

A Poetics of Exhaustion: Looking at the Automation of Literature from its Dead Ends

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Abstract

English

Since Renaissance-era Lullism, the history of computational and computer-generated literature has been one of dead ends which were reflected among others by Jonathan Swift, Georges Perec, Italo Calvino, Franz Josef Czernin, and more recently in the fields of Internet and Deep Learning-based literature. These crises and dead ends have their root in what I would propose to call the kaleidoscope constraint of literary computation. The historical development of computational methods and technology from simple combinatorics via Markov chains to neural networks did not lift this constraint, since it only brought (to borrow from finance) quantitative easing of a qualitative problem. - In the course of sketching this history, I would also like to put some question marks behind common understandings of “digital” and “creativity”.

Deutsch

Seit der frühneuzeitlichen ars combinatoria ist die Geschichte der generativen und computererzeugten Literatur eine Geschichte von Sackgassen und Krisen, die u.a. von Jonathan Swift, Georges Perec, Italo Calvino und Franz Josef Czernin beschrieben wurden und sich seit jüngstem auch auf Netzliteratur und Deep Learning-basierte Texterzeugung erstrecken. Diese Krisen haben ihren Ursprung in dem, was ich “kaleidoskopischen Formzwang” berechneter bzw. generativer Literatur nennen möchte. Dieser Formzwang wurde in der historischen Weiterentwicklung von Rechenmethoden und -techniken - von der einfachen Kombinatorik über Markov-Ketten bis hin zu neuronalen Netzen - nicht aufgehoben, sondern (in der Sprache des Finanzmarkts ausgedrückt) nur quantitativ gelockert. Im Zuge dieser skizzierten Geschichte möchte ich auch Fragezeichen hinter verbreitete Begriffe des “Digitalen” und der “Kreativität” setzen.

Dead ends and crises in computational poetics

The likely reason for my invitation to this conference is my past work on the automation of literature, among others in my doctoral thesis from 2006 in which I attempted to write a history of computational

literature from the Renaissance ars combinatoria to present Internet art, including its precursors in poetry and mysticist writing of the antiquity and Middle Ages. I have only sporadically revisited this topic since, because my thesis concluded with a dead end: that throughout its long but often overlooked history, computational poetry has been characterized by a structural discrepancy between the speculative imagination concerning the powers and potentials of computing language versus the fragmentary and often disappointing outcomes of these experiments.

The poetics of automated literature was, in other words, more interesting than its poetry. With Renate Lachmann, I therefore read this history and genre of literary writing as fantastic literature, implicitly as belonging to (using a concept of Gert Mattenklott) a literary anthropology of speculation. The speculative surplus of this poetics meant that the rather simple act of shuffling words in a poem acquired vastly different meanings throughout different centuries and different poetics: as ecstatic mysticism or as technocratic constructivism, as rules or as randomness, as formalist regimes or as aleatoric anarchy, as satanic or as Christian, as classicism or as anti-classicism, to name only a few.

Lullism

The speculative poetics of medieval and Renaissance ars combinatoria and lullism have been summed up in Jonathan Swift's *Gulliver's Travels* as follows:

"The first Professor I saw was in a very large Room, with Forty Pupils about him. After Salutation, observing me to look earnestly upon a Frame [...] by his Contrivance, the most ignorant Person at a reasonable Charge, and with a little bodily Labour, may write Books in Philosophy, Poetry, Politicks, Law, Mathematicks and Theology, without the least Assistance from Genius or Study. He then led me to the Frame, about the Sides whereof all his Pupils stood in Ranks. It was Twenty Foot Square, placed in the Middle of the Room. The Superficies was composed of several Bits of Wood [...]. They were all linked together by slender Wires. These Bits of Wood were covered on every Square with Papers pasted on them; and on these Papers were written all the Words of their Language [...]. The Professor then desired me to observe, for he was going to set his Engine at work."¹

This satire is effective because it does not actually exaggerate Renaissance Lullism, but describe it very factually. In the 17th century, the German polymath Johann Joachim Becher had constructed an almost identical apparatus for machine translation from Latin into modern languages,² and the poet and mystic Quirinus Kuhlmann had envisioned nineteen combinatorial and automated arts and sciences, among them an automated "ars magna librum scribendi" which would be "of such perfection that no mortal being would be able to write a book that wasn't already contained in our Ars scribendi".³

17th century poetic and scientific Lullism failed because its machines never amounted to more than theoretical sketches or prototypes that over-promised, but under-delivered. In the early 18th century,

¹Swift, Jonathan. *Gulliver's Travels*. Edited by Herbert Davis, Basil Blackwell, 1965.

²Becher, Johann Joachim. *Character pro notitia linguarum universali*. Frankfurt, 1661

³"tanta perfectione, ut nullus Mortalium librum edere posset, quem nostra Ars scribendi non comprehenderet", Quirinus Kuhlmann, *QUIRINI KUHLMANNI PRODOMUS*. Amsterdam: Lotho de Haes, 1674.

when scholastics was replaced by empirical science and - in the arts - rule-based poetics with the new paradigm of aesthetics, the Lullist project of automated creativity had logically come to an end. Swift only needed to summarize it in order to make fun of it. In a classical paradigm shift (as defined by Thomas Kuhn), ars combinatoria and automated creativity became marginalized, living on in the niches of games, children's books, humorism, and also the occult.

When Raymond Queneau resurrected the literary ars combinatoria in 1961 with his *One Hundred Thousand Billion Poems*, this was still in the spirit of ludics and children's games.⁴ The poems initiated the Oulipo group of literary writers and mathematicians, among them Georges Perec and Italo Calvino. The group formally operated as a section of the Parisian Collège de Pataphysique which had been modeled after Alfred Jarry's poetic-absurdist science of pataphysics. The new automation of literature in the 20th century thus did not erase Swift's epitaph, but confirmed its framing of literary combinatorics as organized silliness.

The Oulipo began its collective work in the same years when Marshall McLuhan's book *Understanding Media* was published.⁵ McLuhan defined media, broadly synonymous with technology, as "extensions of man". This discourse has since dominated the discourse of media and technology where new technologies are understood as progressive function updates. The poetics of Oulipo, however, was the opposite, since it understood techniques and technologies, including computation and algorithms, as "constraints" instead of extensions.

In 1968, Georges Perec wrote a radio play for the German Saarländischer Rundfunk, "Die Maschine" ("The Machine") in which a simulated computer processes Goethe's *Wanderer's Nightsong* using the very formal text processing methods developed in the Oulipo.⁶ This processing factually anticipates much of the algorithmic text processing done today in the Digital Humanities. But it ends up as an ultimately futile and pointless exercise of constraining a literary text.

Since 1959 and parallel to the Oulipo, the *Stuttgarter Schule* ("Stuttgart School") of experimental poets around Max Bense, Helmut Heißenbüttel und Reinhard Döhl had created computer-generated poetry which it called "artificial poetry".⁷ The dead end in Perec's *Machine* ended up becoming the dead end of artificial poetry, too. According to Döhl, Perec's radio play had such a crushing effect on the *Stuttgarter Schule* that it gave up computer generative poetry.⁸

In his 1967 lecture *Cybernetics and Ghosts*, Oulipo member Italo Calvino saw computer-generated literature at a similar dead end when he concluded that "the style of a literary automaton" and "its true vocation would be for classicism", in the sense of "traditional works, poems with closed metrical forms, novels that follow all the rules".⁹ In the same year, the American novelist John Barth criticized

⁴Queneau, Raymond. *Cent Mille Millions de Poèmes*. Gallimard, 1961; English translation in Mathews, Harry, and Alastair Brotchie, editors. *Oulipo Compendium*. Atlas Press, 1998.

⁵McLuhan, Marshall. *Understanding Media: The Extensions of Man*. 1964.

⁶Perec, Georges. *Die Maschine*. Stuttgart: Reclam, 1972.

⁷Lutz, Theo. "Stochastische Texte." *Augenblick*, vol. 4, no. 1, 1959, pp. 3–9.

⁸"[E]in Hörspiel, das [...] uns, die wir ja vom Text zum Computer gekommen waren, wie ein vorläufiger Schlussstrich erschien. [...] Wir haben diese Ansätze außer in Vorträgen und Diskussionen damals nicht weiter verfolgt, sondern unser Interesse an künstlerischer Produktion mit Neuen Medien und Aufschreibsystemen in andere Richtungen ausgedehnt". Döhl, Reinhard. „Vom Computertext zur Netzkunst. Vom Bleisatz zum Hypertext“. *Liter@tur: Computer - Literatur - Internet*, Hansgeorg Schmidt-Bergmann and Torsten Liesegang (eds.), Bielefeld: Aisthesis, 2001, 27–50.

⁹Calvino, Italo. "Cybernetics and Ghosts." *The Uses of Literature*, Harcourt, 1982, pp. 3–27.

experimental poetry at large as a *Literature of Exhaustion* that exhausted itself in materially creating proteic variations instead of more simply imagining them, as for example in the prose of Jorge Luis Borges - or, as one might add, Jonathan Swift.¹⁰

The history of literary computing and generative poetry thus can not only be told as a history of dead ends, but perhaps even needs to be told from a perspective and vantage point of its periodical crises since the collapse of the ars combinatoria at the turn of the 17th and 18th century. More recent examples include the attempts and ultimate frustration and failure of the Austrian experimental poet Franz Josef Czernin to write computer-aided poetry with the experimental linguistic processing software “POE” in the 1990s,¹¹ the short-livedness of various schools of electronic literature since the invention of the World Wide Web, including German-language “Netzliteratur” and its collapse in the early 2000s. Contemporary electronic literature suffers from the issue that its scholars either outnumber its writers or, as Álvaro Seica has analyzed, are even identical with them.¹²

It remains to be seen whether the current boom of artificial intelligence text generation using neural networks and Deep Learning will produce similar frustrations. A recent “Guardian” op-ed article written by the currently most advanced artificial intelligence language generator GPT-3, suggests that the technology does not resolve the issues stated by Calvino and others.¹³ Realistically, this form of automated creativity is destined to take over major part of vernacular text production (from articles to reports and helpline chat bots) and thus find indirect ways into literary writing.

Structural issues

From Lull to GPT-3, there have been two, maybe three major modes - or techniques - of language computation and machine-generated literature:

- 1) synthetic computation of pre-defined elements according to pre-defined (or “hard-coded”) rules, in a period from the 13th to the 20th century - with historical origins in the medieval Kabbalah and Lullist combinatorics and continued up to so-called Symbolic Artificial Intelligence (“Symbolic AI”). Examples include Renaissance word permutation poems, the machine described by Swift in *Gulliver’s Travels*; computational poetry of the Oulipo including Raymond Queneau’s 100.000 Billion Poems; but also more recent machine translation systems such as the Internet service *Babelfish*.
- 2) analytic computation of arbitrary text input through pre-defined rules or algorithms, in the 20th and 21st century. It began with Andrei Markov’s invention of Markov chains and his processing of Pushkin’s *Eugene Onegin* in 1906, continued with Tristan Tzara’s 1920 instruction to make Dadaist poetry by cutting out and shuffling words of an arbitrary newspaper article, Brion

¹⁰Barth, John. “The Literature of Exhaustion.” *The Friday Book*, 1984, pp. 62–76.

¹¹Czernin, Franz Josef, and Ferdinand Schmatz. *Teller und Schweiss. Gedichte aus POE*. Pakesch & Schlebrügge, 1991

¹²Seica, Álvaro. “Digital Poetry and Critical Discourse: A Network of Self-References?” 2182-8830, Centro de Literatura Portuguesa Imprensa da Universidade de Coimbra, 2016. Many scholars formerly active in this area have moved on to such fields as computer game studies, digital humanities and cultural studies of computing and technology.

¹³<https://www.theguardian.com/commentisfree/2020/sep/08/robot-wrote-this-article-gpt-3> . Not only leaves the text much to be desired, it also turned out that it needed to be heavily edited by human editors: <https://www.theguardian.com/technology/commentisfree/2020/sep/11/artificial-intelligence-robot-writing-gpt-3>

Gysin's and William S. Burroughs' cut-ups in the 1950s, and literature written with the help of Markov chains such as Max Bense, *Der Monolog der Terry Jo* (1968), Jackson Mac Low's "diastic" poems from the 1980s, Charles O. Hartman's and Hugh Kenner's *Sentences* (1995) and Ray Kurzweil's *Cybernetic Poet* from 2001.¹⁴

- 3) analytic computation of arbitrary input through dynamically adjusted rules - such as in Deep Learning -, with the present-day example of GPT-3.

While language computation became arguably more sophisticated with each new technique, none of them changed the fundamental structure, and constraint, of language computation: mathematical shuffling of predefined (text) material. This is what I would propose to call the *kaleidoscope constraint* of generative literature, and of automated creativity in general. But before explaining it in more detail, allow me to first digress on the notions of "digital" and "creativity".

Digression: digital, creativity

In the history I presented, electronic computer technology plays an important yet not decisive role, since most literary computations do not fundamentally depend on it. But this is not to dispute digitality. Digitality only needs to be put into a larger historical perspective. Since the standardization of alphabets and the equation of letters to numbers in the Greek and Hebrew antiquity, writing in Western culture has been digital; not in a metaphorical, but in the literal scientific definition of "digital" as information encoded into discrete, countable units.¹⁵ The early digitization of language into alphabets was a necessary precondition for any combinatorial poetics, including the computation of names as numbers in the Kabbalah and older schools of mysticism and magic.¹⁶

Secondly, with Oulipo's concept of the constraint along with the observation that automated literature boils down to shuffling linguistic units, one could ask whether computational poetics are *uncreative* rather than creative. Here I am borrowing from the poet Kenneth Goldsmith.¹⁷ Conversely, the notion of "automated creativity" risks to reinforce a problematic romanticist, and nowadays neoliberal,¹⁸ concept of art as creativity.

Kaleidoscope constraint

Constraints, exhaustion and dead-ends of generative systems are not only a matter of poetics, but above all of aesthetic experience. This experience kicks in soon enough when reading permutation poems or robot journalism, watching algorithmically generated visuals and listening to computer-generated music.

¹⁴Hartman, Charles O., and Hugh Kenner. *Sentences*. Sun and Moon Press, 1995.

¹⁵This also is how Goodman, Nelson. *The Languages of Art*. Hackett, 1976, defines digital versus analog.

¹⁶As described in Dornseiff, Franz. *Das Alphabet in Mystik und Magie*. Teubner, 1925.

¹⁷Goldsmith, Kenneth. *Uncreative Writing: Managing Language in the Digital Age*. Columbia University Press, 2011.

¹⁸Such as in the policymaking concepts of the "creative class" and "creative cities" in Florida, Richard. *The Rise of the Creative Class* Hachette UK, 2002 and Landry, Charles. *The Creative City: A Toolkit for Urban Innovators*. Earthscan, 2012.

Whatever the technique or technology, ‘automated creativity’ not only boils down to remixing, but also to remixing as an aesthetic end to itself.¹⁹ The constraint of every generative system is that recombining elements means almost endless possibilities in theory, but gets dull and pointless very soon in practice.

As a result, the promise of extension conflicts with the reality of constraint. This does not only apply to automated literature, but to any programmed system. It is the same aesthetic effect as that of watching the visual shapes generated by a kaleidoscope - an instrument whose early history is part of 17th century *ars combinatoria* since it was co-invented by the Lullist polymath (and later correspondent of Quirinus Kuhlmann) Athanasius Kircher. When talking about machine-generated art and automated creativity, we are effectively talking about glorified kaleidoscopes. Therefore, I propose the concept of the “kaleidoscope constraint” for computational poetics and aesthetics, and use it to explore poetics that do not exhaust itself in it.

The history of computational poetics could be told as a history of quantitative easing of the kaleidoscope constraint: that is, burying a structural problem by throwing more resources at it. Since the larger-scale emergence and institutionalized of computer-generative arts, this quantitative easing has disguised a much smaller extent of qualitative (such as: aesthetic and hermeneutic) “gains”. Thereby it has also upheld the McLuhanian and techno-Hegelian narrative of extension rather than constraint, and fostered collective failures to think of any extension as being a constraint simultaneously.

Postscript on Deep Learning

What are the foreseeable limitations of Neural Network-based “Deep Learning” algorithms (which nowadays are often - but not quite correctly - understood as being synonymous with “artificial intelligence”)?

First and foremost, these are systems for pattern *recognition*; algorithms that find regularities in unstructured data sets. They thus are primarily perception, not creation systems. However, when performing pattern recognition, they reconstruct information that is not actually contained in a data set, such as object details in a blurry photograph or, hypothetically, missing words in a fragmented text.

Deep Learning algorithms are therefore likely to become part of ordinary word processing software where they could, among others, auto-complete sentences that only consist of a beginning or a few keywords. Their ‘learning’ is purely based on heuristics - respectively on probabilities found in the training material. As a result, these algorithms reconstruct the present from the past; or, more simply put, they constantly stereotype.

An advanced Deep Learning system trained on 19th century realist novels as a data set would forever keep writing novels in the style of 19th century realism (or better phrased: remixes of these novels), but it would never be able to write *Ulysses*, for example. Arguably, Italo Calvino’s diagnosis of classicism, or conservatism and conventionalism, applies to Deep Learning even more than to the combinatorial poetics he studied with the Oulipo in the 1960s.

¹⁹Except when those computations are being tactically used outside their own logic, such as by the YesMen for its spoof of the WTO website, for example: Bichlbaum, Andy, et al. *The Yes Men: The True Story of the End of the World Trade Organization*. Disinformation, 2004.