergymen rather than mathematicians. His formality in the classroom did not endear him to them, and Carroll characterized his teaching as unrewarding, calling it a "thankless, uphill work, goading unwilling men to learning they have no taste for" (Wilson 67). While he continued to publish numerous mathematical texts both during and after his retirement as Mathematical Lecturer in 1881, his frustration with his students contributed to his seeking alternative audiences, including children, for his mathematical and nonmathematical works. While his literary works are infused with mathematics, his mathematical works are equally infused with narrative, illustrations, and wit. Carroll produced many more mathematical texts than children's texts, but it is his books for children that endure in popular culture. Reading *Lewis Carroll in Numberland* makes clear that his lifelong fascination with mathematics, especially Euclidian geometry, was a key source of inspiration for his imagination.

Wilson concludes this study of Carroll's mathematical career with a portion of a double acrostic puzzle that Carroll produced in 1857, which has been seen as being his own mathematical self-portrait: "Yet what are all such gaieties to me/ Whose thoughts are full of indices and surds?/ $x^2 + 7x + 53 = 11/3$" (qtd. in Wilson 209). Readers interested in unraveling this mathematical nonsense will find Wilson's *Lewis Carroll in Numberland* an invaluable tool.

Works Cited

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