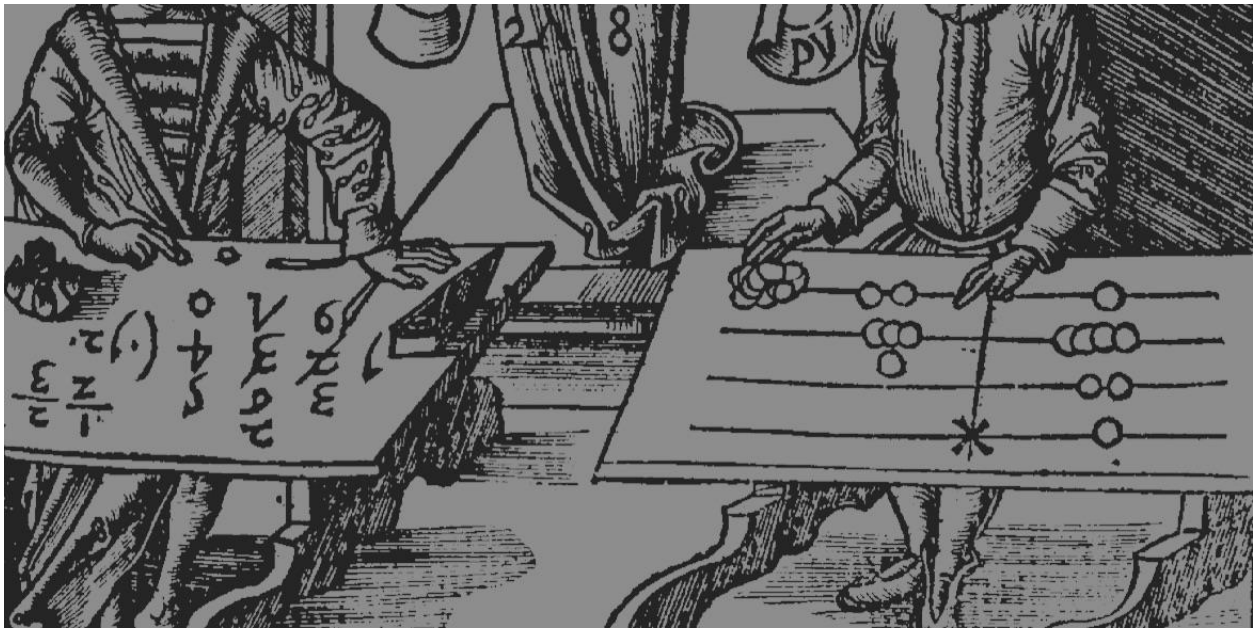

"Algorithmic Spenser": Letter from the Editors

By Bethany Dubow (University of Oxford) and Michael Ullyot (University of Calgary)

> Howe profitable and necessarye this feat of Algorisme is, to all maner of persons, whiche haue rekenynges or accountes, other to make, or elles to receyue.
>
> (Anon, *An introduction for to lerne to recken* [...], *accordyng to the trewe cast of algorisme*, 1546)

The articles in this special issue of *The Spenser Review* explore what Spenser has in common with the scholars who study him—and, in particular, how both he and we use rule-based procedures to solve problems. His metrical, narrative, and conceptual problems differ from ours; he developed formulae like stanzas, quests, and logical interrogations to address them. Our second-order problems are interpretive. They incur sub-problems like organization, comparison, and argument. Solving—or rather, addressing and alleviating—our problems is typically a matter of following standard, conventional procedures: reading Spenser's text alongside others; comparing those readings; arranging our ideas and citations; and presenting them in our best efforts at rhetorical persuasion.

Interpreting Spenser is therefore an iterative and self-reflexive process of reviewing and re-examining his words, transmuting them into readings. Our work of interpretation blends intellectual rigor with imagination, ingenuity, and memory. Thus criticism, which resists reduction to logical procedures, also resists the

algorithmic focus of this special issue. Yet, while it relies heavily on associative and intuitive processes, criticism also builds on the logical operations of organization, selection, and comparison. We might follow an algorithmic approach by setting parameters for what to notice in a text, selecting evidence, and then formulating persuasive arguments based on those patterns—a procedure that Stephen Ramsay has likened to algorithms' logical, goal-oriented nature.[1]

When choosing exemplary quotations to cite in our readings, we deploy logical procedures for sorting and retrieving—rather like Spenser's Eumnestes in *The Faerie Queene*, who enlists Anamnestes as algorithmic assistant in his library. "Tossing and turning" his records "withouten end" (II.ix.58.2), Eumnestes navigates his world wide web of scrolls with the help of the Anamnestes, or "Re-minder," retrieval function.[2] As algorithmic assistant, the "litle boy" is employed to Ctrl-F whatever the old man has "lost, or laid amis" inside his formidable, scrambled data storage system (II.ix.58.6). Early modern books offered similar indices, contents pages, and cross-references that functioned as proto-search engines, allowing readers to quickly retrieve pertinent information from vast compilations of knowledge.[3] In an age of rhetorical resourcefulness, deploying the right commonplace was often the difference between compelling or empty arguments.

The question the articles in this issue pose is how "algorithmic" are Spenser's processes of information retrieval and arrangement, like those of his interpreters: that is, to what degree are they logical, rule-based procedures? An algorithm is a precise, step-by-step procedure for solving a problem or accomplishing a task, based on a set of well-defined rules or instructions. More broadly, it is any rule-based system or formula that takes an input, performs a series of operations, and produces an output in a predictable way. Computer scientist Chris Bleakley has defined an algorithm as "a series of steps that can be performed to solve an information problem," comparing it to a recipe.[4] Bleakley points to some of the earliest algorithms inscribed on clay tablets dating from the Old Babylonian period (ca. 1894–1595 B.C.E.). These ancient algorithms take the form of *how-to* and *if-then* procedures and record a range of knowledge practices. Some are mathematical—how to calculate interest on loans, or

[1] Stephen Ramsay, *Reading Machines: Toward an Algorithmic Criticism* (Chicago: University of Illinois Press, 2006), 171.

[2] "Re-minder," as a gloss on Anamnestes, is A. C. Hamilton's, based on the transliteration of Anamnestes from Gk. οναμνηστικες. See Hamilton's note to II.ix.58.8-9.

[3] Thomas N. Corns, "The Early Modern Search Engine: Indices, Title Pages, Marginalia and Contents." In *The Renaissance Computer: Knowledge Technology in the First Age of Print*, ed. Neil Rhodes and Jonathan Sawday (London and New York: Routledge: 2000), 93-102. See also Ann Moss, *Printed Commonplace-books and the Structuring of Renaissance Thought* (Oxford: Clarendon Press, 1996).

[4] Chris Bleakley, *Poems That Solve Puzzles: The History and Science of Algorithms* (Oxford: Oxford University Press, 2020), 1.

predict astronomical occurrences—but others are legal or medical (*Poems That Solve Puzzles* 13-18).

Applying this understanding of algorithms to Spenser's works reveals parallels and contrasts in how information is processed within his texts and by their interpreters. In "December" of *The Shepheardes Calender*, Colin relays his miseducation in algorithmic problem-solving: for all that he has learnt to calculate "the signes of heaven," predict the "sodain rysing of the raging seas," and deploy "the hidden kinds of many a wede," still he lacks the *how-to* that would allow him to "cure" his "sore hart roote" (83-93). Colin's complaint may suggest Spenser's own limited fluency (according to Gabriel Harvey) in natural philosophical reckoning.[5] But the shepherd's particular dilemma is that no part of his learning instructs him in how to heal his love's wound.

In his contribution to this special issue, Archie Cornish shows how characters in *The Faerie Queene* routinely search their own and other's wounds in order to harvest the data that will enable them to construct a *how-to* for healing: a form of algorithmic reasoning comparable to, but not analogous with, the searching of corpora by literary critics, algorithms, and critics-as-algorithms. For Cornish, corporeal searching, like critical searching, operates within positively, tightly defined parameters and "hardens its objects." However, the same process falters when Spenser's wounded knights strike out across the plain: in this context, "deep searching yields to wide." Illustrating how non-algorithmic searching enables stumbling *upon*, Cornish sets the unfolding of "Fairyland" against algorithmic determinism, and especially against the narrowing effect of the recommender algorithm, which—on today's internet (as well as in certain cafés and libraries)—forecloses the serendipity on which Spenser's allegory depends.

Yet, if an element of chance is paradoxically necessary to *The Faerie Queene*'s allegorical ends, its narrative stumblings are still yoked to a verse form that is highly constrained, iterative—mechanical, even. In his introductory essay to *A Concordance to the Rhymes of The Faerie Queene*, J. B. Lethbridge has described Spenser's verse as a "complex machine," proposing that satisfying *The Faerie Queene*'s "restrictive"

[5] Mary Thomas Crane translates Harvey's note in his edition of Dionysius Perigetes's *The Surveye of the World*: "Spenser himself, even if he isn't completely ignorant of the Sphere and the astrolabe, is unlearned in astronomical laws, tables, and instruments" (95). In her own analysis of Spenser's natural philosophical understanding, Crane counters Harvey's tease—see *Losing Touch with Nature Literature and the New Science in Sixteenth-Century England* (Baltimore: John Hopkins University Press, 2014), 94-122.

rhyme scheme involves a degree of "systemic automation."[6] Lethbridge's argument draws on the *Concordance*'s tables of the poet's rhymes which reveal the extent to which his rhymes are "massively repetitive" (*Bondage of Rhyme* 76). Lethbridge shows how, in addition to relying on formulaic rhymes (for instance, on *-ight*—as in *might*: *knight*: *wight: sight*), Spenser recycles rhetorical and syntactical formulae, such as "of mickle might," "furious and fell," and "both night and day" (*Bondage of Rhyme* 136-143). Lethbridge's analysis of Spenser's strategy for supplying, at scale, the verbal *res* for his stanza to process comes close to making Spenser a poet of autocomplete, so that if Spenser writes "returned backe," his internal algorithm predicts "backe againe" (*Bondage of Rhyme* 149).[7] Or if a given knight fights with "all his might," Spenser's internal algorithm recommends he completes the phrase: "all his might and maine" (*Bondage of Rhyme* 141).

Building on Lethbridge's mechanistic description of Spenser's versification, Chloe Holmquist's article in this issue theorizes Spenser's stanza as governed by an "algorithmic logic" that works effectively, yet imperfectly, to organise Spenser's straying verbal "bits," or "bytes," into allegorical "code." This is, in effect, versification as *algo-rhythm*—what Catherine Nicholson has described as "the painstaking calculus of syllabic measure," or the iterative art of outputting differently weighted units across a line.[8] Yet, for Holmquist, a poetically necessary excess of meaning is generated by *The Faerie Queene*'s "algorithmic uncertainty." Moving between the "corrupted iott[s]" extracted from the Redcrosse Knight's body in the House of Holinesse, the "little bits" of words and text recursively integrated into Spenser's verse, and the quantitatively imprecise "bytes" of the computer scientist, Holmquist attends to the material significances of Spenser's less-than units: the "little bits," "lumpes," "gobbets," and "lumpes" that accrete around the clean lines of Spenser's constraining formal logics.

In his contribution to this issue, Tyler Dunston also considers the computerized algorithm, but connects this to a broader history of material culture and its pattern-making technologies. If, as Bleakley explains, a computer is by definition "a machine that performs algorithms," then some of the first algorithms to be mechanized were

[6] J. B. Lethbridge, "The Bondage of Rhyme in *The Faerie Queene*: Moderate 'This Ornament of Rhyme,'" in *A Concordance to the Rhymes of The Faerie Queene*, ed. by Richard Danson Brown and J. B. Lethbridge (Manchester: Manchester University Press, 2013), 76–180 (76, 120, 134).

[7] We have in mind here Colin Burrow's predictive text poetry in *Imitating Authors: Plato to Futurity* (Oxford: Oxford University Press, 2019), 408-9.

[8] Catherine Nicholson, *Reading and Not Reading* The Faerie Queene (Princeton: Princeton University Press, 2020), 178.

instructions for outputting the binary stitches of textile (*Poems That Solve Puzzles* 6, 39-40). Linking Spenser's analogies between weaving and versification to the pre-history of the modern computer in the Jacquard Loom, Dunston considers the algorithmic dimension of Spenser's "text" as "textile." In his dedicatory sonnet to Lord Grey in *The Faerie Queene*, Spenser casts himself as if as a second Penelope, weaving "Rude rymes [...] In sauadge soyle"—alone at his "vnlearned Loome" (DS10 11-13). Spenser is islanded in Ireland, not Ithaca, but he is also without a sovereign close by. Identifying Spenser's pattern for algorithmic imitation as a distant Elizabeth I, Dunston attends to the recursive symmetries of Spenser's stitched syllables, mirroring tapestries, and reflective images. In particular, he argues that the "enveloping" effect of this design risks trapping the reader as the algorithm, like the tapestries in the House of Busirane, runs away with its own object.

Both Dunston's and Holmquist's attention to the moveable units of Spenser's verse suggests the early sense of algorithm as counting: "the trewe cast of Algorisme," in Spenser's England, comprised the knowledge of how "to recken with the pen, or with the counters," using the Hindu-Arabic number-system.[9] "Algorisme" takes its name from the ninth-century Arabic mathematician, Muhammad ibn Mūsā al-Khwārizmī, but became "algorithm" in the late sixteenth century—apparently classicised under the influence of *arithmos*, the Greek word for "number."[10] In the *The Book of the Duchesse*, Chaucer invokes al-Khwārizmī as "Argus, the noble countour," deploying, as Paul Acker shows, the romance *topos* of "innumerability" to stress the limits of algorithmic reckoning.[11] For Chaucer, the powers of algorism are not, like Argus, all-seeing. Even if al-Khwārizmī "Sete to rekene in his countour" the matter of the poet's dream, "Yet shulde he fayle to rekene even / The wondres, me mette in my sweven" (441-42). Here, al-Khwārizmī's sophisticated use of his "countour," his abacus, is insufficient to process the scale and complexity of the poet's experience. Chaucer seems also to hint at the superior computative power of his own verse *numerus* (in Spenser's description, the powerful metric "numbers" of "that renowmed Poet" [IV.ii.32.6-7]).[12]

[9] Anon, *An introduction for to lerne to recken* […], *accordyng to the trewe cast of algorisme* (London, 1546), A1r.

[10] Oxford English Dictionary, s.v. "Algorithm, n.1"

[11] Geoffrey Chaucer, "The Book of the Duchesse," in *Romaunt of the Rose; Minor Poems*, ed. Walter Skeat, *The Complete Works of Geoffrey Chaucer*, vol. 1. Second Edition (Oxford: Oxford University Press, 1899), 227-322 (line 435); Paul Acker, "The Emergence of an Arithmetical Mentality in Middle English Literature", *The Chaucer Review*, Vol. 28, No. 3 (1994), 293-302.

[12] Spenser's "numbers" as a metonym for verse translates from the sense of *numerus* (Lat.) as "rhythm," or "metre." On verse "numbers," see *The Princeton Encyclopedia of Poetry and Poetics: Fourth Edition*, ed. Roland Greene et al., 4th edn (Princeton, N.J.: Princeton University Press, 2012), 958.

While "this feat of Algorisme" (in our 1546 epigraph) had numerological as well as—in Chaucer's handling—poetic resonance, its practical power makes it part of the pre-history of algorithmic problem-solving in the applied sciences of numeration and measurement.[13] Long before computers were programmed to perform our algorithms at speed, instruments like the abacus (al-Khwārizmī's "countour") and astrolabe supplied the hardware for human observers to reckon with the vast data of the universe. This historical connection between algorithms and counting extends beyond just calculation, entangling with broader concepts of reasoning and logic. Though logical argumentation and deductive thinking are irreducible to bare numeration, both classical rhetoric and medieval scholasticism associate the two: breaking arguments into premises and conclusions, equating reason ("ratiocination") with mathematical computation as Hobbes does in *De Corpore* (1655).[14] Thomas Hobbes's view of reasoning as computation marked a shift in philosophical thinking, toward more mechanistic approaches to logic and cognition. Thus Gottfried Leibnitz describes his calculating machine (inspired by Blaise Pascal's adding machine of 1642 and demonstrated to the Royal Society in 1673) as "the calculus ratiocinator"—by which, he said, "all truths of reason would be reduced to a kind of calculus."[15] This conceptual evolution, from mathematical computation to a broader understanding of reasoning, reflects the intertwining of quantitative methods and philosophical inquiry in the early modern era.

But not everything that counts can be counted, as they say; there are unquantifiable ineffable elements of creation, literary or otherwise. While the intricacy and number patterning of Spenser's organisational schemes has long attracted critical notice, so has the anxiety of incalculability over which they scaffold.[16] In Book IV, Eumnestes's strenuously "endlesse exercise" (II.ix.59.2) transforms into Spenser's "endlesse worke" as the pragmatic *how-to* of algorithmic step-taking collapses into the

[13] On the pre-history of the modern algorithm, see, e.g. Bleakley, *Poems That Solve Puzzles;* Morgan G. Ames and Massimo Mazzotti, *Algorithmic Modernity: Mechanizing Thought and Action, 1500-2000* (New York and Oxford: Oxford University Press, 2023).

[14] "By RATIOCINATION I mean computation. Now to compute, is either to collect the sum of many things that are added together, or to know what remains when one thing is taken out of another. Ratiocination, therefore, is the same with addition and subtraction" (Thomas Hobbes, *Elements of Philosophy*, *The First Section Concerning Body (De Corpore)* ed. J.C.A. Gaskin, Oxford: Oxford University Press, 1994, pp. 186–7).

[15] These Hobbes and Leibnitz examples are from Jonathan Sawday, "Towards the Renaissance Computer," in Rhodes and Sawday, eds. *Renaissance Computer,* 27-41; 28-29.

[16] The 1960s saw particular scholarly interest in the numerologically significant number patterns, and geometric proportions (more broadly conceived), that structure Spenser's poetry, as in A. Kent Hieatt, *Short Time's Endless Monument: The Symbolism of the Numbers in Edmund Spenser's* Epithalamion (New York: Columbia University Press, 1960); Alastair Fowler, *Spenser and the Numbers of Time* (London: Routledge and Kegan Paul, 1964). Critical attention to Spenser's anxieties about what cannot be counted or measured is perhaps more various, but in recent years has become more ecologically inflected—as in, for example, discussion of Spenser's "gruesome and terrifying vision of teeming life" (295) in Joseph Campana, "Spenser's Inhumanity," *Spenser Studies* 30 (2017), 277–299.

aporia of just "to count" and "recount" "numberlesse" material quantities (IV.xii.1). In Book VI, this indeterminacy is transposed onto algorithmic procedures as Aldus, learning of his son's injury, laments how "earthly things, […] fall too short of our fraile reckonings" (VI.iii.5.2-4). Aldus's hypallage transfers the proverbial frailty of mortal "things" onto abstract, calculative "reckonings"—putting pressure on a quadrivial metaphysics that made numerical conclusions immune to material corruption.[17]

Following Chaucer's recourse to the *topos* of "innumerability" in his figuration of al-Khwārizmī's limited power, Spenser's imaginative investment in the concept of incalculability stands in contrast to the algorithmic thinking that dominates our era. We read Spenser in an age of mechanistic reckoning, when seemingly every problem is reducible to algorithmic operations on data. But comparing texts to data, comparing our interpretive work to algorithms, is not to capitulate to Silicon-Valley instrumentalism—rather, it is to co-opt it to serve our interests. The articles in this issue explore the capabilities of the cyborg-critic, who makes effective prostheses of powerful algorithms.

Ramsay has foretold computational processes becoming "a privileged part of the [literary critic's] argument being made" (*Reading Machines* 173). Instead of viewing algorithms as a threat to interpretation, or as mechanisms merely to support or contest existing interpretations, he envisions them as experimental, estranging, generative practices that yield new critical insights. Drawing on Jerome McGann and Lisa Samuels's notion of "deformance," Ramsay explores how "deformative procedures" can reveal new patterns and details in texts that human readers miss: "Instead of concording the nouns in a text," he writes, "we might create machines that cleave off all words except the nouns; instead of flagging the gender terms in a text, we could reverse them; instead of generating word frequency lists, we can alter the typography by order of frequency" (*Reading Machines* 33, 172).

Thus, in her contribution to this issue, Penny McCarthy tests algorithms for critical interpretation with her provocatively "prae-posterous" reading of *The Faerie Queene*. McCarthy takes her cue from the twenty-first-century computer scientist's "forward-backward" algorithm, pre-modern precedent for which she finds in the rhetorical scheme of *hysteron proteron*, or "the later first." Beginning with the "backwards" placement of the *Letter to Raleigh* at the end of the 1590 edition—and its

[17] For an articulation of this Neoplatonist metaphysics, see e.g., John Dee, 'To THE VNFAINED LOVERS of Truthe […],' in Euclid, *The Elements of Geometrie of the Most Auncient Philosopher Euclide of Megara* […], trans. Henry Billingsley (London, 1570), *iᵛ.

plotting of the poem's beginning in its "last" book (*LR* 49-51)—McCarthy proposes a forwards-backwards reading of *The Faerie Queene*. In support of this claim, McCarthy highlights numerous narrative elements that appear puzzling if read linearly but resolve into coherence when read in reverse order. These include the sequence of the Seven Deadly Sins and the gradual, incremental revelation of characters' identities over the course of the narrative. McCarthy finds further basis for authorial intentionality behind this "prae-posterous" reading method in Spenser's playfully disingenuous correspondence with Harvey. Ultimately, McCarthy suggests that applying a "forward-backward" hermeneutic to *The Faerie Queene* can defamiliarize and refresh our sense of the poem's coherence, in a manner akin to the "smoothing" outputs produced by certain algorithmic procedures.

Deformance and inversion militate against the linear attention of human readers, and are among the methods that algorithmic critics learn from our machines. We expand them beyond individual texts to larger-scale corpora, as in Evan Bourke's contribution to this issue. Bourke demonstrates how deformative techniques yield disruptive, estranging, and recombinative insights. His article draws on data from the MACMORRIS project at Maynooth University, which uses network analysis algorithms to explore a dataset that brings together anglophone and Gaelic texts from early modern Ireland—texts that traditional scholars rarely read in relation to each other. By applying these computational methods, Bourke uncovers unexpected connections between the poetry of Edmund Spenser and that of his contemporary, the bardic poet Tadhg Dall Ó hUiginn. These affinities include the two writers' use of fairylore motifs, their similar "brokerage" roles in the period's literary network, and their divergent yet comparable representations of Irish landscapes. In revealing these parallels, Bourke demonstrates how algorithmic approaches can generate new comparative frameworks that challenge the hierarchies and silences of the colonial archive, enabling us to read beyond the limits of established canons and categories.

Bourke's illustration of how algorithms, carefully deployed as critical tool, carve new paths for comparative reading qualifies the perception that computerized algorithms necessarily foreclose fresh insight and creative difference. Today, many share the concern that the most ubiquitous computerized algorithms are, like Talus—Astraea's robotized algorithm for justice—"Immoueable, resistlesse, without end" (V.i.12.6): unseeing in their operations, deadening in their effects. This uneasy and highly contemporary apprehension, as Cornish shows, is shaped by our awareness of

today's market-oriented, digital algorithms—responsible, as Cornish says, for "flattening real-world culture into an unmoored homogeneity," and, online, for the conversion of the early internet's comparably open fields of chance encounter to "new" new media's dangerously narrowing echo chambers.

Thus the articles in this special issue exploit and expand the analogy between the generative constraints of algorithmic and of critical reckonings. This exploration reveals both affinities and divergences between computational *logos* and literary-critical *ethos*. We tend, today, to associate algorithms with computers because computers are fast, and because they give definitive answers. Unlike critics, two computers using the same algorithm on the same inputs will reliably give you the same outputs: algebra is algebra, whether you or I use it today or tomorrow. That two critics reading the same text today or tomorrow are inconsistent is not a sign that our algorithms are incommensurate with algebra. It is a sign that criticism's procedures and heuristics are irreducible to mathematical formulae—and moreover, as Ramsay has argued, criticism's goals to "provoke thought and allow insight" (*Reading Machines* 173) are purposefully generative and nuanced. The articles in this issue demonstrate how this tension between algorithmic precision and critical nuance yield rich and insightful analyses.