

Computational poetry: How machines create art

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The World Poetry Day on 21 March celebrates the unique ability of poetry to capture the creative spirit of the human mind. While many consider art and math to be two disconnected concepts, the University of Luxembourg excels in interdisciplinarity and sometimes its researchers find unconventional ways of bringing ideas together.

Andreas Bock Michelsen, doctoral researcher at the Faculty of Science, Technology and Medicine argues that art, in particular poetry, and math are not disconnected at all, and that computers could certainly be poets—or at least create poetry.

The math behind fractal poetry

In math, fractals are special structures which are infinitely detailed,

repeating basic forms no matter how much you zoom in. They remain infinitely detailed and intricate. Fractal poetry takes this idea of zooming in and out—each [poem](#) can unfold into as many new poems as it had lines, and many poems can be folded together to form a single "master" poem, infinitely in either direction.

All poetry has two essential parts, [structure](#) and content. Without structure it would be prose, and without content it would be gibberish. Whether the structure or the content is more important depends on the type of poem. In [fractal](#) poems, structure clearly comes first.

"Expressing oneself in rigid structures can be quite challenging. Not so for computers. If they are going to express anything at all, they need very clear instructions on the structure of what they express. This comes in handy when writing fractal poetry, because if we really want to appreciate the structure of it, we need to write an enormous heap of connected poems which we can then explore. Such a repetitive task is perfect for a computer. If one can explain to computers how to write [poetry](#), that is," Andreas says.

Most would say that a basic poem has two important elements to its structure, its rhymes and its rhythm (also known as its prosody or "feet"). But as many things in language, the rules for rhyming and rhythm are not completely clear, at least not in the sense that they are easy to explain to a computer. Joshgun Sirajzade, data linguist and postdoctoral researcher at the Department of Computer Science and Communication, points out that rhymes are particularly challenging. "We want the computer to write poems using letters, but these letters do not clearly convey the sounds of the word. So how do you explain the computer that "thought" and "drought" do not rhyme, while "sauce" and "paws" does rhyme? The secret is to use the International Phonetic Alphabet (IPA). This is a so-called phonetic transcription, in which each symbol expresses a unique sound. By comparing how similar their phonetic transcriptions are, a computer can decide how well two words rhyme," Joshgun explains.

Are humans still the masters of poetry?

Now, say you get the computer to write a big, complex fractal poem. Does it have any artistic value? The computer itself does not know the meaning of the words it is using. It is free of creativity and imagination. Essentially, a [computer](#) is a mirror that reflects any human idea that it is taught. Does the poem have to be written with some sort of intent before it can make any kind of sense? Andreas believes: "It is not important how the poem was intended. It is more important how it is received. Only with our imagination does it become something like art."

Provided by University of Luxembourg

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