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Digital Approaches to John Milton

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See table of contents

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Digital Approaches to John Milton

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The articles in this collection use techniques from the digital humanities (DH) to offer new insights into the poetry and prose generally attributed to John Milton and into Milton's place in seventeenth-century European intellectual culture. Milton scholars and longtime readers of *Renaissance and Reformation* should find much of interest here, including what may be for some an introductory snapshot of some of the current methods and challenges of DH; for others, these articles may provide a fresh look at John Milton and literary studies. The varied techniques here—and the diverse status of the various projects, ranging from prospective forays to finalized and completed analyses—reflect how contemporary DH practices can dovetail with literary studies, even on those occasions when preliminary prototypes and "proofs of concept" contribute substantively to overall arguments. Neither DH nor literary studies, of course, is monolithic; both are scoped broadly as is amply demonstrated by these articles, which range from corpus collection to social networks, from text analysis to authorship attribution, and which include a consideration of how new website interface designs can inform the familiar scholarly edition. The juxtaposition of Milton studies and DH offers multiple avenues of engagement, which prompted the original conference session from which most of these articles are drawn.[1]

The appeal of John Milton to digital humanists should surprise no one— nor should it be surprising that his role in DH, as the following articles show, was established long ago and continues unabated. Miltonists new to DH may be heartened by that history, but all readers who seek engagement with the

1. With the exception of the contribution by Esther van Raamsdonk and Ruth Ahnert, the articles in this issue constituted a panel on "Digital Humanities Approaches to John Milton" that was co-sponsored by the Canadian Society for Renaissance Studies and the Canadian Society for Digital Humanities and was presented as part of the 2019 Congress of the Humanities and Social Sciences conference in Vancouver, British Columbia, 3 June 2019.

works and life of the seventeenth century's most enduringly controversial and revolutionary polemicist and poet will be well served by this special issue, regardless of their familiarity with DH or their critical allegiances. While Catherine Erskin has noted that "John Milton's 1644 declaration that 'Books are not absolutely dead things' makes him a rock star among […] English majors […] covetous of the material, reassuringly physical book,"[2] those of us whose bread and butter is the study of texts—texts as opposed to books—can recognize the importance of the digital without having to concede that the physical book has lost any of its enduring value or transcendent importance. While it is important to engage with all significant authors in the *lingua franca* of the times in which readers find themselves—and "the contemporary academy is already of the digital party whether knowingly or not"[3]—the articles in this special issue continue to engage with and demonstrate the enduring scholarly value of questions raised about John Milton in the pre-digital era.[4] For instance, what can Milton's modest output of sonnets tell us about the sonnet as a genre? What emendations did he make to *Paradise Lost* between the first and second editions? With whom was Milton acquainted closely enough to correspond? What can Milton's style tell us about the less-than-fully-conscious choices he made while writing? And finally, how confident should we really be that Milton is the author of *De Doctrina Christiana*? Just as it would be false to assert that DHers have abandoned their collective love of books, so too would it be false to suggest that the digital approaches to Milton in this issue seek to wholly displace more traditional scholarly approaches. As you will see, the articles

2. Catherine R. Eskin, "'Books Are Not Absolutely Dead Things': English Literature, Material Culture and Mapping Text," *International Journal of Humanities & Arts Computing: A Journal of Digital Humanities* 12.1 (March 2018): 37–47, doi.org/10.3366/ijhac.2018.0205.

3. David Currell and Islam Issa, eds., *Digital Milton* (Cham, Switzerland: Palgrave MacMillan, 2018), 4, dx.doi.org/10.1007/978-3-319-90478-8.

4. On the advantage of digital culture for early modern studies, see Anupam Basu, "Form and Computation: A Case Study," in Currell and Issa, 111–28, dx.doi.org/10.1007/978-3-319-90478-8_5. While recognizing that "problems and challenges remain," Basu makes a particularly compelling case "that early modern studies finds itself in an especially rich moment in terms of digital infrastructure" (115). Classic texts on the reality of ours now being a digital culture include Lev Manovich, *The Language of New Media* (Cambridge, MA: MIT Press, 2001), Katherine Hayles, *Writing Machines* (Cambridge, MA: MIT Press, 2002), dx.doi.org/10.7551/mitpress/7328.001.0001, and Katherine Hayles, *My Mother was a Computer* (Chicago: University of Chicago Press, 2005), dx.doi.org/10.7208/chicago/9780226321493.001.0001.

in this issue work closely with the history of Milton criticism, while positing challenging answers to old questions, exploring new digital techniques, and often raising new questions.

Over the past few decades, stretching back into the twentieth century, Milton criticism has by and large followed the pattern of literary criticism generally. Source study, historicism, and close reading have all survived as valid and valuable approaches to Milton's oeuvre.[5] In the 1980s, what quickly came to be thought of as the "old" historicist criticism was displaced, especially in Renaissance studies, by the now much more familiar New Historicism, which Rachel Trubowitz describes as "the Foucauldian emphasis on the episteme."[6] Typically, that refurbished approach to literary studies was explicitly political and its often ideological readings of texts sometimes led, by extension, to more overt ideological uses of texts. For example, from reading Milton in politically

5. Examples of source study would include David Adkins, "Weeping for Eve: Dido in *Paradise Lost* and Humanist Commentary," *Studies in Philology* 116.1 (2019): 159–93, dx.doi.org/10.1353/sip.2019.0006, and Hannah Crawforth, "The Politics of Greek Tragedy in *Samson Agonistes*," *Seventeenth Century* 31.2 (June 2016): 239–60. An example of historicist approaches to Milton can be found in Christopher Kendrick, "Typological Impulses in *Samson Agonistes*," *University of Toronto Quarterly* 84.2 (Spring 2015): 1–30; and, although many of the essays contained therein date from much earlier, more examples of historicist criticism can be found in Feisal G. Mohamed, Mary Nyquist, and Paul Stevens, eds., *Milton and Questions of History: Essays by Canadians Past and Present* (Toronto: University of Toronto Press, 2012). For an interesting commentary on literary historicism of late, see Catherine Gimelli Martin, "Reception Theory, Religion, and Reading a Milton Sonnet: Historicizing 'Undecideability,'" *The Review of English Studies* 67.278 (February 2016): 79–102, dx.doi.org/10.1093/res/hgv090; an intriguing and unusual close reading can be found in Michael Austin, "On First Reading *Paradise Lost*," *New Criterion* 34.7 (March, 2016): 27–30; see also Diana Treviño Benet, "The Fall of the Angels: Theology and Narrative," *Milton Quarterly* 50.1 (April 2016): 1–13, dx.doi.org/10.1111/milt.12156. Since its publication in 2007, the authoritative text on *De Doctrina Christiana* has been Gordon Campbell, Thomas Corns, John Hale, and Fiona Tweedie, *Milton and the Manuscript of* De Doctrina Christiana (Oxford: Oxford University Press, 2007). The conclusion reached therein is that Milton is the author of *De Doctrina*, but as we learn from James Clawson and Hugh Wilson in this issue, there have been and are dissenting points of view. Examples provided here and in subsequent notes are chosen more to display variety than to offer representativeness.

6. Although Trubowitz subsequently writes that "While Greenblattian New Historicism became de rigueur in Shakespeare studies, contextualist historicism as practiced especially by Quentin Skinner and J. G. A. Pocock triumphed as the governing interpretive paradigm in Milton studies," we cannot bring ourselves to divorce "the Foucauldian emphasis on the episteme" from New Historicism so neatly. Rachel Trubowitz, "Introduction," *Modern Language Quarterly* (September 2017): 291–99, 291, dx.doi. org/10.1215/00267929-3898202.

attuned ways, their authors were able to use Milton to inform their readers' understanding of their own political moment, their own "popular culture."[7] All these emphases can be found in contemporary writing on or about Milton and his works. Indeed, it would be exceedingly strange were political criticism not well represented in the oeuvre of Milton studies given that "Milton committed [his] mid-life to revolutionary Commonwealth politics."[8] In addition to the many essays and books given over to presenting Milton and his work as politically engaged and instructive, his work is also often used for ideological purposes beyond their own explicit, or even, in a narrow understanding of the term, implicit articulations. Probably for as long as the United States has existed, for example, *Areopagitica* has been put to use to buttress the ideals of free speech and freedom of the press, and that use continues into our present.[9] In a similar vein, Milton is sometimes used to exemplify the cultural movement widely referred to as Puritanism, and he and his work can be used either to denigrate or to resuscitate that commonly used and abused movement.[10] It is no wonder, then, that scholars engaged in the field of cultural studies also include Milton in

7. See, for example, the use made of Milton and his work in Ned O'Gorman, "Milton, Hobbes, and Rhetorical Freedom," *Advances in the History of Rhetoric* 18:2 (2015): 162–80, doi.org/10.1080/1536242 6.2015.1081527; Laura Knoppers and Gregory M. Colón Semenza, eds., *Milton in Popular Culture* (New York: Palgrave MacMillan, 2006), dx.doi.org/10.1057/9781403983183; Philip Connell, *Secular Chains: Poetry and the Politics of Religion from Milton to Pope* (Oxford: Oxford University Press, 2016), dx.doi. org/10.1093/acprof:oso/9780199269587.001.0001; Andrew S. Brown, "'The Minstrelsy of Heaven': Representation and the Politics of Lyric in *Paradise Lost*," *Milton Studies* 57 (2016): 63–92, dx.doi. org/10.1353/mlt.2016.0003; and Ronald Corthell and Thomas N. Corns, eds., *Milton and Catholicism* (Notre Dame, IN: University of Notre Dame Press, 2017), dx.doi.org/10.2307/j.ctvpg84r5.

8. Tadd Graham Fernee, "Tolerance or a War on Shadows: John Milton's *Paradise Lost*, the English Civil War, and the Kaleidoscopic Early Modern Frontier," *English Studies at NBU* 3.2 (2017): 53–73, 54, dx.doi. org/10.33919/esnbu.17.2.1.

9. See, for example, Peter C Herman, "John Milton, Tom Cotton and Censorship: Why the Great Defender of Freedom Might Have Shut That Down," *Salon* (27 June 2020): salon.com/2020/06/27/john-milton-tom-cotton-and-censorship-why-the-great-defender-of-freedom-might-have-shut-that-down/.

10. For example, Catherine Gimelli Martin, *Milton among the Puritans: The Case for Historical Revisionism* (Surrey, UK: Ashgate Publishing 2010); Parisa Hamidizadeh, Yazdan Mahmoudi, and Amir Hamidizadeh, "The Ideology of Puritanism in John Milton's *Paradise Lost*," *International Journal of Applied Linguistics and English Literature* 7.4 (2018): 33–37, dx.doi.org/10.7575/aiac.ijalel.v.7n.4p.33; and Calvin Lane, "John Milton's Elegy for Lancelot Andrewes (1626) and the Dynamic Nature of Religious Identity in Early Stuart England," *Anglican and Episcopal History* 85.4 (December 2016): 468–91.

their discussions.[11] Various of Milton's works during our time period have also been put to use for the purpose of comparison, usually to highlight some aspect of another author's work or thinking, the assumption being that our familiarity with Milton's work and thinking is greater than our familiarity with the other author's. That is, the influence of Milton and his work, perhaps particularly of *Paradise Lost*, has continued to be felt through intertextual studies.[12] Milton studies attracts a wide array of critical approaches, including deconstruction, psychoanalytic criticism, eco-criticism, and, if we take Erin Shields's 2018 play *Paradise Lost* as an example, the reconstruction or re-imagining of Milton's original works themselves.[13]

But if Milton studies effectively traces the history of literary criticism, so too does it coincidentally trace the history of what has become known as digital humanities. Milton scholarship has had a long, and perhaps under-appreciated, relationship to quantification, stylometry, and computation. In 1964, Ronald Emma relied on published concordances, part of the scholarly *lingua franca* of his time, in order to survey *Milton's Grammar*.[14] By 1982,

11. For example, Jayne Lewis, "'A Lock of Thy Bright Hair': The Enlightenment's Milton and our Auratic Material," *Humanities* 4.4 (2015): 797–817, dx.doi.org/10.3390/h4040797; and David Loewenstein, "Rethinking Political Theology in Milton: *De Doctrina Christiana* and the Colloquy in Heaven in *Paradise Lost*," *Journal for Early Modern Cultural Studies* 18.2 (Spring 2018): 34–59, dx.doi.org/10.1353/jem.2018.0021.

12. For examples of intertextual commentaries that make use of Milton's work, see Megha Agarwal, "Scrounging and Salvaging: Literary Guidance and the Descent into the Underworld in the *Inferno*, *Paradise Lost*, *Frankenstein* and *Heart of Darkness*," *Comparative Critical Studies* 14 (February 2017): 133–53, dx.doi.org/10.3366/ccs.2017.0232; David Loewenstein, "Writing Epic in the Aftermath of Civil War: *Paradise Lost*, the *Aeneid*, and the Politics of Contemporary History," *Milton Studies* 59 (2017): 165–98, dx.doi.org/10.1353/mlt.2018.0006; and Miriam Mansur, "Machado de Assis and Milton: Possible Dialogues," *Milton Studies* 58 (2017): 167–82, dx.doi.org/10.1353/mlt.2017.0009.

13. Akram Nagi Hizam, in "Deconstructing the Miltonic Exaggerations in *Paradise Lost*," *Journal of Language Teaching and Research* 11.3 (May 2020): 462–66, dx.doi.org/10.17507/jltr.1103.14, attempts a deconstruction of *Paradise Lost*; Andrew Barnaby, "Debt Immense: The Freudian Satan, Yet Once More," *Milton Studies* 60 (2018): 183–207, dx.doi.org/10.1353/mlt.2018.0017, offers a psychoanalytic interpretation of Satan in *Paradise Lost*; Sharon Achinstein's "Milton's Political Ontology of the Human," *ELH: English Literary History* 84.3 (2017): 591–616, dx.doi.org/10.1353/elh.2017.0023, can be seen as an example of eco-criticism; and Erin Shields's *Paradise Lost: A Theatrical Adaptation of* Paradise Lost *by John Milton* (Toronto: Playwrights Canada Press, 2018) is an imaginative reconstruction of Milton's epic poem.

14. Ronald Emma, *Milton's Grammar* (London: Mouton, 1964), 19–20.

Thomas Corns used the now legendary early text analysis software COCOA for his work in *The Development of Milton's Prose*.[15] Only a few years later, his technique in *Milton's Language* had broadened to encompass not only the Oxford Concordance Program, but also custom-written FORTRAN programs, as well as the statistical package SPSS.[16] By 2007, the authors of *Milton and the Manuscript of* De Doctrina Christiana used a sophisticated mathematical technique called principal component analysis (PCA) to assess the document's authorship attribution claims[17] (a conclusion that is challenged in this issue by James Clawson and Hugh Wilson, who use the same methodology but with different evidence). Even more recently, Daniel Shore's *Cyberformalism* (2018) analyzes texts—including Milton's grammatical use of depictive adjectives—using tools and techniques that are now standard issue in off-the-shelf natural language processing toolkits: regular expressions, scripting languages like Perl and Python, named entity recognition (NER) engines, and part-of-speech (POS) taggers.[18] But the fullest integration of Miltonic and digital studies thus far is David Currell and Islam Issa's edited collection, *Digital Milton* (2018), a collection designed to rectify the unfortunate fact that, as they see it, "Collections of Milton scholarship have rarely taken account of the digital. Likewise, collections in the digital humanities have rarely taken account of Milton."[19] Although, as we have seen, there is evidence that Milton has indeed been a longstanding coincidental figure in digital studies, *Digital Milton* nevertheless marks a watershed moment in Milton scholarship, bringing several new methods (such as geospatial analysis, social networks, and big data) into the fold of Miltonic literary criticism. As editors Currell and Issa note in their introduction, "digital Milton studies [is] an evolving field" (8), and they

15. Thomas N. Corns, *The Development of Milton's Prose Style* (Oxford: Clarendon Press, 1982), 106n2.

16. Thomas N. Corns, *Milton's Language* (Oxford: Basil Blackwell, 1990), x, 11, 123n3 and n4.

17. Gordon Campbell, Thomas N. Corns, John K. Hale, and Fiona J. Tweedie, *Milton and the Manuscript of* De Doctrina Christiana (Oxford: Oxford University Press, 2007), dx.doi.org/10.1093/acprof:o so/9780199296491.001.0001.

18. Daniel Shore, *Cyberformalism: The Histories of Linguistic Forms in the Digital Archive* (Baltimore: Johns Hopkins University Press, 2018). Regular expressions are pattern-matching templates often used in search engines; Perl and Python are open-source computer programming languages; named entity recognition automatically discovers and labels in a text entities like people, places, or corporations; part-of-speech taggers identify and label the grammatical components of sentences.

19. Currell and Issa, 2.

categorize their essays into three camps: digital (re)presentation, computation, and readerly engagement (10). Their expansive collection offers a glimpse of that evolution—while some of the essays offer commentary on digital advances in Milton studies, others make use themselves of a computational approach to Milton's work and milieu. The articles of this issue follow these broad themes as well, ranging from corpus collection and presentation to social network analysis and sophisticated computational stylometric analysis. The trajectory of even just the past few years suggests how dramatically and quickly the Miltonic critical landscape has been changing.

That shifting critical landscape is consequential in yet another way: it has profound implications for the genre of the scholarly humanities essay as well, which must necessarily strain to carry new weight. A standard DH article's self-conscious revelations about corpus, method, technique, or algorithm may lack sizzle for a general readership, but these maneuvers are more than just empty rhetorical tropes. They represent decisions and choices made by the researcher, choices that must never be assumed or merely implied. In this regard, a DH project is rather less deterministically executed by pressing a button on the computer than it is designed—in the fullest sense of that word—and the intricacies of that design process sometimes resist easy reductions to bullet-point summaries under a general heading of "Results." Stan Ruecker and Alan Galey have argued in their influential article, "How a Prototype Argues," that models and "proofs of concept" are themselves powerful forms of rhetorical argument: "It makes a difference," they say, "whether we think in terms of processes or products."[20] Following John Unsworth, they suggest that DH research transforms the static entities of computer or model into the actions of computing and modelling. That DH's scholarly primitives are participles rather than nouns—discovering, annotating, comparing, referring, sampling, illustrating, representing— signifies how strongly DH researchers need to foreground the design of their own experiments.[21] "As a way of thinking," Ruecker and Galey suggest, "design

20. Alan Galey and Stan Ruecker, "How a Prototype Argues," *Literary and Linguistic Computing* 25.4 (2010): 405–24, 405, dx.doi.org/10.1093/llc/fqq021.

21. John Unsworth, "Scholarly Primitives: What Methods Do Humanities Researchers Have in Common, and How Might Our Tools Reflect This?", from a symposium on "Humanities Computing: Formal Methods, Experimental Practice," sponsored by King's College, London, 13 May 2000, johnunsworth. name/Kings.5-00/primitives.html.

positions us in a potent space between the past and the future."[22] A few of the articles in this collection favour design process over resultant product as they finesse the line between our collective scholarly past and our future—a common maneuver, especially when authoritative and accurate textual corpora are still surprisingly hard to come by. Results, of course, are always inextricably tied to the design choices of the experiment's creators. In the hurly-burly of academic debate, both friendly corroboration and antagonistic refutation must increasingly grapple with the processes themselves as well as with the results. One can hardly imagine seriously engaging these days, for example, in the *De Doctrina Christiana* authorial debate without at least some preliminary understanding of how the technique of principal component analysis actually works and why the choice of a "well-tempered corpus" (as Clawson and Wilson say) is so dramatically consequential for PCA's final results. "Dimensionality reduction," the major foundational concept of that algorithmic process, was not, for most of us, a topic we studied on our way to a degree in literature.[23] Currell and Issa's provocation "that while we are all digital Miltonists now, nobody is yet a Digital Miltonist"[24] points toward the breadth of this brave new world of interdisciplinarity and serves as a clarion call summoning researchers to bring innovation, creativity, and curiosity to the design space that is contemporary Milton studies. The articles in this collection inhabit precisely that space.

Michael Ullyot's "Fieldwork in the Sonnet: Milton, Donne, and Critical Orthodoxy" explores the implications for literary reading that can be made possible with the existence of a vast textual database of sonnets. The banal definition of a sonnet—a fourteen-line poem in any one of a few different rhyme schemes—gives too little respect to the breadth and scope and content of the form in English, to say nothing of the sonnet's storied history in other languages. Ullyot suggests that a growing library of texts and tools will help us

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22. Galey and Ruecker, 421.

23. The short definition of "dimensionality reduction" is that research data metaphorically occupies *space*—and, moreover, a space of typically many more than just three or four dimensions. In order to visualize data on a two-dimensional coordinate grid (as PCA does, for example), the sheer number of dimensions must mathematically be reduced to just two. For more on the various techniques commonly used to accomplish this feat, see Jason Brownlee, "Introduction to Dimensionality Reduction for Machine Learning," 6 May 2020, Machine Learning Mastery, machinelearningmastery.com/dimensionality-reduction-for-machine-learning/.

24. Currell and Issa, 3.

to read the sonnet in less linear and more "scalable" ways (he borrows the term from Martin Mueller and Anupam Basu), but, Ullyot cautions, "That future has not yet arrived." Still, his initial prototype already produces some useful results by focusing on Milton's small corpus of eighteen English sonnets as a test case. "The question," Ullyot asks, "is not whether you would want to distant-read Milton's sonnets in isolation, but what understanding they would yield in comparison to other sonnets." The premise: if textual analysis techniques can confirm our critical insights about Milton's small body of sonnets, then we have more confidence in these tools and techniques when, later, we scale them up to larger bodies of texts.

Ullyot's work successfully identifies thematic categories in Milton's small sonnet corpus but, more interestingly, illuminates a series of "words that other sonnets use, that never appear in Milton's," concluding that "Milton's English-language sonnets differ markedly from those of other vernacular authors." In building a quantifiable model of the sonnet, Ullyot's preliminary results confirm that he's on the right track. Difficult challenges remain: filling the database with authoritative and correct texts, including sonnets written in languages other than English, and (one of the perpetual problems of DH work in early modern studies, seen throughout these articles) orthography. Unless we instruct it to do otherwise, of course, the computer cannot logically deduce that variant spellings (such as "love" and "loue" or "self" and "selfe") are really the same words. While displaying a healthy pragmatic realism about the challenges that lie ahead, Ullyot's piece tantalizingly suggests the scholarly advantages of building the world's largest sonnet anthology.

Another textual problem that can be addressed via technological means is the one of variant textual editions, as Richard Cunningham explores in his article, "A Comparator for the First and Second Editions of John Milton's *Paradise Lost*." As has been exemplified by the republication of the 1667 edition edited by John Shawcross and Michael Lieb,[25] there is a renewed interest in comparing the variant editions of *Paradise Lost* (1667 and 1674), one that extends from scholarly circles into the classroom as well. Cunningham shares a less widely known historical background to the poem as well as insights into a non-programmer's approach to building a sophisticated means of

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25. *Paradise Lost: A Poem Written in Ten Books: An Authoritative Text of the 1667 First Edition*, ed. John Shawcross and Michael Lieb (Pittsburgh: Duquesne University Press, 2007).

examining the differences between Milton's initial ten-book first edition and his subsequent twelve-book second edition. The project, in effect, designs a new kind of online scholarly edition, one that facilitates student annotations of texts but that also asks salient questions about how the commonplace tool of a web browser might help to transform how we interact with texts. Cunningham's workflow in building the Comparator suggests that this kind of successful and useful DH work can be achieved with modest means (his primary tools are a spreadsheet and a simple plain text editor). The choice to encode Milton's two editions in HTML, the *lingua franca* of the World Wide Web, rather than the more heavy-duty, ponderous XML makes the Comparator both lightweight and easily accessible to anyone with a web browser. In doing so, Cunningham capitalizes on a growing trend in DH circles—exemplified by the University of Victoria's Endings Project—to create more stand-alone websites that enhance long-term stability by relying on web-friendly technologies and by reducing or eliminating so-called "back-end dependencies."[26] Cunningham's clever use of nearly ubiquitous tools shortens that learning curve, simplifies the project, and demonstrates how literary scholars can "hack Milton."[27] As Eric Raymond, one of the early gurus of the open source movement, has said, "It is truly written: the best hacks start out as personal solutions to the author's everyday problems."[28] The Comparator started as just that: a personal solution to an everyday classroom problem.

That justification has grown to create an entirely new edition of *Paradise Lost*, an edition made possible by, and seen only through, the Comparator's website interface. Cunningham's article contextualizes *Paradise Lost* before explaining the affordances, to use the editorial term, of the nearly finished new

26. "The Endings Project: Building Sustainable Digital Humanities Projects," 17 April 2021, endings. uvic.ca/. The Endings Project's guiding principles include "No dependence on server-side software: [we] build a static website with no databases, no PHP, no Python. […] Our choices are HTML5, JavaScript and CSS." They treat XML as "input data" rather than as archival-quality "output code" (endings.uvic. ca/principles.html).

27. The term "hacking," once exclusively pejorative, has long since been recuperated by the open-source community. "The term *hacking* has a bad reputation in the press," wrote authors Kevin Hemenway and Tara Calishain in 2003. "Among people who write code, though, the term *hack* refers to a 'quick-n-dirty' solution to a problem or a clever way to get something done." Kevin Hemenway and Tara Calishain, *Spidering Hacks: 100 Industrial-Strength Tips & Tools* (Sebastopol, CA: O'Reilly, 2003), xv–xvi.

28. Eric Raymond, *The Cathedral and the Bazaar* (Sebastopol, CA: O'Reilly, 2001), 49.

edition. Along the way, the author provides a demonstration of the sort of work that can be done by closely examining the differences between text of the first and of the second edition. The latter third of the article explains the method used to create the Comparator, a method, as noted above, that is most dependent on the integrated use of spreadsheets and a simple text editor. Work is in progress to adapt the Comparator to use any two texts, but the Comparator's classroom use has already trial-tested the prototype. At the very least, Cunningham's process ought to help those with no experience in DH to understand that some of the methods of digital humanities are well within their reach. Cunningham's project raises other questions as well: while the print-based scholarly edition might be a known quantity to many of us, we have yet to finalize decisions about how an online, interactive scholarly edition—especially one that "crowd-sources" annotations—ought to look and behave. If DH projects occupy a so-called "design space," we might say that Cunningham's Comparator creatively and imaginatively occupies a new "reading space."[29]

In "John Milton's Network and the Republic of Letters," Esther van Raamsdonk and Ruth Ahnert apply social network analysis to show us "what Milton's network looks like in full," following a comment by Gordon Campbell and Thomas Corns that a particular circle of Milton's acquaintances was "in miniature a representative grouping of Milton's friends."[30] Their network analysis gives us a remarkably clear sense of "those communities with whom [Milton] was closely aligned, and those from which he remained distant." What's more, the communities van Raamsdonk and Ahnert reveal are not only limited to England. Extending our awareness of Milton's influence in Europe is particularly important given that he served as Secretary for Foreign Tongues during the first years of the Interregnum, and was himself greatly influenced by European intellectual and literary as well as political culture. Van Raamsdonk and Ahnert's work demonstrates the results we can glean from network analysis both about Milton and about his period; moreover, they present a strong case for continued digitization of early modern letters so that other figures can be analyzed in a similar way. We see dramatically illustrated the roles these people played in the seventeenth- and eighteenth-century

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29. Currell and Issa, 5.

30. Gordon Campbell and Thomas Corns, *John Milton: Life, Works and Thought* (Oxford: Oxford University Press, 2008), 267.

intellectual milieu encapsulated by the term "Republic of Letters." Due to increasing amounts of work done in the trenches of digitization, it is now possible to "marshal large bodies of correspondence connected to a single person or community, and to visualize it using numerous off-the-shelf network analysis tools." Yet visualization is only one component of network analysis; there are other ways of "extracting insights about the organization of social networks, and the transfer of information." For example, work comparable to their own has demonstrated that women played a more vital role than was previously acknowledged or understood in the exchange and development of ideas in the period. And another example locates Milton in the Republic of Letters, not by evaluating his correspondence directly but by examining cases in which Milton is mentioned by others in their correspondence. For their research, van Raamsdonk and Ahnert use a dataset of seventy-six letters either from or to Milton; these letters alone show us that Milton's network extends to Amsterdam, Florence, Geneva, and elsewhere on the Continent as well as to London. In addition to calling attention to the international reach of Milton's work, the authors are able to use a novel method that shows a network around Milton that goes beyond his direct correspondence. As a result, we are given a much more accurate sense of Milton's influence than has previously been available to us. Van Raamsdonk and Ahnert contextualize Milton's seventy-six letters within a dataset of contemporary correspondence, written by his intellectual peers, comprising 21,228 people, and 151,769 letters drawn from the Early Modern Letters Online (EMLO) database. From this larger dataset, van Raamsdonk and Ahnert are able to identify a contextualizing dataset of 7,253 people corresponding in the period of greatest relevance to a study of Milton. From the various analyses they apply, they reveal that Milton was a man "more written about than written to," with "a considerable geographical reach with letters over all of Western Europe." But in addition to the letters to and from Milton himself, by examining what they call his "mention network," van Raamsdonk and Ahnert demonstrate that "despite this reach and diversity [Milton] remained on the fringes of a number of key intellectual communities [likely] because of his radical convictions."

In "Stylometry without Words: Analyzing John Milton's Grammatical Style," Harvey Quamen investigates how contemporary computational methods might assist us in learning more about John Milton's literary style. In "an attempt to explore style at deeper literary substrates where authorial choice

is barely articulable, where the governing principles of language—the heavy restrictions of grammar, especially—render authorial choice problematic and sometimes even impossible," Quamen undertakes three projects: analyzing periodic verb placement, locating Latinate ablative absolute constructions, and diagramming sentences automatically using natural language processing tools. Quamen concludes with a series of recommendations designed to align the interests of textual scholars and digital humanists. One of the great surprises of Quamen's article is his history of computational analysis in Milton studies. In the current digital humanities landscape, most could be forgiven for thinking that Milton studies is a relative latecomer, seeming as it does to lag behind classical, Shakespearean, Chaucerian, and indeed medieval studies generally. But as Quamen shows, Milton studies have "a surprisingly long history of computational analysis." While the digital humanities can bring new perspectives to some of the big questions in literary studies, despite this long history and the prevalence of new tools, "the longstanding debate about Milton's relative Englishness versus Latinism still remains unresolved, even after all this time, even after all this computational power." This particular impediment notwithstanding, Quamen's work will push us all beyond the version of style articulated by Annabel Patterson when she argues, in *Milton's Words*, that style is but language which ultimately is but words.[31] (One is likely to hear Hamlet's slightly nonsensical "Words, words, words" response to Polonius when Quamen reminds us of Patterson's definition of language.) The approach in "Stylometry without Words," by contrast, focuses "less on the words themselves" and more on the structures—syntax, grammar, unconscious multilingualisms, hypotaxis, parataxis, punctuation, orthography, archaic words and spellings, ambiguous antecedents, and even simple errors—that support them. To move us toward this goal, Quamen discusses parataxis, hypotaxis, and the periodic style, all with a view to reminding us of something undergraduate students see immediately and with which they struggle constantly: "English sentences are not what they once were." And this poses a problem for computational analysis of seventeenth-century literary style. Quamen is meticulous in the methodology he uses, and which he describes clearly and carefully in his article. After suggesting paths through the frequently tortuous forest of seventeenth-century literary style,

31. Annabel Patterson, *Milton's Words* (Oxford: Oxford University Press, 2009), 3, dx.doi.org/10.1093/acprof:oso/9780199573462.001.0001.

Quamen looks toward a future in which digital approaches to Milton, his contemporaries, and others "can reinvigorate our conversations about literary style, can focus stylometric analysis on structures other than word frequency lists, can incorporate interesting tools like tree parsers, and can employ illuminating and creative genres of data visualization."

James Clawson and Hugh Wilson engage with one of the biggest issues in Milton studies in the final article in this issue. "*De Doctrina Christiana* and Milton's Canonical Works: Revisiting the Authorship Question" invites us to reconsider the question of Milton's authorship of the Latin text famously discovered in 1823. The provenance of *De Doctrina Christiana* remains unclear despite the publication in 2007 of Gordon Campbell et al.'s *Milton and the Manuscript of* De Doctrina Christiana, and the subsequent confidence with which most of us now ascribe it to John Milton. After the publication of *Milton and the Manuscript,* the authorship question seemed to have been relatively settled. But as Clawson and Wilson point out, doubts have persisted in subsequent years, even after the appearance of the sumptuous Oxford edition in 2012. Having performed an extensive literature review, Clawson and Wilson can confidently say that "much of the work that uses or refers to *De Doctrina Christiana* does so in a way that presumes its Miltonic attribution," yet they nonetheless suggest that John Milton is not the likeliest candidate for authorship of the disputed manuscript. They return to a neglected scholarly tradition that began even before the manuscript's discovery in 1823 while also "deploying innovations in stylometric best practices, and offering a fuller consideration of candidates" to challenge "incumbent assumptions about the authorship of *De Doctrina Christiana*." The scholarship here is necessarily dense and painstakingly detailed. After reminding us of the history of the authorship controversy, they place the theology of *De Doctrina Christiana* next to that of Milton's canonical works in order to further contextualize and contest earlier claims that *De Doctrina* was penned by Milton. They then review the previous stylometric analysis—work that seemed so convincing at the time—and design their own experiment by using the now-standard technique of PCA while also taking additional steps to corroborate those results with three supplementary algorithmic techniques. Of particular note here is not just the challenge of performing stylometric analysis on English texts, but the far greater difficulty of doing it—and doing it well—on Latin texts. These new approaches "triangulate the manuscript within a corpus of potential authors," which in turn leads them

to revive interest in a once-known authorial candidate who was subsequently dismissed. By building a new corpus of test texts and using new stylometric methods, Clawson and Wilson, deducing that "unorthodox writers should be far more plausible candidates for its authorship than theological conservatives," can confidently point to a different author's "characteristic style [which] is often closer to the style of most of the anonymous treatise than is the style of John Milton." Clawson and Wilson's provocative "*De Doctrina Christiana* and Milton's Canonical Works: Revisiting the Authorship Question" combines "traditional philology and innovative stylometry" to demand that we rethink, reappraise, and potentially revise our long-held and recently reinforced beliefs about the authorship of *De Doctrina Christiana*.