Literary Pattern Recognition: Modernism between Close Reading and Machine Learning

Hoyt Long and Richard Jean So

The title of this essay announces its core ambition: to propose a model of reading literary texts that synthesizes familiar humanistic approaches with computational ones. In recent years, debates over the use of computers to interpret literature have been fierce. On one side, scholars such as Franco Moretti, Matthew Jockers, Matthew Wilkens, and Andrew Piper defend the deployment of sophisticated machine techniques, like topic modeling and network analysis, to expose macroscale patterns of language and form culled from massive digitized literary corpora.[1] On the other side, scholars such as Alexander Galloway, David Golumbia, Tara McPherson, and Alan Liu, who work in the field of New Media Studies, have criticized machine techniques for reducing the complexity of literary texts to mere "data" or for being incommensurable with the goals of critical theory.[2] Here we move beyond this impasse by modeling a form of literary analysis

1. Franco Moretti, *Distant Reading* (London, 2013); Matthew L. Jockers, *Macroanalysis: Digital Methods and Literary History* (Urbana, Ill., 2013); Matthew Wilkens, "The Geographic Imagination of Civil War-Era American Fiction," *American Literary History* 25 (Winter 2013): 803–40; and Andrew Piper and Mark Algee-Hewitt, "The Werther Effect I: Goethe, Objecthoods, and the Handling of Knowledge," in *Distant Readings: Topologies of German Culture in the Long Nineteenth Century*, ed. Matt Erlin and Lynn Tatlock (Rochester, N.Y., 2014), pp. 155–84.

2. For recent critiques by Galloway, Golumbia, and McPherson, see the special issue of *Differences* on the theme of "In the Shadows of the Digital Humanities." Their essays include Alexander Galloway, "The Cybernetic Hypothesis," *Differences* 25, no. 1 (2014): 107–31; David Golumbia, "Death of a Discipline," *Differences* 25, no. 1 (2014): 156–76; and Tara McPherson, "Designing for Difference," *Differences* 25, no. 1 (2014): 177–88. Also see Alan Liu, "Where is Cultural Criticism in the Digital Humanities?" in *Debates in the Digital Humanities,* ed. Matthew K. Gold (Minneapolis, 2012), pp. 490–509.

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that, rather than leveraging one mode of reading against another, synthesizes humanistic and computational approaches into what we call literary pattern recognition.

The motivation for this synthesis is two-fold. First, there is the reality that most humanistic scholars today already engage in some form of computational criticism. As Ted Underwood notes, any computer-aided search for information, whether through Google or more formal academic databases like JSTOR, is a form of "data mining" underwritten by machine learning algorithms.[3] Each time we enter a search term into Google Books or some other digitized corpus, we are interacting with these algorithms. Underwood adds that humanists have tended to leave this interaction undertheorized, assuming that the search engine is merely a tool that helps us get to the real work of interpretation while often insisting that the science behind these tools is inhuman, rigid, and machinic. We black box the tool in our own research even as we critique it for its black boxedness compared with the careful analysis and critical reflection we engage in as human readers. Literary scholars who utilize even more complex data mining tools are doubly accused of deforming literary texts via the cold and inflexible logic of the machine. Yet as more of our interactions with texts (and information) are mediated by digital formats and large databases, this stance proves increasingly untenable. We cannot continue to ignore how

3. Ted Underwood, "Theorizing Research Practices We Forgot to Theorize Twenty Years Ago," *Representations* 127 (Summer 2014): 65.

Hoyt Long is associate professor of East Asian Languages and Civilizations at the University of Chicago. He is the author of *On Uneven Ground: Miyazawa Kenji and the Making of Place in Modern Japan* (2012). His research interests include modern Japanese literature, media history, the sociology of literature, and the digital humanities. His current book projects include a history of communication in modern Japan and a computational study of global literary modernism centered on Japan. He codirects the Chicago Text Lab with Richard So.
Richard Jean So is assistant professor of English at the University of Chicago. He also codirects the Chicago Text Lab with Hoyt Long. He is the author of *Transpacific Community: America, China and the Rise and Fall of a Global Cultural Network* (forthcoming). He is currently engaged with several projects that merge cultural history, textual criticism, and computational methods. One is a new history of racial formation and the modern US novel that tracks codes and networks of racial discourse as they evolve and segregate over the twentieth century; another is on the Great Depression and the transformation of representations of wealth.

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machine algorithms "read" literary information while blindly relying on them to enhance our own reading and interpretative practices.

At the same time, to insist that critics must learn how these algorithms operate is not to say that they are unproblematic substitutes for human modes of reading—nor is it to imply that the valid critiques of machine techniques simply be met with more complex computational models and larger datasets, despite the remarkable work being done, for example, at the Stanford Literary Lab by Moretti, Mark Algee-Hewitt, and Ryan Heuser.[4] We must take seriously Liu's argument that computer-assisted reading benefits from the reflexive critique provided by an STS (science and technology studies) perspective, which allows us to think about our tools within a broader framework of "'power, finance, and other governance protocols.'"[5] We must heed Golumbia's advice that computational criticism has to think harder about the spirit of technological "authority" that uncritically animates work in the digital humanities today.[6] If machine algorithms are now ubiquitous in our research and writing—and they increasingly are—the challenge, as with any new interpretive tool, is to both master them and use them critically.

This is what we aim to do here through a case study centered around literary modernism and in particular the English-language haiku. Beginning with the very basic question of what defines the English haiku in the modern period, we use both familiar modes of criticism (close reading and historicism) and computational methods (machine learning) to provide three separate answers. That is, we take what is essentially a problem of stylistic identification and address it through three modes of textual analysis. We do this to show that each of these modes harbors its own ontology of the text, and that each reveals an understanding of literary pattern and stylistic influence tied to this ontology. Rather than privilege one mode over another, however, we insist that a new critical perception of the haiku as literary object emerges through the mutual interface of these human and machine ways of reading. By treating these modes as valid on their own terms, and yet commensurable under the broader hermeneutic of pattern recognition, a new ontology of the haiku—and of the modernist text in general—comes into view.

This essay consists of four parts. The first section explicates the haiku through the lens of close reading; the second reads it as sociohistorical object; and the third interprets it through a machine-learning framework.

4. See the excellent series of pamphlets this group has released at Stanford Literary Lab, *Pamphlets*, litlab.stanford.edu/?page_id=255

5. Liu, "Where is Cultural Criticism in the Digital Humanities?" p. 501.

6. Golumbia, "Death of a Discipline," p. 172.

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In each of these sections, we parse the specific and autonomous conception of the haiku that each critical method offers, while showing how these conceptions structure the method's ability to identify the haiku as a distinct and replicable style or literary pattern. In the final section, we bring the methods into direct conversation to show that in spite of the discrete ontological visions of the haiku under which each operates, their different ways of recognizing *pattern* supplement the inevitable limitations of each. Taken together, they produce a more comprehensive picture of the English haiku as a social or cultural milieu—part of a broader Orientalist style that circulated in the early twentieth century.[7] This essay thus takes final shape as a contribution to the history of modernist Orientalism in the US by showing how we might reconceptualize it as a set of overlapping textual patterns expressed at different ontological scales.

The English Haiku as Modernist Text

To begin, what makes a poem an English haiku or not? One way to determine if a poem belongs to a certain style of writing is to approach it as an individual text and carefully analyze its content and formal aspects. This approach is what we typically think of as close reading. Suppose we have a poem like "April" by Ezra Pound. How would we decide if it is an English haiku?

> Three spirits came to me
> And drew me apart
> To where the olive boughs
> Lay stripped upon the ground;
> Pale carnage beneath bright mist.[8]

Because it lacks the traditional five-seven-five syllabic pattern of Japanese haiku, we might first conclude that this poem, by the strictest formal definition, is not a haiku. But a few intuitive, if naïve, observations could support a reading of its borrowing other stylistic aspects from the Japanese haiku. For one, the poem is short, unusually so. It also foregrounds a series of vivid images, rather than a narrative—there is no story or "characters"—and these images are drawn from nature. On these points, "April" conforms to superficial ideas of what characterizes haiku poems. A deeper, more involved reading might attend to the text as a kind of philosophical statement. Thus in the first two lines, we find the speaking self or lyrical *I* literally torn apart by the text and quickly replaced by a concrete image: olive boughs. Subjectivity, the text suggests, resides in objects rather than

7. We specify our precise invocation of this term in the concluding section.
8. Ezra Pound, "April," *Personae: Collected Shorter Poems of Ezra Pound* (London, 1952), p. 101.

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in the human mind or body. It is the "boughs" that lie stripped upon the ground, a substitute for the body or consciousness previously torn apart. The final line intensifies this image by overlaying it with another, the bough abstracted as "pale carnage" beneath a "bright mist." Subjectivity returns (the image of "pale carnage" indicates affect and emotion, unlike the pure objectness of the "boughs") but is now mediated through a vivid image that operates by way of juxtaposition. Part is material and taken from nature (the "mist"), and part is affective (the "pale carnage"), producing a successful merging of subject and object.

Based on this reading, we can argue that "April" represents an example of the English haiku because it fulfills certain criteria that we associate with other poems of this style. How did we arrive at these criteria? In part by intuition. As readers of literature, we have been passed down a general sense of what the haiku in English looks like: it should be short, contain natural imagery, and be taciturn in expression. More rigorously, the criteria by which we judge a poem to be an English haiku or not will derive from the work of other literary scholars. Earl Miner, for example, has argued that the English haiku usually possesses the following qualities: a reliance on brevity and concision; the use of a visual language that regularly juxtaposes concrete yet incongruous images; and a meaning that arises through this play of images in a way that is suggestive rather than deliberate or explicit.[9] We might think of these qualities as a set of rules to which English haikus generally adhere. Combining these criteria with our own intuition, we could confidently argue for a reading of "April" as an English haiku.

Using this criteria, we could also begin identifying other English haiku from this period by determining whether *X* or *Y* poem enacts similar aesthetic qualities as those found in "April." Consider "Marriage" by William Carlos Williams:

So different, this man
And this woman:
A stream flowing
In a field.[10]

Intuition once again suggests that this is a verse inspired by haiku. The poem is short and image based. It ends with an object pulled from nature. More importantly, it also fulfills Miner's basic criteria. Both in content and typographic appearance, it is focused on presentation, not representation,

9. See Earl Miner, *The Japanese Tradition in British and American Literature* (Princeton, N.J., 1958), p. 125; hereafter abbreviated *JT*.

10. William Carlos Williams, "Marriage," *The Collected Poems of William Carlos Williams*, ed. A. Walton Litz and Christopher MacGowan, 2 vols. (New York, 1986–1988), 1:56.

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and makes clear use of juxtaposition by overlaying the presence of a man and a woman onto a scene from nature. Yet, when compared to "April" there are certain differences. There is a juxaposition (or superposition) that takes place, but the technique is not as firmly rooted in the image. And while there is a movement from subjectivity to objectivity and the eventual merging of the two, the poem is less intent on crystallizing that phenomenon visually. Scholarship confirms this cursory comparison. Charles Altieri writes that, "Williams for the most part refused Pound's abstract discourse about form in order to emphasize how sensitivity to place and to common speech might be a sufficient source for the dynamizing of fact."[11] To identify both poems as English haiku, then, we would have to make a compromise and say that both show the influence of a haiku style but express this according to the individual disposition and circumstances of the poets. This, indeed, is often the analytical position that close reading puts us in when we try to say something about the proliferation and mutation of a style across multiple actors and contexts: an examination of how different artists variously engage with that style. As rehearsed here, the procedure operates by assuming some ideal model of the English haiku against which to assess the "haikuness" of a poem based on its proximity or distance to that model.

The procedure is certainly a familiar one in modernist poetry scholarship. Major scholars like Altieri, Marjorie Perloff, and Helen Vendler often use the language of models in describing the association of a style with a particular poet or coterie of poets. For instance, Altieri argues that Imagist poets pursue "a distinctive model" of "perception,"[12] while Vendler asserts the existence of a Wallace Stevens model of writing that functions like "an algebraic statement into which each reader can substitute his own values for x and y."[13] Criticism in this vein attempts to discern how modernist poets transform the full range of language into something that looks like a style or model of writing—what Perloff calls the poem's "pattern," which she understands to be both semantic and typographic.[14]

In other cases, however, modernist scholars employ comparative close reading to opposite ends, preferring to focus on "'the living singularity'" of

11. Charles Altieri, *The Art of Twentieth-Century American Poetry: Modernism and After* (Malden, Mass., 2006), p. 41.

12. Ibid., p. 23.

13. Helen Vendler, *Wallace Stevens: Words Chosen out of Desire* (Knoxville, Tenn., 1984), p. 8.

14. See Marjorie Perloff, *The Dance of the Intellect: Studies in the Poetry of the Pound Tradition* (1985; Evanston, Ill., 1996).

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texts rather than on their shared adherence to a "model" or "pattern."[15] In these instances, they will underscore the degree to which a poem acquires meaning through the process by which it is written into existence and by which it takes form through language. Meaning is produced by the physical language and appearance of the text itself. Not only does the poem's power of expression come from its own language, but reading the poem is also about seeing the poem itself as an event in the making. These are points emphatically asserted by authoritative scholars in what have become canonical interpretations of writers like Pound, Williams, and Stevens. For example, Peter Nicholls contends that each modernist text discloses "a new and 'particular reality' within the texture of a language" and "establishes its own world."[16] In such accounts, a poem is an example of expressive singularity, belonging only to the language of which it is made. Implicit here is the belief that each text, as a linguistic world unfolding before the reader's eyes, can only be and represent itself as a particular type of poem.

These two interpretive tendencies of close reading, when taken together, leave us with a somewhat slippery ontology of the modernist text. On the one hand, the text is seen to belong, to varying degrees, to a more general model of literary style, such as "Stevens' model." On the other hand, the text exists as a "living singularity" or self-constructing reality whose aesthetic value depends on its deviation from all convention. In studies of modernist poetry, it has often been the second perspective that wins out. Virtuosic close readings of individual texts that illuminate their unique qualities dominate these studies, while less attention is given to classifying poems according to generalizable stylistic models or patterns. This is surely a matter of certain critical dispositions holding sway in the field, but we can also partly attribute it to the constraints of close reading itself as an approach. The prospect of consistently sorting poems according to a shared stylistic pattern seems feasible at the level of dozens of poems, but what about at the level of hundreds of poems? If one privileges the notion that every act of reading is inherently subjective, and that the style of a text depends on a host of factors that hold only for that particular instance, then close reading as a form of pattern recognition becomes a highly unwieldy method. There is more to be gained by explicating the singular aspects of a text, or by describing how it deviates from an assumed normative model, rather than by trying to define the model itself. If the

15. Peter Nicholls, "The Poetics of Modernism," in *The Cambridge Companion to Modernist Poetry,* ed. Alex Davis and Lee M. Jenkins (New York, 2007), p. 61.

16. Ibid., pp. 62, 61.

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model has to be altered and adjusted each time a new text is read, it becomes harder to imagine that the model has any verifiable coherence at all, and thus it is easier to either discard or postulate it only as a vague notion.

We might be content to accept this destabilized notion of literary pattern, except that the English haiku presents us with a special case. As an object of close reading, it tends to cut both ways in critical scholarship. That is, it is read by some as conforming to a distinct and recognizable model and by others as an extremely open-ended and ambiguous aesthetic form. Jeffrey Johnson, for instance, asserts the existence of a definitive "haiku model" and, like Miner, outlines a clear body of rules that characterize this model. Examples of these rules include "noun-dominated verse" and "imagery without commentary," some combination of which are always said to be present in an English haiku.[17] Other scholars, however, insist that these rules amount to a much looser set of formal and stylistic parameters or even just a vague aesthetic orientation. When Vendler refers to "Stevens' model," for example, she has in mind a general ethos or *feeling* that these poems share, not a list of formal criteria.[18] The English haiku is both as recognizable as a five-seven-five meter, and as amorphous as a shared sensibility.

Something of this two-sided quality is captured nicely in the canonical *A Survey of Modernist Poetry* (1927), by Laura Riding and Robert Graves. In their defense of the autonomy of creative acts, they use the example of the haiku as a negative representation of such autonomy. The haiku to them is ubiquitous, "parasitical" in modernist poetry, and exemplifies a type of poetry that was imitative and more like a social institution than an individual act. Exemplary close readers, they diagnose the problem with a handful of representative examples (fig. 1) and proceed to "plot out a literary chart" to track down where the English haiku began and where it went awry:[19]

> Who was the inventor of the style of the first two pieces, Mr. Aldington or Mr. Williams? or yet H. D. or F. S. Flint? . . . In the two last pieces who is responsible for the form? Who first thought of imitating the Japanese *hokku* form? Or rather who first thought of imitating the French imitations of the *hokku* form? Did Mr. Aldington suggest a slightly shorter poem to Mr. Stevens or Mr. Pound or did Mr. Pound

17. Jeffrey Johnson, *Haiku Poetics in Twentieth Century Avant-Garde Poetry* (Lanham, Md., 2011), pp. 69, 68.

18. Vendler, *Wallace Stevens*, pp. 57.

19. Laura Riding and Robert Graves, *A Survey of Modernist Poetry* (London, 1927), pp. 216, 217, 218.

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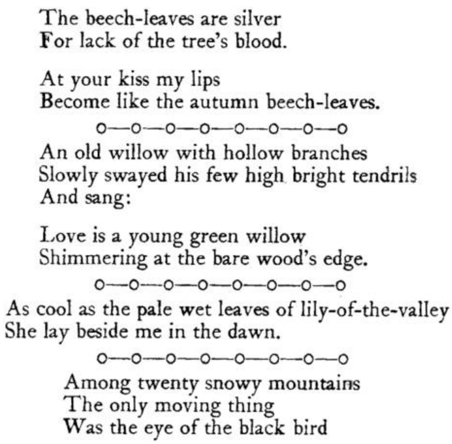

The beech-leaves are silver
For lack of the tree's blood.

At your kiss my lips
Become like the autumn beech-leaves.

o—o—o—o—o—o—o—o

An old willow with hollow branches
Slowly swayed his few high bright tendrils
And sang:

Love is a young green willow
Shimmering at the bare wood's edge.

o—o—o—o—o—o—o—o

As cool as the pale wet leaves of lily-of-the-valley
She lay beside me in the dawn.

o—o—o—o—o—o—o—o

Among twenty snowy mountains
The only moving thing
Was the eye of the black bird

FIGURE 1. The four poems cited by Riding and Graves are emblematic of the haiku as parasite. These are the same poems referred to in the extended quote.

> suggest a slightly longer poem to Mr. Aldington, etc., or did Mr. Pound and Mr. Stevens and Mr. Aldington and Mr. Williams decide, as mutual pairs, to work as a school team, or did Mr. Williams and Mr. Stevens and Mr. Aldington and Mr. Pound pair off, as being by nationality more pairable?[20]

This is as far as Riding and Graves go, however, in trying to isolate the rise and spread of a haiku pattern. The rest is left to conjecture. Their impasse is the impasse of a method that privileges the idea of poems as self-actualizing living singularities. They hold up the haiku as quintessential literary pattern, suggesting that it evokes a common *feeling* that adds up to a broader, overly replicated style. But who started it? Who was most guilty of spreading it? How are the poems similar? Defiantly loyal to a specific mode of reading and vision of the poetic text, Riding and Graves can only parody a set of critical questions to which they do not expect, nor care to find, convincing answers. For them, the English haiku is at once the epitome of a conventional literary pattern and something they feel comfortable identifying merely by pointing at it.

The English Haiku as Sociohistorical Event

One way to discern stylistic patterns across a greater number of poems is to opt for a different ontology of the haiku text. Here we can turn to New Modernist Studies, which, building on the lessons of New Historicism,

20. Ibid., p. 217.

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expands the methods and materials available to scholars of modernism. Once narrowly focused on a small body of canonical, elite, and largely Anglophone texts, the object of modernist studies, argue Rebecca Walkowitz and Douglas Mao, has moved in new "temporal, spatial, and vertical directions."[21] This has meant an expansion of modernism's temporal parameters both forward and backwards in time; its spatial parameters to locations distant from its ostensible Anglo-American geographical core; and its cultural parameters to texts and institutional contexts beyond small coteries of elite production. With this expansion have come revised visions of the modernist text as a product of institutional and media contexts, one also embedded within historical systems of discourse.[22] These visions change the way we read texts as part of broader aesthetic and sociological patterns.

Following such visions, the English haiku begins to look less like an autonomous and independent poetic artifact and more like a concerted attempt by American authors to borrow a foreign poetic style. Here the haiku is popular style and historical event—an object of aesthetic attention caught up in specific patterns of social and material circulation. A significant body of research under the name modernism and Orientalism (by scholars like Christopher Bush, Robert Kern, Eric Hayot, Steven Yao, and Zhaoming Qian) has already offered a framework, one undergirded by thick historicism, for understanding the appearance of Asian aesthetic texts in English as part of a larger fascination with East-Asian culture by Western artists in the early to mid-twentieth century.[23] This fascination exceeded mere aesthetic interest; tropes of exoticism and imperialism, influenced by greater political forces, animated the West's interest in Chinese and Japanese art. Kern offers a pithy summary of this project: "We have been dealing, then, with the problem of what might be called 'the Chinese poem in a state of Western captivity,' and with the extent to which

21. Douglas Mao and Rebecca L. Walkowitz, "The New Modernist Studies," *PMLA* 123 (May 2008): 737.

22. See, for example, Lawrence Rainey, *Institutions of Modernism: Literary Elites and Public Culture* (New Haven, Conn., 1999), and Andrew Goldstone, *Fictions of Autonomy: Modernism from Wilde to de Man* (New York, 2013). On institutional contexts, see also Mark Wollaeger, *Modernism, Media, and Propaganda: British Narrative from 1900 to 1945* (Princeton, N.J., 2008), and Mark Goble, *Beautiful Circuits: Modernism and the Mediated Life* (New York, 2010) on the relationship between modernism and modern forms of media.

23. See Christopher Bush, "Modernism, Orientalism, and East Asia," in *A Handbook of Modernism Studies*, ed. Jean-Michel Rabaté (Malden, Mass., 2013), pp. 193–208; Robert Kern, *Orientalism, Modernism, and the American Poem* (New York, 1996); Eric Hayot, *Chinese Dreams: Pound, Brecht, Tel Quel* (Ann Arbor, Mich., 2004); Steven G. Yao, *Translation and the Languages of Modernism: Gender, Politics, Language* (New York, 2002); and Zhaoming Qian, *Orientalism and Modernism: The Legacy of China in Pound and Williams* (Durham, N.C., 1995).

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the practice of translation itself is commandeered and guided by priorities that tend to disrupt and redirect the process by which Chinese poetry is supposedly made available to Western readers."[24]

Within a new modernist framework, focus thus turns to the historical priorities that shaped how haiku were made available to English audiences and the impact these priorities had on haiku's reception. This process can be delineated according to three phases. The first, which we call the discovery phase, began at the turn of the twentieth century and is largely defined by acts of collection or specimen gathering. The goal here was to add another curio to the Oriental literary cabinet, which was expanding alongside Japan's increased presence on the geopolitical stage. Japanologists William George Aston and Basil Hall Chamberlain assembled some of the first scholarly translations of haiku at the turn of the century.[25] They also offered some of the first formal accounts of the haiku's syllabic structure and literary genealogy. As part of this effort to introduce haiku to Western audiences, however, they tended to treat it in the manner typical of Orientalist discourse—as an exotic oddity and emblem of national and ethnic character. As such, these many "tiny effusions"[26] and "microscopic compositions,"[27] as they referred to them, were subject to typological statements intended to capture what was so peculiar and unique about the genre. Aston, for example, felt that they enshrined "minute but genuine pearls of true sentiment or pretty fancy," with "suggestiveness [being] their most distinctive quality."[28] Chamberlain similarly described them as "the tiniest of vignettes" that were at best "a loop-hole opened for an instant on some little natural fact, some incident of daily life."[29] In a more popular treatment of the form, Lafcadio Hearn stated that, "by the use of a few chosen words the composer of a short poem endeavors . . . to evoke an image or a mood," the accomplishment of which "depends altogether upon [a] capacity to *suggest*."[30]

For all their eagerness to collect and categorize this foreign literary spe-

24. Kern, *Orientalism, Modernism, and the American Poem*, p. 175.

25. At the time, the terms *hokku* and *haikai* were more commonly used to denote the genre. Although used synonymously with *haiku*, they are technically distinct. *Hokku* refers to the opening five-seven-five syllable sequence in what had historically been a much longer series of linked verse. *Haikai* denotes this specific tradition of linked verse, dating to the early 1600s. *Haiku* was newly coined by poet Masaoka Shiki in the 1890s to separate out these individual verses as discrete poetic units.

26. W. G. Aston, *A History of Japanese Literature* (New York, 1899), p. 294.

27. Basil Hall Chamberlain, "Bashô and the Japanese Poetical Epigram," *Transactions of the Asiatic Society of Japan* 30, no. 2 (1902): 243.

28. Aston, *A History of Japanese Literature*, p. 294.

29. Chamberlain, "Bashô and the Japanese Poetical Epigram," pp. 245, 305.

30. Lafcadio Hearn, *In Ghostly Japan* (Boston, 1899), p. 154.

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cies, these curio seekers ultimately showed little interest in cultivating a domestic strain. But their choices about which Japanese haiku to translate—and the popularity of these translations later on—arguably instantiated a set of aesthetic priorities and "chosen words" that would continue to be expressed in the next phase of the haiku's reception.[31] This is what we call the experimental phase, when poets became more willing to animate the specimens that the earlier generation had gathered. It is the phase most attended to by modernist scholars, who usually trace its beginnings to a small clique of literary figures around 1913. Yet the details of who was talking to who, and when, are murky. Indeed, it is best to characterize the phase as one of highly energized "chatter" amongst a close-knit group of early adopters and "native" informants. Those involved were mainly poets in England and America affiliated with the Imagist movement and who found in the haiku various possibilities for aesthetic innovation. As one of these poets, F. S. Flint, observed in 1915, the origins of the movement could be traced to a group of London artists who, dissatisfied with English poetry, "proposed at various times to replace it by pure *vers libre*; by the Japanese *tanka* and *haikai*; We all wrote dozens of the latter as an amusement."[32] What was amusement for some became serious business for others, prompting a flurry of English-language adaptations in avant-garde magazines and Imagist anthologies. These naturally came with an updated set of rationales (and priorities) for what made haiku so categorically distinct.

Pound, who fell in with the London group, began to experiment with the style in 1912, culminating in his "Vorticism" essay of 1914. Here he emphasized the qualities of concision, image, and super-position ("one idea set on top of another") in Japanese verse, seeing these as essential to the formulation of "*hokku*-like sentence[s]" like his famous "In a Station of the Metro" (1913). This same year he helped assemble the first of the Imagist anthologies, where Richard Aldington, Amy Lowell, and later Fletcher tried their hand at *hokku*-inspired verse.[33] Significantly, Lowell

31. Some of them, for instance, used the language of translated haiku (specific phrases like temple bell, tiny flower, and hovering insect) to describe the ideal effect haiku should have on readers; see ibid., and Chamberlain, "Bashô and the Japanese Poetical Epigram," p. 309. Similarly, in an influential essay, Paul-Louis Couchoud wrote in 1906 that the meaning of a haiku drifts to us "like the sound of a cithar from behind a screen or the scent, through a fog, of plum-trees in flower" (Paul-Louis Couchoud, "The Lyric Epigrams of Japan," *Japanese Impressions: With a Note on Confucius*, trans. Frances Rumsey [London, 1921], p. 38).

32. F. S. Flint, "The History of Imagism," *The Egoist* 2 (May 1915): 71. That he associates *tanka* and *haikai* with free verse suggests a lack of awareness about how fixed the syllabic structure of these forms was in practice. It also suggests a general tendency to blur the distinctions between them, a point we will return to in the next section.

33. One critic went so far as to claim that "undoubtedly the Japanese Hokku poetry was the

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and Fletcher admired the form for some of the same qualities emphasized by critics in phase one: its brevity, suggestiveness, and explicit linking of emotion to the natural world.[34] Indeed, *suggestiveness* was such a mainstay of critical discourse that, by 1913, the Japanese poet Yone Noguchi, himself a key contributor to all the chatter, could declare that "there is no word in so common use by Western critics as suggestive, which makes more mischief than enlightenment."[35] Yet he also played up the Orientalist overtones of this critical discourse by comparing the "inwardly extensive and outwardly vague" language of haiku to "a spider-thread laden with the white summer dews, swaying among the branches of a tree like an often invisible ghost in the air, on the perfect balance."[36]

Despite an outward consensus about what made the haiku so innovative, scholars have shown how Pound, Williams, Noguchi, and others had their own distinct take on the form. Yet as pointed out above, these scholars also insist on a shared set of qualities that attracted poets: "[its] brevity and concision: its immediacy, its presentational mode, its suggestion, and its use of concrete particulars in juxtaposition."[37] It was these points of cohesion that likely facilitated the haiku's third phase of reception: an imitation craze that circulated it beyond the original small circle of Imagist poets and their acquaintances. This more populist phase is attested to by the rising number of adaptations, their wider dispersion across the poetry field, and the critical commentary from the time. Indeed, the latter suggests that a saturation point was reached by 1920. The haiku was everywhere. For some this was cause for celebration, signaling a "surprisingly close rapprochement" of the arts of East and West and a more fundamental merging of the poetry of Japan and America than had ever before taken place.[38] For others this was a reason to call for an end to the madness. A critic of Lowell and the other poets who "'do the *hokku* in English'" decried

model upon which much of the work in the first Imagist Anthology was formed, notably the contributions of Mr. Ezra Pound" (George Lane, "Some Imagist Poets," *The Little Review* 2 [May, 1915]: 27).

34. Lowell endeavored in her adaptations to "keep the brevity and suggestion of the *hokku*, and to preserve it within its natural sphere" (quoted in *JT*, p. 165). Fletcher admired the haiku for its use of "universalized emotion derived from a natural fact" and for its expression of this emotion in "the fewest possible terms" (quoted in *JT*, p. 177).

35. Yone Noguchi, "What is a Hokku Poem?" *Rhythm* 2 (Jan. 1913): 355.

36. Noguchi, *The Spirit of Japanese Poetry* (London, 1914), pp. 42–43, and 51. On Noguchi's influence on early adopters like Pound, see Edward Marx, "A Slightly Open Door: Yone Noguchi and the Invention of English Haiku," *Genre* 39 (Fall 2006): 107–26.

37. Johnson, *Haiku Poetics in Twentieth Century Avant-Garde Poetry*, p. 45.

38. Royall Snow, "Marriage with the East," *The New Republic,* 29 June 1921, p. 138. And see Torao Taketomo, "American Imitations of Japanese Poetry," *The Nation,* 17 Jan. 1920, p. 70.

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it as a "much over-rated form, fit to be the vehicle of only the tiniest facets of emotion."[39] A scholar from Harvard acknowledged that the "deftness and precision" of *hokku* had been "an asset of high value to poetry" but also saw it as symptomatic of a more general, negative shift of poetic style from long to short. "One wearies quickly of what somebody has called 'thumbnail sketches of the star in the puddle.'"[40] Even less kind was the Midwestern satirical magazine *Siren*, which parodied the *hokku*'s highbrow associations and ended with this mocking refrain, in five-seven-five form: "Do you think there is anything in this Hokku stuff? / Neither do I."[41] The English haiku had truly arrived.

The slew of adaptations that accompanied this arrival are less familiar to us than the work of the Imagists and, according to Miner, present readers with a "jungle of mixed forms, meaninglessly imitated techniques, and exoticism" (*JT*, p. 184). Whatever diffuseness might have resulted at the level of individual poems, however, there continued to be a surprising consistency in haiku's treatment as object of critical discourse. Japanese critic Taketomo Torao argued that "the poetic merit of Hokku . . . is entirely dependent on the power of suggestion" and observed that poets of the form in America "are inclined to use the minimum of words, and to prefer images and symbols to explanations of things as they are."[42] Royall Snow, writing for *The New Republic*, went further to claim that haiku had so fascinated "the occidental mind" because of "the effects it was possible to produce in limited space." He asserted that the two dominant and influential characteristics of "Asiatic poetry" were "concentration, and a suggestive quality curiously allied to its objectivity"; he had only to cite the Imagist's own pronouncements to affirm how truly allied these characteristics were with what made the haiku so essentially other and so definitively Oriental.[43] It is these sorts of generalizing claims about the haiku's aesthetic influence that define critical discourse in phase three of its reception.[44] Yet concomitant with these claims is a pattern of objectification that, as in

39. Marjorie Allen Seiffert, "The Floating World," review of *Pictures of the Floating World* by Amy Lowell, in *Poetry* 15 (Mar. 1920): 334.

40. John Livingston Lowes, *Convention and Revolt in Poetry* (Boston, 1919), pp. 166, 309.

41. "Hoch der Hokku!" *Siren* (Sept. 1921): 10.

42. Taketomo, "American Imitations of Japanese Poetry," p. 71.

43. Snow, "Marriage with the East," p. 138. Snow cites a 1914 essay by Pound in which he writes that, "'We cannot escape in the coming centuries . . . a stronger and stronger modification of our established standards by the pungent subtlety of oriental thought, and the power of condensed oriental forms." Amy Lowell is also invoked, most notably her remark that, "'Suggestion is one of the great things we have learned from the Orient'" (p. 138).

44. Jay Hubbell and John O. Beaty see haiku as part of the "great and growing influence of Asiatic poetry on contemporary verse [that] has tended to bring about greater conciseness and finish" (Jay Hubbell and John O. Beaty, *An Introduction to Poetry* [New York, 1922], p. 360).

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earlier phases, looks past the specifics of the form to a set of vague aesthetic ideals coupled to a decidedly Orientalist discourse. The pattern is exemplified most succinctly in the comments of a critic writing on one of Noguchi's poems: "This is written in a hokku form, seventeen syllables in three lines. But the form does not make a hokku. Some of the best hokkus are written without this form. Where is that fine and illusive mood, big enough to illuminate the infinity of the universe, which is essential to the hokku?"[45]

By approaching the haiku text as a sociohistorical object, we have seen that at each phase, its perceived essential qualities—namely brevity, suggestiveness, and natural imagery—are vigorously and repeatedly asserted by its many commentators. We can now see these qualities as part of a historical accumulation of observational judgment. But we also see them as part of a broader set of political and cultural formations that is today simply referred to as Orientalism. If discourse about, and creative engagement with, the haiku comes to constitute a vast popular pattern in American society in its third phase, that pattern arguably stems from a larger pattern of American exoticization of East Asia across multiple domains. Last, our brief history reveals some important sociological contingencies essential to the popularity and proliferation of haiku. Flint had to talk to Pound who had to talk to Noguchi in order for Pound to get excited about it, who then got others excited about it as well. The haiku was circulated, like currency, within sociomaterial networks of poets and editors and readers, many of whom were working with the same sets of priorities and under the same assumptions as to what made the haiku valuable. The combination of these forces, both American Orientalism and artistic networks, mark the reality of the haiku text as social and historical event, one that reflects and enacts broader patterns of cultural discourse and sociological behavior amongst artists.

In identifying such patterns, however, we are also left with some new questions. In particular, what is the relationship between these patterns and the "jungle of mixed forms" that they were ostensibly helping to generate? What was happening at the level of the texts themselves, considered now as part of this larger social movement? Did they exhibit similarities across the transition from foreign translated objects to avant-garde experiments and finally to an accessible popular form? A cultural-historical approach is of little help here, since it can only illuminate the context through which we are able to frame such questions. Close reading, to the

45. Jun Fujita, "A Japanese Cosmopolite," review of *Seen and Unseen: Or Monologues of a Homeless Snail* and *Selected Poems of Yone Noguchi* by Noguchi, *Poetry* 20 (June 1922): 164.

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extent it privileges the "living singularity" of individual texts, also falls short. One would like a mode of reading more fine-grained than cultural history but expansive in ways that allow for a definition of textual pattern looser than the one close reading offers—a mode that does not treat the text as a nexus of individual aesthetic effects or an object of discourse but as a set of generic features shared across hundreds of instances. We need an ontology of the English haiku that helps us to see it as more than the arrangement of certain types of images and taciturn language and less than a jungle of imitative forms loosely bound by Orientalism. Brevity and suggestiveness may be the effect of textual patterns at once more subtle than strict formal imitation and yet more concrete than impressionistic aesthetic intuition.

The English Haiku as Statistical Pattern

Since the early 1990s, a popular method for discovering patterns across large quantities of texts has been machine learning and its use in automated text classification. Machine learning refers to a whole suite of statistical algorithms that treat every text as an amalgam of certain quantifiable features. They assume these features are distributed across texts in ways that help to identify differences between them and attempt to *learn* these features in order to classify or predict the category or group to which a text is likely to belong. Such algorithms, for instance, will help to decide whether an email is likely to be spam or not, based on the features they have learned to associate with messages of each type.[46] In literary studies, the prospect of using machine learning to perform similar kinds of information filtering on literary or other aesthetic texts is a decade old. Scholars have used it to try to identify patterns of lexical, semantic, or other textual difference in such things as the narrative structure of plays, political metaphor, theatrical dialogue, and novelistic style.[47] More recently, ma-

46. Such filtering has been one of the most common uses of machine learning since its rise to prominence in the early 1990s. It proved to be more efficient and effective than older methods of text classification, since these relied on human experts having to manually define rules of differentiation that were inextricably tied to whatever texts they were analyzing. With advances in machine learning, experts could begin to focus on identifying the categories themselves, allowing the machine to infer the rules. Fabrizio Sebastiani provides a comprehensive introduction to the history of machine learning within the field of information systems in "Machine Learning in Automated Text Categorization," *ACM Computing Surveys* 34 (Mar. 2002): 1–47.

47. See Stephen Ramsay, "In Praise of Pattern," *TEXT Technology* 14, no. 2 (2005): 177–90; Bradley Pasanek and D. Sculley, "Meaning and Mining: The Impact of Implicit Assumptions in Data Mining for the Humanities," *Literary and Linguistic Computing* 23 (Dec. 2008): 409–24; Shlomo Argamon et al., "Gender, Race, and Nationality in Black Drama, 1950–2006: Mining Differences in Language Use in Authors and Their Characters," *Digital Humanities Quarterly* 3,

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chine learning has played an integral part in highly complex classification tasks such as genre detection and the identification of character types in fiction.[48] Here we apply the method to the English-language haiku with two purposes in mind. First, to try to identify it according to the specific epistemology of machine learning; that is, as a statistical pattern that is by some measure distinct from the patterns found in other poetic texts. And second, to determine how this mode of pattern recognition can be reconciled to those of close reading and cultural history.

Four key tasks constitute machine learning as method, each of which forces the haiku to exist as textual object in ways quite alien to other modes of reading. These tasks are categorization, representation, learning, and classification. Categorization is the task of assigning labels to texts according to their membership in a set of categories, or classes. Representation refers to the task of isolating specific features of texts and quantifying these features in ways interpretable by machine learning algorithms. This is followed by learning, where the machine takes the features associated with each text and calculates the degree to which they distinguish that text as belonging to its assigned category. The final step is the task of classification, which utilizes information from the learning stage to predict the category of a text based on features alone (in other words, the label is unknown). In what follows, we step through each of these tasks in turn, foregrounding the interpretive decisions made at each stage and how these ultimately shape the ontology of the haiku text that emerges in the process.

Categorization is the seemingly simple act of labeling a set of texts according to discrete categories. These categories are binary in the most general case (such as spam and not spam) but can be multiple as well.[49] More importantly, they "cannot be decided deterministically" and depend "on the subjective judgment of the expert" who reads a collection of documents and categorizes them according to the distinctions in which he or she is interested.[50] This is called a supervised approach to machine learn-

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no. 2 (2009); and Matthew Jockers, *Macroanalysis: Digital Methods and Literary History* (Urbana, Ill., 2013), chap. 6.

48. Ted Underwood, et al., "Mapping Mutable Genres in Structurally Complex Volumes," unpublished paper presented for the "2013 IEEE International Conference on Big Data," Santa Clara, Calif., 6–9 Oct. 2013, and David Bamman, Underwood, and Noah Smith, "A Bayesian Mixed Effects Model of Literary Character," paper presented on "Topic Modeling" at the 52nd Annual Meeting of the Association for Computational Linguistics, Baltimore, 22–27 June 2014, acl2014.org/acl2014/P14-1/pdf/P14-1035.pdf

49. See Jockers, *Macroanalysis*, chap. 6, for an explanation and demonstration of multicategory text classification.

50. Sebastiani, "Machine Learning in Automated Text Categorization," p. 3.

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ing.[51] Simple as it sounds, this step also fundamentally determines the outcome of analysis and requires that a set of internally diverse texts be ostensibly pigeonholed into a limited number of categories. For us, this means finding a large body of poems that conform to expectations of what an English haiku was in the early twentieth century and a large body of poems that do not. Labeling them "haiku" and "nonhaiku" respectively, we can then classify the two categories of text against each other. This is not, however, to reinforce the initial distinction we have made, but to test its boundaries and determine what textual patterns are unique to each group of texts. That is, we want to know whether the machine recognizes a haiku over and against a text that is nonhaiku and, if so, what statistical evidence it uses to make that decision.

To identify our two corpora, we first used primary archival and secondary sources to find poems that qualified as haiku according to these basic criteria: they had to be a translation in one of the seminal scholarly texts from the discovery phase; self-identified as haiku in their title; or else identified explicitly by the poet or critic as influenced by Japanese short verse forms. This yielded a corpus of 400 texts that we divided into two categories, translations and adaptations. The translations represent the canonical version of the haiku as it was initially received by Anglo-American audiences and adhere more closely to the strict formal constraints of five-seven-five meter. The adaptations represent a much more diverse group of poems that stray from this formal convention but that adhere at the level of content or aesthetic disposition, at least as acknowledged by poets and critics. This includes explicit adaptations of *tanka*, a thirty-one-syllable form that critics often grouped together with haiku as part of a more general category of short Japanese verse (fig. 2).[52] The sharp spikes in the late teens and early twenties represent large collections of haiku-inspired poems by Lowell, Fletcher, and Noguchi, as well as new translations and adaptations by major and minor poets with no ties to Imagist circles.

To assemble a corpus of nonhaiku, it was necessary to find a substantial body of poems that were not a part of the English-haiku movement, and

51. In contrast, an *unsupervised* approach allows the machine to first identify how a set of documents might be clustered based on some set of specified features, leaving the user to decide if these clusters correspond with meaningful categories. See Jockers, *Macroanalysis*, pp. 70–71, for a helpful explanation.

52. In Japan, *haiku* and *tanka* are naturally associated with very distinct aesthetic orientations and lineages, as well as stylistic and social markers. The former was traditionally devoted to observations of the natural world or philosophical and social commentary, while the latter is associated with emotion and expressions of sentiment. Such fine distinctions were generally ignored by American poets and critics, however, with the result that both were often lumped together as part of a single Japanese poetic tradition.

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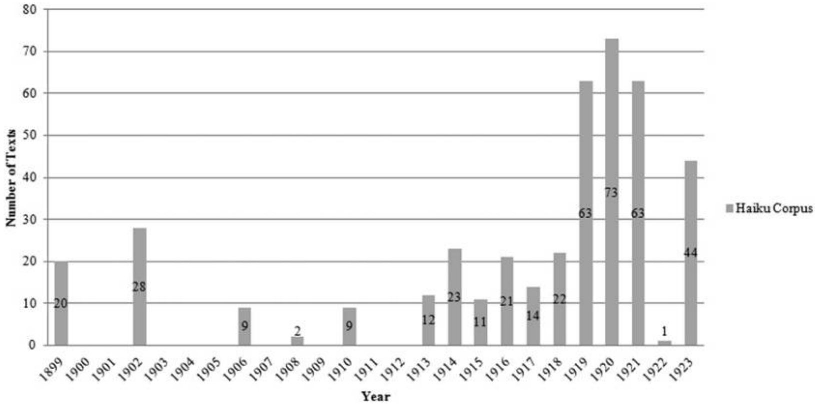

FIGURE 2. Distribution of our haiku texts over time.

yet within which we might expect to find traces of that movement. Thus we collected over 1,900 short poems from poetry and other magazines prominent during phases two and three of the haiku's reception, including little magazines like *Poetry Magazine*, *Little Review*, and *Others*; generalist publications like *Harper's Magazine*, *Scribner's Magazine*, and *The Nation*; key journals of the Harlem Renaissance, including *Crisis* and *Opportunity*; and regional magazines like *The Midland* and *Lyric West*, based in Iowa and California respectively (fig. 3).[53] Here, *short* was defined as any text with a length of less than 300 characters, as this is slightly more than the average length of all haiku in our corpus. These poems became the other category of text against which we would try to assess the boundaries of our two groups of haiku.

Next we had to decide on a *representation* of our texts so that they could be read and interpreted by a classification algorithm. This is where the ontology of the text truly becomes the machine's own. Because classification depends on the uniform indexing of texts, they must be treated as the composite of some smaller unit (words, phrases, parts-of-speech) or units. Once selected, texts are decomposed into simple lists of these units that index their presence or relative frequency (whether a unit occurs in a text or the number of times it occurs). Each unit is treated as a *feature* of the texts in which it appears—a kind of identifying trait—and the text becomes a vector of these traits. But machine representations often do not

53. Poems were collected from the Hathi Trust Digital Library and the Modernist Journals Project. Because these collections can only make available works in the public domain, we were chronologically limited to poems published before 1923. In the case of the Harlem Renaissance journals, however, we hand input the poems directly from the original publications.

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Magazine Corpora	Dates	Number of Short Poems
Poetry Magazine (Early)	1912-1917	222
Poetry Magazine (Late)	1918-1922	317
Masses	1911-1917	113
Little Review	1914-1922	119
Others	1915-1919	138
Smart Set	1915-1922	92
Midland	1915-1922	58
Contemporary Verse	1916-1922	256
Lyric West	1921-1922	106
Harlem Renaissance Magazines (*Crisis*, *Opportunity*)	1911-1929	268
Generalist Magazines (*Bookman*, *Century Magazine*, *Harper's Magazine*, *The Nation*, *New Republic*, and *Scribner's Magazine*)	1915-1922	230

FIGURE 3. A list of the short-poem corpora compiled from contemporary magazines. These short poems come from the roughly 11,000 total poems published in these venues for the given dates.

account for the rules by which these individual units are combined, confirming the observation by Justin Grimmer and Brandon Stewart that "automated content analysis methods use insightful, but wrong, models of . . . text to help researchers make inferences from their data."[54] Wrong because they do not capture the complexity of how texts are produced through language, but insightful because these "incorrect" models can detect patterns of textual units across large and diverse corpora.

One of the most common but also simplest representations in machine learning is the bag-of-words model, which sees a text as the set of words contained within it. This is the model we begin with, and the following figure shows what a single haiku looks like when transformed into a bag-of-words representation (fig. 4). This representation can be refined even further, of course, depending on what we decide constitutes a meaningful distinguishing feature. It turns out that not every single word is useful for detecting the semantic patterns that interest us. So, for instance, we remove grammatical function words (or stopwords), as these are not well suited for distinguishing content-level patterns. We also do not record the frequency of words in our poems, since this is not as effective for corpora

54. Justin Grimmer and Brandon Stewart, "Text as Data: The Promise and Pitfalls of Automated Content Analysis Methods for Political Texts," *Political Analysis* 21 (Summer 2013): 270.

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Poem as Raw Text

So cold I cannot sleep; and as
I cannot sleep, I'm colder still.

Author Unknown; A 1902 translation by Basil Hall Chamberlain

Poem as a tokenized "bag-of-words"

['so', 'cold', 'i', 'can', 'not', 'sleep', 'and', 'as', 'i', 'can', 'not', 'sleep', 'i'm', 'colder', 'still']

Poem as "bag-of-words" without stopwords (i.e., function words)

['so', 'cold', 'sleep', 'colder', 'still']

Poem as labeled feature set (note that word-order is irrelevant)

[{'cold': True, 'colder': True, 'less_than_20_syl': True, 'sleep': True, 'still': True, 'so': True}, 'haiku']

FIGURE 4. Machine interpretable representations of a single haiku text. Note in the final representation that each feature is assigned a value of "True," indicating its presence in the original text. "Haiku" is the label assigned to the feature vector.

with small vocabularies.[55] Further, we lemmatize all nouns so that words like *mountains* and *mountain* are treated as a single unit and exclude words that appear only once in the texts being analyzed.[56] Finally, in addition to word-level features, we can also include in our representation more complex formal features by recording their simple presence or absence in a text. Given the importance of syllable count to perceptions of the haiku during its early reception, we include this feature as well.[57] The result is the text that appears at the bottom of figure 3: a labeled feature vector which

55. On the advantages of a binary bag-of-words approach, where words are represented by their presence or absence, see Pasanek and Sculley, "Meaning and Mining," p. 413, and Bei Yu, "An Evaluation of Text Classification Methods for Literary Study," *Literary and Linguistic Computing* 23 (Sept. 2008): 329–30. Both address the question of when it is advisable to include function words, which can be useful in discerning authorial style. See also Jockers, *Macroanalysis*, p. 64. We also did not account for capitalization and removed all punctuation except for exclamation marks and em dashes, which appear frequently in haiku texts.

56. The latter task is commonly known as feature selection, and is useful for reducing the statistical noise produced by a lot of low-frequency features. One can also reduce features in the other direction by leaving out words that occur many times in both categories of texts.

57. Syllable counts for poems were obtained through a combination of user input and reference to the Carnegie Mellon University (CMU) Pronouncing Dictionary for US English. We then looked at the distribution of syllable counts across both the translated and adapted haiku corpora and used the results to create cutoff points. Thus in the case of the translations, we used eighteen syllables as our threshold, so that every text was represented as having either less or more than that amount.

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now stands in as the model for all our texts. The choices made about how to represent our two sets of poems allow us now to test the hypothesis that haiku are distinguishable from nonhaiku by shared patterns of diction and syllable count.

To do so, we next decided on a classification algorithm (or *learning* method) that would take the features of these vectors and weight them by how influential they were in identifying the vector's assigned label (as haiku or nonhaiku). Numerous such algorithms are available for this task, although each understands *influence* in different, often incommensurable ways. Some treat features as coordinates in a high-dimensional Cartesian space and try to draw a line that best divides the features unique to one class from those of another. Others adopt a symbolic, or nonnumeric, approach and treat the presence or absence of a feature as the result of a set of logical conjunctions (this feature appears because these other features appeared before it). Still others assume that there is a probabilistic process driving the appearance of these features and then try to determine the likelihood of a feature being associated with a particular class.[58]

A popular baseline method from this last group is the Naïve Bayes classifier, which is what we employ. Given a random sample of haiku and nonhaiku vectors, the classifier trains on some part of them (the training set) and learns the distribution of features across these two categories. It then assigns a probability score to every feature, indicating how likely it is to belong to either category (fig. 5). Once trained, the classifier is given the rest of the vectors in the sample (the test set) and, using the calculated probability scores, tries to predict the category of each based on the features it sees. That is, it determines how likely each feature is to predict haiku or nonhaiku, adds these probabilities together for each category, and makes its prediction about the vector based on whichever value is higher.[59] To the Naïve Bayes algorithm, whether a "text" is haiku or not is simply a matter of how probable it is that the features it sees came from one class of text and not another. The more unique these features are to each class, the

58. This point is made in Pasanek and Sculley, "Meaning and Mining," p. 412. The first group of methods includes linear-based models such as support vector machines (SVMs) and logistic regression; the second includes the Naïve Bayes algorithm and hidden Markov models; the last includes decision tree classifiers. For a full description of all these methods, see Sebastiani, "Machine Learning in Automated Text Categorization."

59. For a more complete explanation of this classifier, see Grimmer and Stewart, "Text as Data," p. 11. Its "naïve" character has to do with its core statistical assumption, namely that given a certain category of text, the words in it are generated independently of one another. This is obviously incorrect, as the use of words in a group of similar texts tends to be highly correlated. And yet this simple method has still proven very effective in certain kinds of text classification.

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Word	Label	Probability
sky = True	not-ha : haiku =	5.7 : 1.0
shall = True	not-ha : haiku =	5.0 : 1.0
sea = True	not-ha : haiku =	5.0 : 1.0
man = True	not-ha : haiku =	4.3 : 1.0
last = True	not-ha : haiku =	3.7 : 1.0
snow = True	haiku : not-ha =	3.7 : 1.0
earth = True	not-ha : haiku =	3.7 : 1.0
blue = True	not-ha : haiku =	3.7 : 1.0
pass = True	not-ha : haiku =	3.7 : 1.0
voice = True	haiku : not-ha =	3.7 : 1.0
white = True	not-ha : haiku =	3.0 : 1.0
house = True	haiku : not-ha =	3.0 : 1.0
child = True	not-ha : haiku =	3.0 : 1.0
give = True	not-ha : haiku =	3.0 : 1.0
lo = True	haiku : not-ha =	3.0 : 1.0
sun = True	not-ha : haiku =	3.0 : 1.0
life = True	not-ha : haiku =	2.3 : 1.0
full = True	haiku : not-ha =	2.3 : 1.0
things = True	haiku : not-ha =	2.3 : 1.0
morning = True	haiku : not-ha =	2.3 : 1.0

FIGURE 5. A sample list of probability measures generated from a single classification test. In this instance, the word *sky* was 5.7 times more likely to be associated with nonhaiku (not-haiku) than with haiku. Conversely, the word *snow* was 3.7 times more likely to be associated with haiku than with nonhaiku (not-haiku).

easier it is to make that decision. While literary scholars have noted that Naïve Bayes is not well suited for making certain kinds of distinctions between aesthetic texts, it does excel at identifying the unique, lower frequency features (and words) that mark the difference between classes.[60] This makes it especially useful for exploring our initial questions of how different translated and adapted haiku are from other short poems of the period, and whether or not a pattern of haikuness—as captured by diction and syllable count—can be detected in these other poems.

With these questions in mind, we took our haiku translations and adaptations and classified each group separately against the short poems

60. See Yu, "An Evaluation of Text Classification Methods for Literary Study," p. 336. The method against which Naïve Bayes is most often compared in machine learning approaches to literary texts is Support Vector Machines (SVMs). See Argamon et al., "Gender, Race, and Nationality in Black Drama, 1950–2006"; Pasanek and Sculley, "Meaning and Mining"; and Yu, "An Evaluation of Text Classification Methods for Literary Study." SVMs tend to isolate higher-frequency words as influential features.

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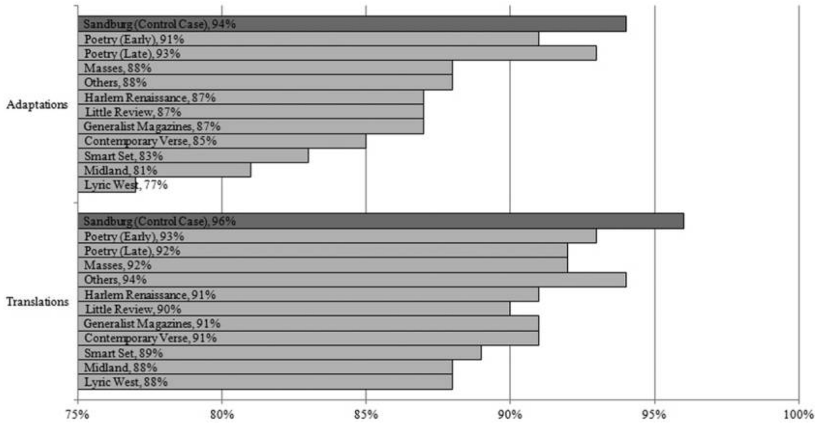

FIGURE 6. Average accuracy scores for one hundred classification tests. The top portion gives the scores for adapted haiku classified against the various short-poem corpora. The bottom portion gives the scores for the translated haiku.

from each journal (or set of journals). We also included a control case so as to verify that the Naïve Bayes algorithm was identifying textual differences where we knew them to exist. This control consisted of 300-character-long segments taken from poems by Carl Sandburg, whose early free-verse poetry profiled the gritty streetscapes of Chicago and surrounding towns and the people who populated them, including working-class laborers, corrupt politicians, poor immigrants, and prostitutes. Unlike the short poems taken from poetry journals, we knew in advance that these poems by Sandburg exhibited patterns of diction and syllable count utterly distinct from our haiku.[61] For each of our classification tests (translations against *Poetry Magazine*, translations against Sandburg and others) we ran the test one hundred times, drawing samples of equal size from the two categories of texts and splitting them into training and test sets. Known as cross validation, this process ensured that our results were not biased toward the features of just a small subset of our texts.[62] From these tests we computed average accuracy scores that show the percentage of times the machine correctly classified a text according to the labels assigned to it (fig. 6).

These accuracy scores indicate that Naïve Bayes was able to distinguish our haiku from the various short poem corpora with exceptional accuracy.

61. All poem fragments were taken from Carl Sandburg, *Chicago Poems* (New York, 1916). Only those poems that dealt explicitly with urban themes or portraits of urban denizens were included.

62. Specifically, we performed 4-fold cross-validation, using three-fourths of the combined samples as training data and the other one-fourth as testing data.

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On average, it guessed correctly 91 percent of the time for the haiku translations and 86 percent for the adaptations. The Sandburg poems, as expected, were in both cases the easiest to differentiate.[63] That the translations scored slightly higher is evidence of their distinctiveness as a class, relying as they do on a more circumscribed vocabulary. In contrast, the lower accuracy scores for the adaptations hint at a greater diversity of features. Because these scores can reflect different underlying results, however, it is necessary to look at where the classification errors occur. For some journals, notably *Poetry* and the Harlem Renaissance magazines, the classifier was less precise in identifying nonhaiku texts, misclassifying many more of them as haiku. That is, it found features associated with haiku in more of the short poems. For other journals, especially those at the lower end of the spectrum, the classifier was less sensitive in its ability to recognize haiku, misclassifying more of them as nonhaiku. This could mean that the haiku features are less internally consistent or that certain features prevalent in both classes—generic words like *spring* or *cold*—have biased the classifier toward one class.[64] Thus, for example, if *spring* appeared many more times in the nonhaiku texts (increasing its probabilistic association with that class) then when found in a haiku, its influence on the classifier's decision potentially outweighed that of other words.

These types of misclassification bring to light the assumptions that Naïve Bayes makes when predicting the class of a text. In particular, that it is composed of features used in specific proportions within each class—proportions that determine the likelihood of a feature being associated with the class to which the text has been assigned. This assumption is useful if you have two classes with very distinct features and distinct distributions of those features across each class. Yet it can lead to problems the more these classes overlap or the more they exhibit internal variation. Problems, that is, if one is trying to assert a hard categorical distinction between two classes. But if one is looking for points of overlap and confluence, as we are, then the problems are actually advantages. In fact, we would like to see more such problems. By including syllable counts and only the most fre-

63. All of these accuracy scores were highly statistically significant, based on randomized tests done for each set of classifications. The scores ranged from 54 percent to 64 percent. The ideal score for such tests is 50 percent, indicating that the machine's ability to guess correctly is no better than a coin toss.

64. In machine learning, *precision* measures the exactness of a classifier and indicates how often it guesses the correct class when given a text of that class. High precision means that more highly unique features are found in a class of texts. *Recall* measures the completeness or sensitivity of the classifier and indicates how many of the texts of a specific class it guesses correctly. Lower recall for a class means that the texts in this class more often omit the features that distinguish their assigned class.

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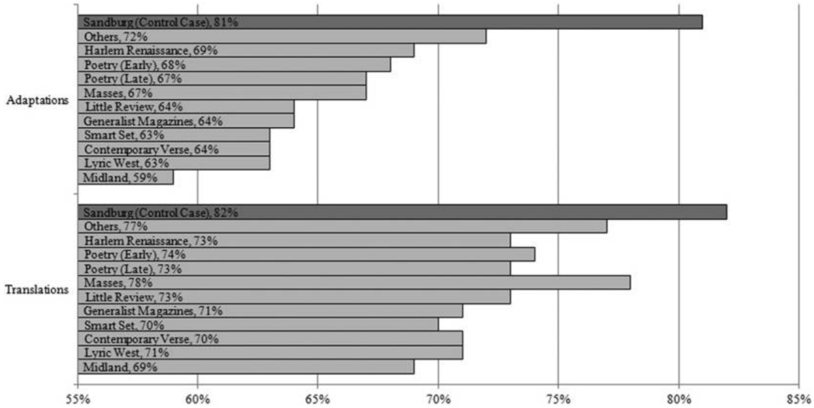

FIGURE 7. Average accuracy scores for one hundred classification tests using a more loosely defined feature set.

quent words, we have too strict a model of textual difference, masking those instances where syllable count was simply disregarded by a poet, or where less frequent words combine with words like *spring* and *cold* to contribute to a haiku (or larger Orientalist) aesthetic. To expose such potential cases of overlap, we needed a more flexible representation of our texts.

Thus we repeated our tests without using syllable count as a feature, and this time included all words except function words (fig. 7). What we found is that accuracy scores dropped considerably, averaging 73 percent for the translations and 65 percent for the adaptations. Even the control case fell significantly, dropping to 82 percent, although it remained high in comparison. Some journals were slightly more distinctive than others—including *Poetry*, *Others*, and *Little Review*—but on the whole our more inclusive representation of the texts exposes almost too much overlap. As in the earlier tests, however, the accuracy scores can be misleading without analyzing where the errors occur. It turns out that for many of the journals, scores decreased in large part because the classifier was misclassifying many more short poems as haiku.[65] By expanding the set of features with which Naïve Bayes identified textual pattern, we got more misclassifica-

65. For certain other journals, the reverse is true. The accuracy drops because more haiku are misclassified as nonhaiku. Although an analysis of these errors is beyond the scope of this paper, we should note that these results are telling us something important about the composition of the short poems in these journals. We provisionally treat these poems as representing a unified class distinct from haiku, entirely based on where they were published, though in fact they are internally diverse in their own unique ways.

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tions and thus more evidence of where our haiku and nonhaiku corpora overlap. If loosening our representation of what distinguishes these corpora confused the machine, it also created more opportunities to read textual pattern as understood by the machine's probabilistic logic.

The Orientalist Milieu

It may seem paradoxical that by confusing the machine we can better assess how it makes its decisions. What we mean by this will become clearer as we examine some of the results of this confusion. First, however, it is useful to briefly review what machine learning tells us about the English haiku. To the Naïve Bayes classifier, a haiku text is just a combination of features that tend to occur more in one class of texts than another. If a poem contains more of the features associated with poems designated as haiku—words like *snow* or *cold*—it is thus more likely to be identified as haiku and vice versa. In our initial tests, Naïve Bayes was very good at making these identifications in ways that reinforced our own labeling of the poems as haiku or nonhaiku. The tests confirmed that haiku were distinct in their diction and meter from other short poems of the period. What machine learning told us, essentially, is that the features present in English haiku, when viewed as a whole, comprised a statistical pattern meaningfully distinct from the statistical patterns prevailing in other short poems.

And yet the ability to make such a clear distinction ultimately depended on the specific features we told Naïve Bayes to account for. It performed so well because we included in our textual representations only the features most likely to distinguish haiku from other texts. According to the traditional goals of machine learning, this is a perfectly reasonable approach. Higher accuracy is desirable, for instance, when one is trying to filter spam messages from a personal email account. If a machine learning algorithm consistently misclassifies messages from a friend as spam, then the data scientist will want to treat this as an error and find a way to refine his or her model to improve the accuracy of the algorithm. For us, however, the error raises an interpretative question: what made the friend's message so spam-like? Rather than correct for the error, what if we consider how it troubles the initial categorical distinction built into the procedure? Or better yet, try to generate similar errors so as to blur this distinction? This was our goal in enlarging the set of features that Naïve Bayes used to distinguish haiku from nonhaiku. We widened its capacity to find haiku-like poems precisely by loosening our definition of the English haiku as statistical pattern.

What the machine learning literature treats as misclassifications, then, we treat as opportunities for interpretation. In this final section, we will do

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so in two ways. First, each misclassified haiku (a text labeled as nonhaiku but which was identified as likely to be haiku) is for us an opening into how the machine is reading textual pattern. It compels us to consider what the machine found in the poem to be more representative of haiku than nonhaiku and whether this is something shared across multiple errors. Taking seriously the idea of haiku as statistical pattern, these misclassified texts become evidence for how broadly distributed haiku's influence was within modernism and for its role in constituting a wider American Orientalist milieu. They serve as evidence, however, not based on a machine ontology alone. They do so because these misclassified haiku are secondarily opportunities to assess how the patterns recognized by the machine align with the patterns recognized by close reading and cultural history. They allow us to interpret not only how the machine understands pattern but also how to position this understanding against those intrinsic to more human modes of reading. The result is a method of literary pattern recognition that is enriched by points of confluence between multiple ontological scales of interpretation.

In the hundreds of classification tests that we ran, 585 short poems (from a total of about 1,900) were misclassified as haiku, although some much more than others.[66] In this group, the average number of times a poem was misclassified was six times. If we consider just the poems that met or exceeded this threshold, we would have an additional 202 haiku to add to our corpus (fig. 8). This is a sizable new body of material with which to potentially reimagine the history of the English haiku, but the question remains as to how (or if) it should be included in that history. We could simply take the machine at its word, but a more critically productive approach is to investigate where the machine-identified patterns do and do not intersect with human-identified ones.

Our misclassified texts fall into one of three groups. The first we call haiku in waiting. These include poems by known adopters of the haiku, such as Pound and Richard Aldington, but also figures not commonly associated with Imagism, such as Louise Bryant, Elizabeth Coatsworth, and the Harlem Renaissance poet Lewis Alexander. These poems are haiku in waiting because, from the perspective of close reading and cultural history, a case can be made for their resemblance to the poems included in our haiku corpus. They were discovered by the machine, but they could just as readily have been identified as English haiku using more traditional

66. Compare this with just forty-five misclassified poems when we used the more precise model of haiku.

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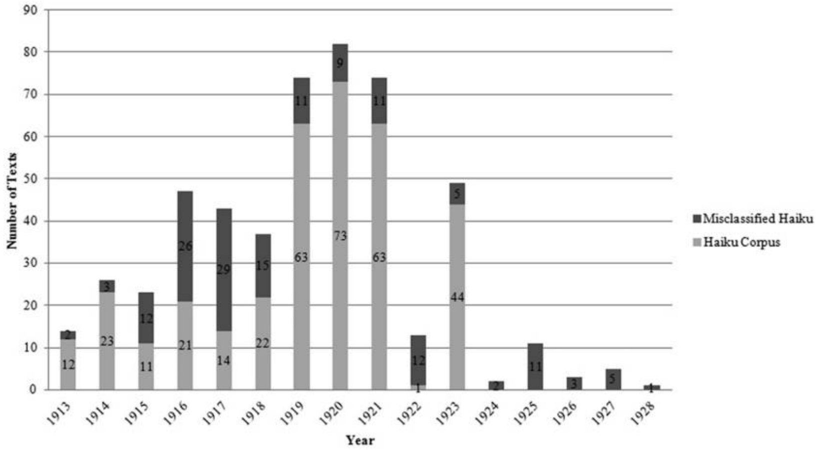

FIGURE 8. The distribution of misclassified haiku as compared with the distribution of our original haiku corpus. Most poems were found in the period between 1916 and 1918. The post-1922 poems come from the Harlem Renaissance journals.

means. A representative example is Aldington's "Epigram," published in 1916 in the *Little Review*:

> Rain rings break on the pool
> And white rain drips from the reeds
> Which shake and murmur and bend;
> The wind-tossed wistaria falls.
>
> The red-beaked water fowl
> Cower beneath the lily leaves;
> And a grey bee, stunned by the storm,
> Clings to my sleeve.[67]

Here is a poem both laden with appropriate natural imagery and indebted to a super-pository technique that juxtaposes movement with stillness, an objective gaze with a faintly lyrical inward turn. The author and publication venue also fit expectations of where haiku influence was most prevalent. The machine has found a pattern—indexed by words like "drips," "leaves," and "clings"—that corresponds to what a close reader or cultural historian would also likely identify as a haiku style. The machine, to be sure, is not identifying style in the same way, but it is suggesting that diction and brevity alone can be equally good indicators of the more rigorous, but also more vague, definitions of style articulated by human readers. Sometimes, it seems, an ineffable sense

67. Richard Aldington, "Epigram," *The Little Review* 3 (Mar. 1916): 29.

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of haiku-ness can indeed be reducible to statistical patterns of word choice. The elusive notion of suggestiveness intoned by so many critics was in some instances just a matter of choosing the right words.

A second group of misclassified texts do not as readily align with the critical intuition of the close reader or cultural historian. We call these machine haiku. An extreme example is "Evelyn" (1917), by George Briggs:

> When she turns her head sidewise;
> The line of her chin and throat
> Running down her shoulder
> Is as graceful as the undulating motion of the neck of a peacock
> Is as smooth as the petals of a Marechal Niel rose.
> And her voice
> Sounds like a man
> Cleaning the rust out of a boiler.[68]

The poem, published in *The Smart Set*, runs counter to expectations of haiku-influenced verse from this time. It not only appears in an unexpected place—a New York literary magazine best known for its fiction and satirical wit—but the material itself is found wanting; there is no natural imagery, nor any suggestive language pointing to a greater existential insight. The final humorous juxtaposition that jolts the poet and reader from their ethereal revelry is by no means unfamiliar to haiku tradition in Japan, and one can find parodic send-ups of the superpository technique in English as well. That the machine discovers parody based on diction alone is certainly coincidental, although it prompts us to investigate further how diction may be correlated to more complex stylistic features. Another misclassified poem from this journal, titled "Poem of Nature" and published in 1916, affirms this impulse: "A squirrel ran along the wall. That's all."[69] We admit that the Naïve Bayes algorithm is much more generous in its recognition of a haiku style than close reading or cultural history would allow. In "Evelyn," words like "rose," which appear frequently in the haiku corpus, led it to classify the poem as a haiku, while it ignored far rarer words like "boiler."[70] A model based on diction and brevity alone seems to cast too wide a net. If we decide to call this poem a haiku, do we not open the door to judging any short poem as such? And yet we still have to acknowledge

68. George Briggs, "Evelyn," *The Smart Set* 52 (Aug. 1917): 28.

69. Sarsfield Young, "Poem of Nature," *The Smart Set* 50 (Dec. 1916): 104.

70. This is what Shlomo Argamon and Mark Olsen call the "'lowest common denominator'" problem, in that classification algorithms will often rely on a tiny fraction of all features that do not adequately characterize or do intellectual justice to the complexity of a literary work (Shlomo Argamon and Mark Olsen, "Words, Patterns and Documents: Experiments in Machine Learning and Text Analysis," *Digital Humanities Quarterly* 3, no. 2 [2009] www.digitalhumanities.org/dhq/vol/3/2/000041/000041.html).

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the machine's approach to pattern recognition as internally logical—as catching *something* about the English haiku that might feel incongruous at the level of individual texts but is present at the level of several hundred. That "Evelyn" was misclassified nineteen times compels us to reconsider our own interpretative biases about the haiku.

A final group of misclassified texts puts even more pressure on close reading and cultural history, while also pointing to a more general Orientalist milieu. These poems fall somewhere in between the haiku in waiting and the machine haiku. It turns out that Naïve Bayes is also a subtle "reader" of style, exposing ambiguous zones where different patterns of language intersect. Consider the poem "A Sierra Juniper (1921)," by Anna Porter and printed in the Los Angeles based journal *Lyric West*:

> Out of the granite rock I've wrested life;
> Fending the storm I've strengthened root and limb,
> Crouching, I hold the plunging chasm's rim,
> As I have braved a thousand years of strife.[71]

As a potential haiku, this ode to a scraggly mountain tree cuts both ways. It provides a highly focused image of a natural object and yet feels weighted down by its rhyme scheme and verbal repetition (wrested, fending, crouching); it enacts a merging of poetic subject and object and yet the personification feels too explicit. To call it a strictly haiku-inspired poem goes too far, but certainly we can say that it participates in a larger fascination with East Asian culture of which the English haiku was an integral part. This is where the looser ontology of machine learning proves invaluable despite its relatively impoverished notion of the poetic text. It not only extends our capacity to find textual patterns that extend to lesser-known and marginal poets but also to cultural-historical contexts that might otherwise remain beyond our purview. *Lyric West*, a journal based in California and far from the conventional centers of little-magazine culture and Imagism (New York and Chicago), has never been a part of that story. But machine learning suggests that it could be. Other poems in this journal, such as haiku-inspired vignettes by George Rowles or allusions to Chuang-tzu's butterflies by Snow Langley—poems that were similarly discovered as misclassified haiku—also appear to participate in the era's more general Orientalist chatter.[72]

71. Anna Porter, "A Sierra Juniper," *Lyric West* 1, no. 4 (1921): 18.

72. Several of Rowles's poems turned up as misclassifications, including "To the Samurai," "Sunset," and "The Geisha and her Kota," all from 1922. The Chuang-tzu reference is from Langley's "April Illusions," also published in 1922. Surveying all the misclassified poems, we found that roughly 20 percent fell into the category of haiku-in-waiting, 40 percent into the category of machine haiku, and the remaining 40 percent into the in-between category.

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A poem like "A Sierra Juniper" is a compelling case for how a pluralistic mode of literary pattern recognition helps to redraw the boundaries of literary influence. From the perspective of close reading alone, the poem does not rigorously fulfill certain criteria as laid out by scholars such as Miner, nor is there evidence of its being inspired by the haiku style. As cultural historians, we would have difficulty positioning the poem within the known circuits of dissemination as plotted by modernist scholars, not least because of Porter's anonymity. Close reading and historical research delimit a set of literary and social patterns from which the text is easily excluded. Machine learning, on the other hand, suggests that there is some relation to haiku at the level of statistical pattern—a subtle yet consistently present pattern of words and collocations of words. This is influence as a kind of statistical likelihood, where words and other stylistic features are seen to be uniquely distributed across different types of texts. These latent, nonexplicit traces of influence are precisely what the machine is good at detecting and are impossible for the individual reader to identify on a large scale.

In some cases these traces add up to a poem that fits with established expectations of the haiku style (nature-based imagery, suggestiveness, brevity). In other cases the result is a poem whose relation to the haiku style looks to be entirely random or at best tangentially linked through a more loosely defined Orientalist discourse. And yet it is important to remember that even in these cases where the machine's determination of influence is not aligned with what close reading or cultural history might tell us, these latter methods have informed the machine's decisions from the start. They, after all, are what we used to designate a haiku corpus in the first place. The machine has discovered a definite empirical relation between these haiku and the misclassified texts, even though that relation is ontologically distinct from the kinds of relation that we tend to focus on as literary critics. At the level of individual poems this relation may seem incidental, but at the level of hundreds of poems scattered across dozens of journals, what emerges is a collection of texts that share specific elements of the haiku style. The textual patterns set down in translated and adapted haiku appear to saturate a much broader array of poems, adding up to a kind of Orientalist milieu that is related to the haiku style but also part of something larger. We can think of this milieu as a circulating textual pattern that, because of its difference from other patterns, was more likely to signal affinity with some kinds of aesthetics than with others. In this way, the machine helps to extend the history of the haiku's reception beyond its immediate and obvious points of influence so that we might consider its impact on, and position in, a more general poetic discourse.

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This final section only gestures to how we might begin to track the formation and growth of this Orientalist milieu, but what we want to make clear is that it will require a method of reading that oscillates or pivots between human and machine interpretation, each providing feedback to the other in the critic's effort to extract meaning from texts. Literary pattern recognition, then, brings together close reading, cultural history, and machine learning so that they supplement one another. Our accounts of these methods indicate the inevitable limitations of each, but they also show that each is invested in a form of pattern discovery. This concept of pattern is a *controlling term* that mediates between them and, most importantly, relativizes the ontologies of the text (and of textual relation) that each relies on. We insist that the friction produced by this merger leads to new histories of the English haiku, as well as of modernism in general.

Granted, our method gains from the fact that there was always something pattern like and algorithmic about the haiku and about certain visions of the modernist poem itself. This is what the late-nineteenth-century Japanese literary critic, Masaoka Shiki, was trying to get at when he wrote: "It is evident from the theory of permutations that there is a numerical limit to the haiku . . . , which are confined to a mere twenty or thirty syllables."[73] It is what Dadaist Tristan Tzara obliquely referenced when he suggested that poets carefully cut the words from news articles, "put them all in a bag," shake gently, and compose poems by pulling the clippings out one at a time.[74] And also Marinetti, who understood "language as a system which is fundamentally mechanical, and capable of being atomized into elements available for recombination."[75] In this regard, to posit a merging of human and machine reading is a provocation, but not a heresy against, or degradation of, the literary text, nor of the work we do as literary critics. It is to return the literary object to an ontology that was once, and is increasingly, its own—an ontology we frame today through the language of data and algorithms, and which earlier generations framed through the language of frequency, formula, and imitation. Machines help us find the patterns of relation that we have always known to operate in the creation and diffusion of literary styles, but which until now we have been limited in our capacity to recognize.

73. Quoted in Janine Beichman, *Masaoka Shiki: His Life and Works* (Boston, 2002), p. 35. Masaoka Shiki was here borrowing from a "'contemporary scholar conversant with mathematics,'" so as to support his argument that the haiku was nearing its end (p. 35).

74. Tristan Tzara, "To Make a Dadaist Poem" (1920), *Seven Dada Manifestos,* in "*Seven Dada Manifestos*" *and* "*Lampisteries*," trans. Barbara Wright (London, 1977), p. 39.

75. Johanna Drucker, *The Visible Word: Experimental Typography and Modern Art: 1909–1923* (Chicago, 1994), p. 114.

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