Journal of Humanistic Mathematics

Volume 12 | Issue 1 January 2022

Alice's Adventures in Wonderland: Carroll's Symbolic Attack on Mathematical Symbolism

Firdous Ahmad Mala
Govt. Degree College Sopore, J&K, India

Alice's Adventures in Wonderland: Carroll's Symbolic Attack on Mathematical Symbolism

Firdous Ahmad Mala[1]

Department of Mathematics, Government Degree College Sopore, Jammu and Kashmir, INDIA
firdousmala@gmail.com

Synopsis

In 2009, a literature scholar, Melanie Bayley, proposed that Lewis Carroll's famous books about Alice visiting the magical and illogical Wonderland were attempts to mock and critique the modern mathematics of the day. In this short paper, I aim to support Bayley's thesis and expound upon Lewis Carroll's artful use of symbolism to criticize excessive use of symbolism in mathematics.

Charles Lutwidge Dodgson, more famously known as Lewis Carroll, was a mathematician and was also keenly interested in literature. He is known for his fictional pieces *Alice's Adventures in Wonderland* [3] and *Through the Looking Glass* [4], as well as his fantastic literary non-sense poems "The Hunting of the Snark" and "Jabberwocky".

In the words of Johann Wolfgang von Goethe, "[m]athematicians are like Frenchmen: whatever you say to them they translate into their own language and forthwith it is something entirely different." It appears that Carroll did precisely what Goethe said.

In 2009, a literature scholar, Melanie Bayley, proposed that Lewis Carroll's famous books about Alice visiting the magical and illogical Wonderland were attempts to mock and critique the modern mathematics of the day [1]; also see [2]. Here I try to expound upon Bayley's argument.

[1] Firdous Ahmad Mala is a faculty member at the Department of Mathematics, Government Degree College Sopore, and a part-time research scholar at Department of Mathematics, Chandigarh University, Gharuan Mohali, Punjab.

Bayley points out that Carroll was a traditionalist, and as such, in *Alice's Adventures in Wonderland*, he gave voice to his distress caused by the new theories which were sweeping away the realistic feel of mathematics. She goes further to argue that *Alice's Adventures in Wonderland* was, in fact, a mathematical satire and a masterful way of belittling the transition that was going on in the mathematical world at the time of Carroll. Mentions of magical mushrooms, babies transforming into pigs, and questions that have no answers were made to show how pointless, wasteful, and annoying these new theories were. A clothed white rabbit with a pocket watch, the hookah-smoking caterpillar, the mad tea party, and others seem to have been on-purpose and brought about to ridicule the mathematicians and the theories they presented, which, to Carroll, were undermining the realistic touch and relevance that the old theories of algebra and geometry possessed.

Carroll liked old-style mathematics and was somewhat non-receptive to the alternate theories that were being popularized in his times. For him, two and two made four and there was no other possibility. Regarding this, Alice says, "Four times five is twelve, and four times six is thirteen, and four times seven is — oh dear! I shall never get to twenty at that rate!" Herein Carroll made an artful comment on the other-than-ten base arithmetic:

$4 \times 5 = 1 \times 18 + 2$ so it can be written as 12 in base 18 arithmetic;
$4 \times 6 = 1 \times 21 + 3$ so it can be written as 13 in base 21 arithmetic;
$4 \times 7 = 1 \times 24 + 4$ so it can be written as 14 in base 24 arithmetic;
$4 \times 8 = 1 \times 27 + 5$ so it can be written as 15 in base 27 arithmetic;
$4 \times 9 = 1 \times 30 + 6$ so it can be written as 16 in base 30 arithmetic;
$4 \times 10 = 1 \times 33 + 7$ so it can be written as 17 in base 33 arithmetic;
$4 \times 11 = 1 \times 36 + 8$ so it can be written as 18 in base 36 arithmetic;
$4 \times 12 = 1 \times 39 + 9$ so it can be written as 19 in base 39 arithmetic.

However,

$4 \times 13 = 1 \times 42 + 10$ cannot be written as 20 in base 42 arithmetic.

Indeed, Alice could never reach twenty this way! This was nothing less than a satire on the use of switching over to base representations other than that of the decimal one.

However, Carroll does acknowledge that, even though these new theories are bizarre and misleading, going through these new motions is the only way forward, for if one sticks to tradition, one is akin to be left high and dry. Alice's frustrations and her not being able to get on with the multiplication table point out that those who do not embrace the newfangled theories in mathematics are going to be left in a state of puzzlement and self-disbelief like that of Alice.

Another example of Carroll using his fiction to mock the newfangled theories of his day can be seen in the incident of a child turning into a pig. It seems to be the case of what happened to Euclidean geometry with the advent of subjects like topology. Since in topology, completely different geometrical objects could be considered the same, Carroll was pointing out that the innocent baby-like geometry has turned into an abominable pig-like one: a traditionalist would consider a baby and a pig different, yet for a topologist, there is no difference between the two. Today it is a famous aphorism that a topologist does not differentiate between a teacup and a torus. But for Carroll this was a totally new perspective, and one he did not seem to care much for. Taking the bull by the horns, Carroll craftily expressed his contempt for the work of mathematician Jean-Victor Poncelet, who propounded that geometric figures undergoing a continuous transformation, without any sharp changes or deletions, are likely to retain some of their original features. The transforming of a baby into a pig was just a way Carroll used to show how absurd and unwelcome such a notion should be.

Today, arithmetic in different bases and topology are both well established mathematical frameworks, and very productive ones at that. However, it is not hard to sympathize with Carroll, especially when he makes his point so playfully.

As to Bayley's thesis, I hope you will agree with me that it has some merit. It definitely offers a new layer of appreciation to these famous classics. For more on this perspective, I suggest reading Keith Devlin's exposition [5].

Acknowledgment. The author is immensely thankful to Dr. Gizem Karaali for her valuable suggestions and effort in bringing this piece about.

References

[1] Melanie Bayley, "Alice's Adventures in Algebra: Wonderland Solved," *New Scientist*, Issue 2739, December 19, 2009. Available at https://www.newscientist.com/article/mg20427391-600-alices-adventures-in-algebra-wonderland-solved/, last accessed on January 14, 2022.

[2] Melanie Bayley, "Algebra in Wonderland," *The New York Times*, March 7, 2010. Available at https://www.nytimes.com/2010/03/07/opinion/07bayley.html, last accessed on January 14, 2022.

[3] Lewis Carroll, *Alice's Adventures in Wonderland*, Macmillan, 1865. Available online at https://gutenberg.org/ebooks/28885 via Project Gutenberg, last accessed on January 14, 2022.

[4] Lewis Carroll, *Through the Looking-Glass*, Macmillan, 1871. Available online at https://gutenberg.org/ebooks/12 via Project Gutenberg, last accessed on January 14, 2022.

[5] Keith Devlin, "The Hidden Math Behind *Alice in Wonderland*," blog post on *Devlin's Angle*, Mathematical Association of America, March 2010, available at https://www.maa.org/external_archive/devlin/devlin_03_10.html, last accessed on January 14, 2022.