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## A Hyperspace Poetics, or, Words in Space: Digital Poetry Through Ezra Pound's Vorticism

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### Abstract:

This essay examines the mathematical influences on Ezra Pound's Vorticism at the same time as it provides close readings, by way of interludes interwoven throughout, of digital texts whose underlying spatial structure appears to be both an analog for and a distinct departure from what Pound attempted to embody in his earlier "book-bound" texts. My intention is to lay out the groundwork for a conversation between bookbound and digital works, many of which I shall somewhat arbitrarily call "poems" (genre distinctions typically begin to break down in the digital realm), whose impetus appears to arise from the same dedication to translating scientific and mathematical principles of space into the poetic realm.

"All of our language is woven of space. Thus it is difficult to specify to what degree and in what manner our vocabulary today is more spatialized than that of yesterday, and what the meaning of this surplus spatialization might be. One thing appears certain at a general ideological level: the discreditation of space which was so fully expressed in Bergson's philosophy has given way to an inverse valorization, one which maintains in its own fashion that man 'prefers' space to time. . . . At present, literature—and thought in general—speaks only in terms of distance, horizon, universe, landscape, locale, site, paths, and habitations: naive figures but . . .

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figures par excellence where language is *spaced* so that space in it, become language, is spoken and written."

—Gerard Genette, *Figures*<sup>1</sup>

### Introduction

This essay examines the mathematical influences on Ezra Pound's Vorticism at the same time as it provides close readings, by way of interludes interwoven throughout, of digital texts whose underlying spatial structure appears to be both an analog for and a distinct departure from what Pound attempted to embody in his earlier "bookbound" texts. My intention is to lay out the groundwork for a conversation between bookbound and digital works, many of which I shall somewhat arbitrarily call "poems" (genre distinctions typically begin to break down in the digital realm), whose impetus appears to arise from the same dedication to translating scientific and mathematical principles of space into the poetic realm. This juxtaposition of twenty-first-century digital poetry with Pound's early twentieth-century Vorticist writing not only serves to establish that there is a relationship between geometry (both analytic, or Euclidean, and non-Euclidean) and Pound's Vorticism, but it also gestures toward the ways in which this intersection continues to play itself out in contemporary, spatially driven digital poetry—a playing-out that is becoming more evident with the accelerated ubiquity of digital cultural and whose effects (on our language and on our writing) I believe we ought to self-consciously exploit in order to reread or augment our understanding of digital poetry precursors such as Pound.<sup>2</sup>

1. Quoted in and translated by Alexander Gelley in "Metonymy, Schematism, and the Space of Literature," *New Literary History* 11:3 (1980): 469–487. The original quotation is from Gerard Genette's *Figures* (Paris, 1975), p. 107.

2. In proposing these links, I am implicitly responding to Charles Altieri's astute interrogation in his essay "The Concept of Force as Modernist Response to the Authority of Science" (*Modernism/Modernity* 5:2 [1998]: 77–83) of the growing number of critical studies that attempt to establish a "scientific context for the arts." Altieri rightly points out that the study of literature and science cannot simply be engaged with uncovering intersections between the two fields; rather, scholars need to be concerned with "how we state the relationship between what seems to be the artist's intention and what we can say about the frameworks within which that intention is articulated? And that question requires our clearly addressing two closely related but importantly distinct issues: how such contextualizing will change our interpretations of these writers and artists as historical agents, and how such a stance will modify our own perspectives as we try to evaluate what claims their work has on our present?" (78). For the moment, my answer to Altieri is that digital culture is now so ubiquitous that it inevitably frames our readings of earlier writers; rather than trying to see through or past the framing of the digital in order to achieve a supposedly historically accurate reading of earlier writers,

More fundamentally, however, this essay is an extension of earlier work concerned with relationships between the mathematization of space and of writing and their effects on "kinetic" poems (paper-based as well as digital) that are themselves modeled on mathematical modes of thinking and that suggest that the gap between the digital and the bookbound is not nearly as unbridgeable as it might first appear.<sup>3</sup> Here, I intend to explore the correlation among the popularization of non-Euclidean geometry, Pound's fraught relationship with related developments in science and technology, and the extent to which his engagement with non-Euclidean geometry may have laid the foundation for contemporary digital poems whose poetic space is flexible, emergent, and constantly shifting.<sup>4</sup>

I first examine the mathematical influences on Ezra Pound's Vorticism, a term that Pound likely first encountered in his reading of the 1913 reprint of Sir Oliver Lodge's *Pioneers of Science*, which included a lecture titled "Descartes and His Theory of Vortices," preceded by an account of Cartesian geometry that argues that Descartes made possible the movement from numbers to form.<sup>5</sup> Pound's explicit en-

we should instead consider how the digital works on us, and in this way bring to light previously unacknowledged aspects of earlier texts—a self-conscious reading of the present through the past and vice versa.

3. In this earlier essay, published in 2006 and titled "Numbered Space and Topographic Writing," I began with the large-scale premise that the cultural trend toward the mathematization of space has brought about the mathematicization of writing, to then argue that a number of twentieth- and twenty-first-century poems—digital as well as paper-based—that are kinetic and/or generated model themselves on mathematical modes of thinking. I saw these poems reflecting thinking that is based on either Euclidean or non-Euclidean principles of mathematics—principles that can then be used to ultimately account for a variety of paper-based and digital poems that are kinetic and/or generated; therefore, I argued, this line of poetic inquiry demonstrates that the gap between the digital and the bookbound is not nearly as unbridgeable as it might first appear.

4. One direction for future research is the extent to which these contemporary, spatially driven digital poems are not just on the cutting edge of poetic experimentation, but also on the cutting edge of computing. Speaking at the MIT Emerging Technology Conference on the long-range goals of Microsoft, Microsoft chief research and strategy officer Craig Mundie "envisioned a 3D virtual world populated by virtual presences, using a combination of client and cloud services. He called this next generation 'spatial computing' and listed numerous attributes: many-core processors; parallel programming; seamlessly connected and fully productive; context-aware and model-based; personalized, humanistic, and adaptive; 3D and immersive; and utilizing speech, vision and gestures" (as reported by CNET reporter Dan Farber).

5. Ian Bell, *Critic as Scientist: The Modernist Poetics of Ezra Pound* (New York: Methuen, 1981), pp. 12–13; see also Antje Pfannkuchen, "From Vortex to Vorticism: Ezra Pound's Art and Science" (*Intertexts* 9:1 [2005]: 61–76) for a detailed history of the concept of the vortex, which dates back to work undertaken by German physicist Hermann von Helmholtz.

gagement with analytic geometry and the implicit influence of non-Euclidean mathematics on his work, especially prominent during his Vorticist period from 1914 to 1919, must be accounted for, because Pound himself viewed his critical writings during these years as preparing him for later work. His Vorticist period and accompanying philosophies/mathematical models thus correspond exactly with the years in which he formed the basis of a poetics that would later be worked out in the *Cantos* (“I consider criticism merely a preliminary excitement, a statement of things a writer has to clear up in his own head sometime or other, probably antecedent to writing”).<sup>6</sup> This particular phase is also significant, given the confluence of developments in early twentieth-century arts, physics, and mathematics, all of which led to fundamental changes in conceptions and representations of space in bookbound poetry—changes that may in turn account for the fluid, multilayered space of digital poetry that has subsequently emerged. Digital culture has fundamentally altered our sense of the how and why of a text/author, and it has re-enlivened our sense of the literary lineages of the twentieth century and their intersections with art, science, and technology. It is simply no longer tenable to argue, as Stephen Kern does in his historical study, *The Culture of Space and Time: 1880–1918*, that “the proliferation of geometrical and physical spaces had a great effect on mathematics and physics but did not generally influence thinking in other areas.”<sup>7</sup> Likewise, as I shall demonstrate in what follows, it is no longer tenable to argue that the late twentieth and early twenty-first centuries were an era of “post-spatiality”: to echo the claim of Klaus Benesch and Kerstin Schmidt in *Space in America*, “if real space has become a limited resource, cyberspace, the World Wide Web and other global electronic networks at once [have] expanded and subverted our traditional sense of space.”<sup>8</sup> To this list we must now add

6. Ezra Pound, “Criticism,” in *Ezra Pound’s Poetry and Prose: Contributions to Periodicals, 1940–1954*, ed. Lea Baechler, A. Walton Litz, and James Longenbach (New York: Garland Publishing, 1991), p. 266.

7. Stephen Kern, *The Culture of Time and Space 1880–1918* (Cambridge, MA: Harvard University Press, 1983), pp. 139–140.

8. Klaus Benesch and Kerstin Schmidt, eds., *Space in America: Theory History Culture* (Amsterdam: Rodopi Publishers, 2005), p. 15. The sentiment is also echoed by Fredric Jameson in *Postmodernism, or, The Cultural Logic of Late Capitalism* and David Harvey in *The Condition of Postmodernity*; Harvey in particular makes clear that “the collapse of spatial barriers does not mean that the significance of space is decreasing. . . . As spatial barriers diminish so we become much more sensitized to what the world’s spaces contain”; see Harvey, *The Condition of Postmodernity: An Enquiry into the Origins of Cultural Change* (Cambridge, MA: Blackwell, 1989), pp. 293–294.

digital poems, many of which carefully and self-consciously straddle the line between material and immaterial space and use the one to comment on the other.

Even a brief examination of Pound's early writings immediately reveals to us that the proliferation of geometrical theories of space most certainly did influence poetry in the early twentieth century, and, for this reason, presents itself to us as a model for the new "hyperspace poetics" emerging in the early twenty-first.<sup>9</sup> Despite what can often appear as an unbridgeable gap between digital and book-bound poetry, surely we can now say, looking at Pound through our present moment of digital literature, that his work stands as a book-bound example of what we now recognize as an emergent, flexible poetics that foregrounds the space of reading and language itself?<sup>10</sup> That said, I want to emphasize once more that while it does appear to be the case that Pound's Vorticist writing prefigures certain contemporary digital poems, I have not been able to uncover any

9. William Carlos Williams is another pertinent example of a poet not only well-informed about the implications of the new physics, but also one gripped by a nearly all-encompassing desire to articulate what he could not quite articulate: a consistent and yet variable poetic measure that simultaneously rhythmically sounded and visually scored the particularities of the American idiom. And for Williams, nothing had more fundamentally defined his present moment and changed the very definition of what it means to measure (space in general or just lines of poetry) than Einstein's theory of relativity and the related concept of space-time that had replaced the previously separate axes of space and time. His search for a new relative measure was also a search for an absolutely consistent way to represent the poem spatially, as it unfolds in time. The newly measured poem must rhythmically unfold over time, and it must spatially mark this (particularly American) rhythm. Further, his search for a new measure was spurred on by his early awareness of how artists had to acknowledge the cultural shift away from Platonism—one that had been brought on in part by the growing public awareness of non-Euclidean geometry and the accompanying new space-time of Einstein's theory of relativity that replaced the transcendental (or, again, Platonic) concepts of space and/as separate from time.

10. However, as I have argued elsewhere, there are always exceptions to the lineage I am advocating with Pound as exemplar (along with others such as William Carlos Williams and Wallace Stevens). While my argument proceeds from the premise that non-Euclidean mathematics—which assumes the possibility of multiple and/or shifting, fluid spaces—has made possible digital works by David Knoebel, Jim Rosenberg, Maria Mencia, and Eduardo Kac, all of whom make the most of their medium, there is a lineage of poets that falls on the side of Pound's interest in Platonism. These poets—for example, the bookbound poet Raymond Queneau and the digital poet Simon Biggs—are engaged in writing with the use of Euclidean mathematics (or mathematics that assumes the existence of transcendent realms such as infinity) and they fully embrace a move toward abstraction, one that the digital age makes as available as it does a move toward emergence. See Lori Emerson, "Numbered Space and Topographic Writing," *Leonardo Electronic Almanac* 14:5 (2006). [http://leoalmanac.org/journal/vol\\_14/lea\\_v14\\_n05-06/lemerson.asp](http://leoalmanac.org/journal/vol_14/lea_v14_n05-06/lemerson.asp).

evidence (from author interviews, letters, e-mails, and so on) that contemporary poets are intentionally seeking to carry on Pound's work in the digital realm. The larger point of this essay is instead to create a dialogue between bookbound and digital poems in such a way that our readings of each are enriched by our current cultural moment, rather than providing yet another opportunity to attend to the supposed radical differences between bookbound and digital, thereby advocating for a continual ahistorical celebration of the new. Put another way, Jay Bolter and Richard Grusin's notion of "remediation"—while now nearly a decade old—continues to underlie my sense of how we might go about reading digital poems. Today, however, new media not only "refashions its predecessors and other contemporary media": the products themselves of so-called new media, digital poems in particular, create a kind of feedback loop in our reading practices, as they "refashion" the way we read both bookbound precursors and digital poems themselves.<sup>11</sup>

*Interlude: Words in Space by David Knoebel*

We live surrounded by words. They lie discarded on wrappers beneath our feet.

They adhere to windows at eye level and to billboards high above. We perceive these words in no particular order. They are part of life's jumble, unlikely to yield beauty or truth. But what if they did? What if we could walk among the words of novels and poems? What if we wrote with words in space?

—David Knoebel, "Preface"<sup>12</sup>

The series of poems titled *Words in Space*—part of David Knoebel's larger oeuvre of "click poetry"—presents the reader with poems created using VRML (Virtual Reality Modeling Language) and that therefore appear to be three-dimensional, as if, indeed, in Knoebel's words, the reader can "walk among the words." With these pieces, we can align Knoebel—who happens to have a background in sculpture—not only with the work of such digital poets as John Cayley, Mary Flanagan, Maria Mencia, or (as I discuss in this essay) Jim Rosenberg and Eduardo Kac, all of whom are clearly engaged with exploring the objecthood of language. We can also align him with a lineage of twentieth-century bookbound writers who treat language as a material object to be viewed, explored, touched, and sensed and who could include anyone from F. T. Marinetti and his

11. Jay David Bolter and Richard Grusin, *Remediation: Undertanding New Media* (Cambridge, MA: MIT Press, 1999), p. 19.

12. David Knoebel, "Preface," Click Poetry. <http://home.ptd.net/~clkpoet/space/index.html>.

"words in freedom" to Pound's whirling Vorticist poems, Eugen Gomringer's concrete poetry, Robert Smithson's works such as "Heap of Language," and the blue neon sign of Joseph Kosuth (that reads, "I am only describing language, not explaining anything"). Further, Knoebel has a sophisticated understanding of the space in which language is constituted by letter-objects residing in the digital realm, taking advantage of the fact that the virtual space created by a digital computer is both smooth and striated, in Gilles Deleuze and Félix Guattari's terms, or, otherwise put, is strictly Euclidean (in its undergirding of zeroes and ones in a hierarchical, linear programming) and at the same time flexibly non-Euclidean (emerging and evolving along with the reader/user's interactions).

I will return to my usage of the terms Euclidean and non-Euclidean later in this essay; Deleuze and Guattari's sense of the smooth and striated is defined with reference to the composer Pierre Boulez in ways that eerily prefigure the nature of virtual space and that inform my own appropriation of the Euclidean and non-Euclidean from the mathematician/theorist Brian Rotman. The striated is

that which intertwines fixed and variable elements, produces an order and succession of distinct norms, and organizes horizontal melodic lines and vertical harmonic planes. The smooth is the continuous variation, continuous development of form . . . the pure act of the drawing of a diagonal across the vertical and the horizontal.<sup>13</sup>

Thus while it may be immediately apparent how virtual space retains some striated qualities (think of how Microsoft Word is based entirely on emulating the rigidity of the typographical page for its user), virtual space is also perpetually evolving as it assembles texts "on the fly,"<sup>14</sup> adding a temporal dimension to its ability to represent an explorable three-dimensional space and also responding to the reader/user's interactions with this virtual space.<sup>15</sup> Knoebel, then, uses VRML to

13. Gilles Deleuze and Félix Guattari, *A Thousand Plateaus: Capitalism and Schizophrenia* (Minneapolis: University of Minnesota Press, 1987), p. 478.

14. N. Katherine Hayles, *My Mother Was a Computer* (Chicago: University of Chicago Press, 2005), p. 93.

15. This process of assemblage is precisely described by Hayles in *ibid.*: "When a text is generated in an electronic environment, the data files may reside on a server hundreds of miles distant from the user's local computer. Moreover, in cases where text is dynamically assembled on the fly, the text as 'the actual order of words and punctuation' does not exist as such in these data files. Indeed, it does not exist as an artifact at all. Rather, it comes into existence as a process that includes the data files, the programs

create the illusion of movement at will through a virtual Cartesian space [as well as] to expand and contract little pieces of space, so that it is not continuous at all. As the viewer moves from point A to point B, the distance can suddenly expand or contract, or a sort of warp space can transport her to somewhere else altogether.<sup>16</sup>

Of the eleven works designated three-dimensional by Knoebel, only three or four are less than completely compelling. No doubt because digital poetry is a new and emerging field, rife with experiments with the limits and possibilities of new software and interfaces more than the limits and possibilities of language in the digital realm, poems such as “A Fine View” and “See This” are wholly narrative, linear pieces that appear as though they just happen to be presented to the reader in a three-dimensional simulated environment. For example, “A Fine View” first appears as a dense stack of white words on a black background, with the instruction to “click on the image” immediately beneath the text.<sup>17</sup> Once the reader performs the action, the text slowly rotates so that it becomes clear that the stack of language was only an optical illusion; the poem instead consists of lines of poetry that have been placed, one in front of the other, on a single, transparent plane. At this point, the text now starts to move as if the reader were gliding underneath this plane of text and reading it as it travels overhead. But the technical feats are far more experimental than the poem’s engagement with language, for we soon find that the text is straightforwardly a vignette of workers resting on a rooftop, who watch a colleague’s cigarette smoke and drop ash to the ground below—all of which is literalized with the final “frame” of the poem in which the reader/viewer is confronted with a rectangular grey slab of concrete. The text reads as follows:

The view is fine from where  
the workers take their break  
and over coffee talk  
of sports and Bill, who lost  
his footing on the dew  
slick plywood.

that call these files, and the hardware on which the programs run, as well as the optical fibres, connections, switching algorithms, and other devices necessary to route the text from one networked computer to another” (93).

16. Lewis laCook, “Feeling Like Warped Space: An Interview with David Knoebel.” <http://www.suite101.com/article.cfm/litarture/92391>.

17. David Knoebel, “A Fine View.” <http://home.ptd.net/~clkpoet/fineview/fineview.html>.

One flicks his cigarette.  
 The others watch it smoke  
 in downward arc  
 between two beams  
 and then shatter sparks  
 against the basement slab.

A screenshot of the poem midway through its screening is shown in figure 1.

However, poems such as "Heartpole," "Wheels," "Walkdont," and "Oh" represent a remarkable turn in the development of digital textuality, whereby the reader is given the impression that he or she has been granted access to one of the rare and highly sought-after virtual reality caves, in which language appears to become a nearly tangible, highly complex, and visibly vibrating form of artificial life capable of reacting to external stimuli. "Heartpole," for instance, consists of three moving parts that the reader may rotate or navigate over, under, beside, and behind: the handwritten word "breathe" literalizes the action of a heart throbbing or a chest moving up and down with each inhalation and exhalation; "breathe" pushes against the second moving part, which appears as an undulating blanket of text that the reader must move around to read as the central passages are obscured by the two additional moving parts (fig. 2).<sup>18</sup>

The carpet reads:

He remembers a dimly lit bedroom. Him in his mother's arms. She sings him a song as she rocks him to sleep. The song is about him and all the things he did that day. His life, a song! The words, about him! Suddenly, she stops. He cries. She sings another verse, but then she stops for good, and he is in her arms no more.

Even though the passage, like the text of "A Fine View," does not seem in itself to represent poetic innovation, its thingness, its reliance on readerly navigation, and the fact that the text appears as an object floating in space along with two other word objects, decouples it from narrative conventions built on linearity, character and plot development, closure, and an assumed one-to-one relationship between signifier and signified. The third word-object is a constantly rotating sphere consisting of a longitudinal and latitudinal string of text wrapped in opposite directions: one reads "mind absorbing" (or, as the sphere rotates, it could also read as "mind absorbing mind absorbing mind" and so on), and the other reads "moment to

18. David Knoebel, "Heartpole." <http://home.ptd.net/~clkpoet/html/index.html>.



Figure 1. Screenshot of David Knoebel's "A Fine View."

moment" (which, again, could also be read as a textual feedback loop perpetually falling back on itself). "Heartpole," then, is a text of juxtaposed text objects, each of which are both independent of the others and yet also intersecting—effectively destabilizing any of our attempts to ascribe meaning or even authorial intent. It is a textual artificial form of life comprised of Knoebel's version of the absolute basics of any living, organic entity: memory, consciousness, respiration.

What does it mean to claim, as Ernest Fenollosa did in Pound's 1919 edited version of the essay "The Chinese Written Character as a Medium for Poetry," published in the *Little Review*, that "[p]oetry agrees with science and not with logic"?<sup>19</sup> Since one would think that logic surely underlies science (or, as Hegel conversely argues, that there is a science to logic), it would seem nearly nonsensical to align poetry with one and not the other. Such statements partly account for the confused and frequently contradictory accounts of Pound's Vorticism. Reed Way Dasenbrock is frequently acknowledged for his lucid and nuanced accounts of literary Vorticism, but even he has difficulty accounting for Pound's shifting attitudes toward mathematics and science. First, Dasenbrock asserts that Vorticism endorses "the celebration of form against the fluidity

19. Ezra Pound, *Early Writings: Poems and Prose*, ed. Ira B. Nadel (New York: Penguin, 2005), p. 325.

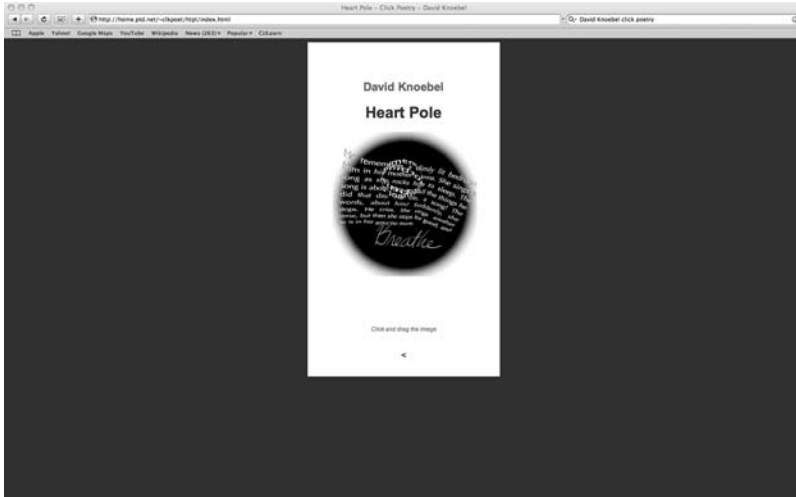


Figure 2. Screenshot of David Knoebel's "Heart Pole."

or formless of Impressionism and Futurism,"<sup>20</sup> a claim that is followed only a few pages later by the assertion that Vorticism "seems to reconcile the Cubist concern with form and Futurist dynamism . . . a reconciliation of form and flux."<sup>21</sup> Similarly, Harriet Zinnes struggles to find textual support for her claim that "Vorticism meant abstraction, and abstraction is modernism"—a claim that, oddly, is followed by a quote from Pound in which he declares that "Vorticism from my angle was a renewal of the sense of construction. . . . Vorticism, as distinct from cubism, was an attempt to revive the sense of form," with the implication that a commitment to form means a commitment to abstraction or to separating oneself from the vagaries of time and space.<sup>22</sup>

As I discuss below, not only does non-Euclidean geometry and the "new" physics teach us that form reflects and is very much a part of the material world, but developments in geometry and physics at the turn of the twentieth century also help to highlight Pound's tendency to oscillate between advocating for a form that is, on the one hand, pure and timeless (as derived from established

20. Reed Way Dasenbrock, *The Literary Vorticism of Ezra Pound and Wyndham Lewis: Towards the Condition of Painting* (Baltimore: Johns Hopkins University Press, 1985), p. 33.

21. *Ibid.*, p. 36.

22. Harriet Zinnes, ed., *Ezra Pound and the Visual Arts* (New York: New Directions, 1980), p. xv.

principles of analytic geometry that were in the midst of being overturned), and, on the other, emergent and embodied (as derived from principles of non-Euclidean geometry underlying the new physics). Thus we can read “[p]oetry agrees with science and not with logic” as an argument simultaneously for and against abstraction—that is, while abstraction is involved in both science and logic, one could also argue that the emphasis on empirical evidence taken from the material world means that science is not abstract and logic is. Such a statement also goes *against* abundant claims for Pound’s desire for abstraction (only) as a means of transcendence, a way to “arrive at a point where the factual limitations of the material world could be dispensed with and a new form of ‘eternity’ approached.”<sup>23</sup> In fact, the contradictory pulls in Fenollosa’s statement perfectly reflect what Patricia Rae calls Pound’s “tensional aesthetic,” one that would never be compatible with a poetics based on absolutes or the attempt to write a poetry of pure, abstract forms:<sup>24</sup>

Pound comments that anyone who regards insights as absolute will succumb to a state of “paralysis” or mental “atrophy.” . . . He would hardly recommend, therefore, a poetic structure that encouraged such a regard in its reader. Only a construct that encourages the ongoing construction and dismantling of truths . . . will comply with the restrictions on human inquiry that Pound shares with [William] James. It is . . . [an] achievement of . . . tensionality.<sup>25</sup>

Likewise, rather than gloss over the difficulties of such contradictory pulls in Pound’s Vorticism, Marjorie Perloff notes a divided loyalty in his work that she claims is philosophically positioned among Confucianism, neo-Platonism, and nominalism—a division that does not necessarily signal a poetic failure so much as a hybrid philosophical approach that turned out to be most productive for Pound’s later work:<sup>26</sup>

[H]owever much Pound yearned to *believe* in Confucian and neo-Platonic doctrine, his own bent was toward a *nominalism* that ironically nourished his long poem much more successfully than he himself might have imagined. . . . Nominalism holds that all that really exists are particular, usually physical objects, and that properties, numbers, and sets (for instance) are not further

23. Ian Bell, *Critic as Scientist: The Modernist Poetics of Ezra Pound* (New York: Methuen, 1981), p. 36.

24. Patricia Rae, “From Mystical Gaze to Pragmatic Game: Representations of Truth in Vorticist Art,” *English Literary History* 56:3 (1989): 690.

25. *Ibid.*, p. 704.

26. Marjorie Perloff, *Differentials: Poetry, Poetics, Pedagogy* (Tuscaloosa: University of Alabama Press, 2004), p. 44.

things in the world, but merely features of our way of thinking or speaking about those things that do exist. . . . What makes Pound a nominalist is his peculiar fixation on the uniqueness of a given word or object, its *haecceitas*, its *difference* from all other words or objects.<sup>27</sup>

It may be that it is useful to think of Pound's work in terms of nominalism, and in Perloff's characterization it certainly seems that nominalism is perfectly compatible with Brian Rotman's account (which I discuss below) of non-Euclidean geometry as emphasizing the particular (even subjectively experienced) rather than on the universal or the transcendent.<sup>28</sup> However, my sense is that using the terms "Euclidean" and "non-Euclidean" in relation to Pound is even more useful in highlighting the way his "tensional poetics" reflects the philosophical temperament of the time, as well as the way in which Pound was caught in the midst of a paradigm shift underway in the science and mathematics—a shift whose effects continue to be felt in the digital realm.

I should clarify that my use of Euclidean and non-Euclidean in relation to space is also meant to capture a general conceptual shift, one from viewing space as that which is stable and can be mapped using a transcendent model of counting to a view in which space is constantly in flux and shifting along with the counter. This somewhat idiosyncratic inflection of Euclidean and non-Euclidean is my own extension of the work set out by Rotman, particularly his *Mathematics as Sign: Writing, Imagining, Counting*. Here, Rotman persuasively argues for a model of materiality—or a theory of matter in space—in which space itself may be mapped using one of two modes of mathematical counting, one drawn from Euclidean geometry and the other from non-Euclidean geometry and Deleuze and Guattari's notion of the Nomad, the smooth, and the striated.<sup>29</sup> As Rotman writes:

Within this investigation, what I am calling nomad counting is designated as *non-Euclidean*. It is opposed to the Euclidean kind, what I've been calling *royal counting*, which, like the Euclidean plane, is homogenous, uniform, pregiven, and always the same; the paradigm in fact of the purest numerical striation. Thus, non-Euclidean counting is the counting of an imagined but always (theoretically and in principle) materializable / embodiable counting agent.<sup>30</sup>

27. Ibid.

28. Brian Rotman, *Mathematics as Sign: Writing, Imagining, Counting* (Stanford, CA: Stanford University Press, 2000), p. 148.

29. See also Arkady Plotnitsky's contribution ("Bernhard Riemann's Conceptual Mathematics and the Idea of Space") to this special issue.

30. Rotman, *Mathematics as Sign* (above, n. 28), p. 148.

Euclidean and non-Euclidean, as I am using these terms, are partly grounded in a particular, historically based shift that took place in mathematics and physics. But they are also “scaleable” terms that we can use to describe a more general cultural exploration still underway of material space, whether via a Platonic *objectivism* that seeks to move toward transcendence, or via a *constructivism* that locates all our measurements as earthbound, material-based actions. While my focus is on Pound’s particular inflection of Vorticism and those works that we can say for certain are Vorticist (i.e., those poems that he published in the two issues of the explicitly Vorticist journal *BLAST*), Vorticist practitioners in general understood their work as *simultaneously* both fluid and static, dynamic and rigid, Euclidean and non-Euclidean. As Wyndham Lewis puts it: “At the heart of the whirlpool is a great silent place where all the energy is concentrated. And there, at the point of concentration, is the Vorticist.”<sup>31</sup> Situated in the realm of both whirling energy and “a great silent place” of transcendence, the Vorticist was driven by two conflicting models of materiality that may have emerged from particular historical circumstances in mathematics at the turn of the century, which has been brought into relief once again in contemporary digital poetry.

*Interlude: Eduardo Kac’s “Letter” and “Secret”*

The opening twenty pages of *BLAST* contain a Vorticist manifesto co-written by Pound and Lewis. Figure 3 shows the image that opened and closed the manifesto. Eighty-two years later, in 1996, digital poetry innovator Eduardo Kac used VRML to create two of the first navigational poems, “Letter” and “Secret.” Kac writes of “Letter,” which looks strikingly similar to the vortex reproduced above:

A navigational poem that presents the viewer with the image of a three-dimensional spiral jetting off the center of a two-dimensional spiral. Both spirals are made exclusively of text. The reader is able to grab and spin this cosmic verbal image in all directions. Thus, reading becomes a process of probing the virtual object from all possible angles. The reader is also able to fly through and around the object, thus expanding reading possibilities.<sup>32</sup>

But what it means to probe a “virtual object from all possible angles” does not become clear until one downloads the poem and is greeted with the two-dimensional/three-dimensional virtual-text object

31. Quoted in Douglas Goldring, *South Lodge: Reminiscences of Violet Hunt, Ford Madox Ford, and the “English Review” Circle* (London: Constable, 1943), p. 65.

32. Eduardo Kac, “Letter.” <http://www.ekac.org/multimedia.html>.



Figure 3. Image of vortex from "Manifesto—1," in *BLAST* 1, p. 11. (Source: Modernist Journals Project. <http://dl.lib.brown.edu/repository2/repoman.php?verb=render&view=pageturner&task=jump&id=1143209523824844&pageno=11&PHPSESSID=4ce2edb47148366d50c653dd9a67eb8e>.)

shown in figure 4. The reader can navigate, with some difficulty, around and even inside—partly reproduced by figure 5.

Aside from the fact that "Letter" appears to be a literal realization of a vortex constructed of language (language that, Kac informs us, consists of fragments of letters written to the same person, but whose subject position is constantly shifting), it—along with "Secret" and his earlier, more well-known "holopoems"—also seems to carry with it a heritage of being simultaneously both fluid and static, dynamic and rigid, material and immaterial;<sup>33</sup> that is, whether or not it is because VRML was in its infancy at the time "Letter" was written, the poem offers itself up to the reader as a fully interactive virtual-text environment, while at the same time withholding complete interactivity (by, for example, forbidding complete access

33. Kac defines holographic poetry as that which "tries to exhibit the impossibility of an absolute textual structure," and which "seeks to create a space where the linguistic ordering factor of surfaces is disregarded in favor of an irregular fluctuation of signs that can never be grasped at once by the reader"; see Kac, "Recent Experiments in Holopoetry and Computer Holopoetry" (<http://www.ekac.org/allholopoems.html>). Some key characteristics of holographic poems are animation, behavior, discontinuous space, empty space, fluidity, immateriality, interactivity, nonlinearity, and so on; see Kac, "Key Concepts of Holopoetry" (<http://www.ekac.org/allholopoems.html>). One can judge from this list of characteristics that this aspect of Kac's oeuvre fits well with my observation that there is a lineage of poets whose linguistic experiments straddle two models of space; however, since these holographic poems are not available online and can only be viewed in a specially equipped gallery viewing space, I have chosen instead to focus on Kac's later digital poems, which can be downloaded from his home page and that also happen to be some of the last poems he created before going on to explore the broader field of bio-art.



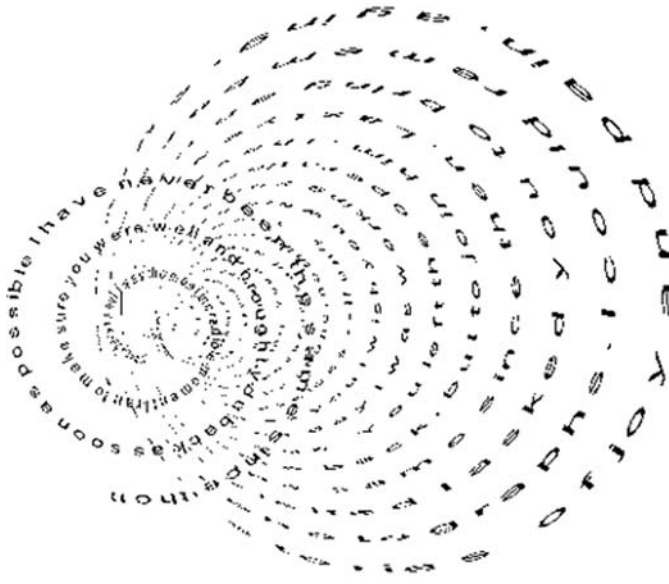


Figure 5. Screenshot of Eduardo Kac's "Letter."

was not until the mid-1910s and '20s that, in the English-speaking world, science was widely seen to have undergone a fundamental paradigm shift, by 1908, in Michael Whitworth's account, "writers were treating space and time in unusual ways many years before they had heard of Einstein, and in some cases, years before Einstein had published his theory."<sup>35</sup> Whitworth points out that even before relativity, "[t]elegraphy allowed the Victorians to think about space and time in new ways," and that "the Victorians had created a global communications network."<sup>36</sup> More to the point, debates about "the fourth dimension" and non-Euclidean geometry had also come to the forefront of the public imagination during the turn of the century.

As Linda Henderson writes in her foundational *The Fourth Dimension and Non-Euclidean Geometry in Modern Art*, "the impact of 'the fourth dimension' was far more comprehensive than that of Black Holes or any other more recent scientific hypothesis except Relativity Theory after 1919."<sup>37</sup> While the principles of a non-Euclidean

35. Michael H. Whitworth, *Einstein's Wake: Relativity, Metaphor, and Modernist Literature* (New York: Oxford University Press, 2001), p. 170.

36. *Ibid.*, p. 171.

37. Linda Henderson, *The Fourth Dimension and Non-Euclidean Geometry in Modern Art* (Princeton, NJ: Princeton University Press, 1983), p. xix.

geometry were initially formulated by Karl Gauss in 1824, by 1867, Nikolai Lobachevsky, Janos Bolyai, and Bernhard Riemann had published papers that denied Euclid's fifth postulate (on the intersection of lines at potentially infinite distances) and that outlined the existence of curved space. As Arkady Plotnitsky discusses in detail in this special issue, Riemann saw geometry in general as the science of "manifolds" of any dimension—adding a fourth spatial dimension was a logical first step to proving the existence of  $n$  dimensions.<sup>38</sup> Further, as Elizabeth Grosz observes, Riemann's work also "enabled geometry to claim a much closer affinity to the production of empirical (rather than a priori) truths about the world . . . the geometrical properties of infinitely small bodies depend on the physical forces or fields (such as gravity), which provide their context."<sup>39</sup> Hence non-Euclidean geometry and debates about  $n$ -dimensional geometry were not only firmly grounded in the particularities of the material world, but were conjoined almost from the beginning.

By the end of the nineteenth century, the traditional understanding of objects as existing in a static, absolute, three-dimensional space (or the assumption underlying Euclidean geometry of "the indeformability of figures in movement"<sup>40</sup>) was challenged, if not entirely overturned. Henderson evocatively explains the profound implications of the movement away from an understanding of space as static/rigid, giving us an indication of how such a shift laid the groundwork for later digital poets to exploit the way in which figures in space were now understood to "squirm" as they moved through space:

While in a system of Lobachevskian or Riemannian geometry based on alternatives to the parallel postulate the measure of curvature must be constant, Riemann's broad view of geometry had suggested the possibility of surfaces or spaces where curvature might vary. On such an irregularly shaped surface, a figure could not be moved about without changes occurring in its own shape and properties. . . . When the principle of indeformability is negated, a geometry results in which figures may "squirm" when they are moved about.<sup>41</sup>

Given the cultural atmosphere of the time, then, it is not surprising that Edwin Abbott published his *Flatland: A Romance of Many Dimensions* in 1884, which was followed by an ever-increasingly public

38. *Ibid.*, p. 5.

39. Elizabeth Grosz, *Space, Time, and Perversion: Essays on the Politics of Bodies* (New York: Routledge, 1995), p. 95.

40. Henderson, *Fourth Dimension* (above, n. 37), p. 5.

41. *Ibid.*

interest in the fourth dimension, as reflected in Oscar Wilde's "The Canterville Ghost" (1891), H. G. Wells's "The Remarkable Case of Davidson's Eyes" (1895), and Joseph Conrad and Ford Maddox Brown's *The Inheritors* (1901).<sup>42</sup> Writer-mathematicians such as Charles Henry Hinton also further popularized the fourth dimension in the form of what Henderson calls "hyperspace philosophy": "[w]ith the aid of hyperspace philosophy, Theosophy, fantasies like Abbott's *Flatland*, and the science fiction of Wells and others, the fourth dimension had become almost a household word by 1910."<sup>43</sup> It is worth noting here that Hinton corresponded extensively with William James from 1892 to 1906—precisely the years that Henri Bergson, an early user of the term "vortex" and whose work would influence Pound after 1909, was reading and corresponding with James.

Furthermore, by 1908, roughly the year that Fenollosa wrote "The Chinese Written Character as a Medium for Poetry," Henri Poincaré had published all three of what became the most popular books on science of his time: *Science and Hypothesis* (1902), *The Value of Science* (1904), and *Science and Method* (1908). Poincaré is considered to be the founder of the field of topology (the mathematical study of the nature of space) and, in the first decade of the twentieth century, he was the first to popularize non-Euclidean geometry and introduce the modern principle of relativity to Paris intellectuals. In *Science and Hypothesis*, he describes the existence of non-Euclidean geometry in strikingly Wittgensteinian (or even nominalist) terms, as if it is only one of many scientific language-games, or is simply as an alternative form of geometry to the (equally) conventional system of Euclidean geometry:

42. Not surprisingly, given the intersection of mathematics and poetry that I explore in this essay, writerly interest not only in the fourth dimension but in Abbott's *Flatland* in particular and the possibility of a comparable exploration of space through poetry rather than narrative has recently been reignited—the latest example being Canadian poet Derek Beaulieu's version of *Flatland*, which, as Marjorie Perloff points out in the afterword, "contains *no words whatsoever*." Beaulieu describes the process of "writing" *Flatland*: "I began by photocopying each page. . . . I then identified each unique letter on the 1st line of each page, and traced a line—using a light-table, ink and a ruler—from the first occurrence of each letter on the 1st line through the 1st appearance of each of those same letters on each subsequent line. . . . The generated result appears in a series of superimposed seismographic images which reduce *Flatland* to a two-dimensional schematic reminiscent of EKG results of stock reports. . . . By reducing reading and language into parametrical statistical analysis, content is subsumed into [a] graphical representation of how language covers a page." See Marjorie Perloff, "Afterword," in Derek Beaulieu, *Flatland: A Romance of Many Dimensions* (York, UK: Information as Material, 2007), pp. 105–109.

43. Henderson, *Fourth Dimension* (above, n. 37), p. 43.

If they [beings from another world with a different, culturally determined sense of space] construct a geometry, it will not be like ours, which is the study of the movements of our invariable solids; it will be the study of the changes of position which they will have thus distinguished, and will be “non-Euclidean displacements,” and *this will be non-Euclidean geometry*. So that beings like ourselves, educated in such a world, will not have the same geometry as ours.<sup>44</sup>

Poincaré sought to foreground and make accessible to the general public those fundamental shifts in science that had been underway since the 1820s: to change the public’s perception of the world as that which is governed by certain immutable laws, to that which is convention-bound and constructed through and through. Expanding and refining his focus to address the nature of space and relativity, *Science et Methode* (translated into English as *Science and Method* in 1913) was enthusiastically endorsed first by cubists—with whom Pound was also in contact—and later by writers such as T. S. Eliot.<sup>45</sup> In it, Poincaré declares:

Absolute space exists no longer; there is only space relative to a certain initial position of the body. For a conscious being, fixed to the ground like the inferior animals, who would consequently only know restricted space, space would still be relative, since it would be referred to his body, but this being would not be conscious of relativity, because the axes to which he referred this restricted space would not change.<sup>46</sup>

To call into question our understanding of something so fundamental as space is certainly to call into question the very basis of how we perceive, understand, and know the world. Even more, since we are “fixed to the ground like the inferior animals,”<sup>47</sup> we cannot hope to perceive the relative nature of space: we are irredeemably

44. Henri Poincaré, *Science and Hypothesis* (1902; reprint, New York: Dover Publications, 1952), p. 57. Emphasis in the original quotation by Poincaré.

45. Michael H. Whitworth describes the frequently unacknowledged connection between Eliot and Poincaré, writing that “the widespread anthologization of ‘Tradition and the Individual Talent’ has led to the neglect of the immediately contemporary lecture ‘Modern Tendencies in Poetry.’ . . . The lecture, delivered on 28 October 1919, explicitly acknowledges *The Athenaeum* and draws upon an important debate about the relations of art and science which had occupied its pages since April 1919. These debates in turn drew on the work of Henri Poincaré”; see Whitworth, *Einstein’s Wake: Relativity, Metaphor, and Modernist Literature* (New York: Oxford University Press, 2001), p. 135.

46. Henri Poincaré, *Science and Method* (1908; reprint, New York: Dover Publications, 1952), p. 433.

47. *Ibid.*, p. 433.

caught between what is and what appears to be the case. Since, as critic and poet Arthur Symons put it in *The Symbolist Movement in Literature*, writers were torn between writing a literature “in which the visible world is no longer a reality and the unseen world no longer a dream,” Pound’s own appropriation of science disciplines was bound to be similarly “tensional.”<sup>48</sup> Even Albert Einstein himself, in his 1908 special theory of relativity, couldn’t help but to acknowledge first that “we entirely shun the vague word ‘space,’ of which, we must honestly acknowledge, we cannot form the slightest conception, and we replace it by ‘motion relative to a practically rigid body.’”<sup>49</sup> And only a few pages later, he concedes:

Even though classical mechanics does not supply us with a sufficiently broad basis for the theoretical presentation of all physical phenomena, still we must grant it a considerable measure of “truth,” since it supplies us with the actual motions of the heavenly bodies with a delicacy of detail little short of wonderful. The principle of relativity must therefore apply with great accuracy in the domain of *mechanics*.<sup>50</sup>

It is doubtful that Pound was aware of Einstein so early on.<sup>51</sup> Nevertheless, the excerpt above indicates that a redefinition of space as a result of developments in geometry was increasingly at the forefront of the cultural imagination. It also points to how Pound’s divided loyalties—between what could be seen as an increasingly outdated reliance on Euclidean principles derived from Plato (and therefore also Euclid) and the more implicit, cultural influence of non-Euclidean principles—were equally of his time.

The year 1908 was also when Pound moved to London, where he stayed until 1920; by 1909, he had met student of mathematics and philosophy T. E. Hulme and poet-critic F. S. Flint, both of whom, along with Richard Aldington, Hilda Doolittle, and, later, William Carlos Williams, would be published under the banner of Imagisme in

48. Arthur Symons, *The Symbolist Movement in Literature* (1899; reprint, New York: Dutton, 1958), p. 4.

49. Albert Einstein, *Relativity: The Special and the General Theory* (New York: Three Rivers Press, 1961), pp. 10–11.

50. *Ibid.*, pp. 16–17. Emphasis in the original quotation by Einstein.

51. Even though Daniel Albright points to Einstein as a crucial influence on Pound’s Vorticism, partly because his special theory of relativity, published in 1905, posits that *energy* ( $e$ ) is equivalent to mass ( $m$ ) in direct proportion to the square of the speed of light in a vacuum ( $c^2$ ), this article was originally published in German and did not come to the attention of the general public until 1919–1920, after the publication of his general theory of relativity and its discussion in the major American periodicals of the time, including *The Dial*.

1912. March 1913 marks the publication in Harriet Monroe's journal *Poetry* of Pound's Imagist manifesto, "A Few Don'ts by an Imagiste"—a short piece that opens with the following definition of "image":

An "Image" is that which presents an intellectual and emotional complex in an instant of time. I use the term "complex" rather in the technical sense employed by the newer psychologists, such as Hart, though we might not agree absolutely in our application. It is the presentation of such a "complex" instantaneously which gives that sense of sudden liberation; that sense of freedom from time limits and space limits; that sense of sudden growth, which we experience in the presence of the greatest works of art.<sup>52</sup>

Although Daniel Albright sees imagism as concerned with the poem as an "exterior product—the poem conceived as a hard gleaming object" rather than being concerned, as he argues Vorticism is, with "the conception of the poem as a coming-into-being, an imagining, an entelechy that never quite terminates in a closed form," it is clear that Pound is thinking of poetry as action and movement when he invokes "complex" to mean (as it no longer does) a group of related, often repressed ideas and impulses that *compel* patterns of thought, feelings, and behavior.<sup>53</sup> Capturing "an instant" in order to record such a "complex" requires stopping time, of course, by stopping motion or movement, one of many contradictions in Pound's work at this stage. Similarly contradictory, achieving "freedom from time limits and space limits" marks, on the one hand, Pound's fascination with (neo-)Platonic transcendence: as he writes in "The Wisdom of Poetry," an essay first published in *Forum* in April 1912 and that anticipates his more-extended writing on geometry in his 1916 book *Gaudier-Brzeska: A Memoir*:

What the analytical geometer does for space and form, the poet does for the states of consciousness. . . . By the signs  $a^2 + b^2 = c^2$ , I imply the circle. By  $(a - r)^2 + (b - r)^2 = (c - r)^2$ , I imply the circle and its mode of birth. I am led from the consideration of particular circles formed by my inkwell . . . to the contemplation of the circle absolute, its law; the circle free in all space, unbounded, loosed from the accidents of time and place.<sup>54</sup>

The foregoing passage could not provide a clearer expression of what Rotman describes as the "doctrine" of Platonism: "the idea that certain ideal objects . . . are 'out there' somewhere, existing prior to

52. Ezra Pound, *Literary Essays of Ezra Pound* (New York: New Directions, 1968), p. 4.

53. Daniel Albright, *Quantum Poetics: Yeats, Pound, Eliot and the Science of Modernism* (New York: Cambridge University Press, 1997), p. 168.

54. Pound, *Early Writings* (above, n. 19), pp. 193–194.

human beings and their culture, untouched by change, independent of energy and matter, beyond the confines and necessities of space and time, and yet somehow accessible to the minds of mathematicians."<sup>55</sup> However, on the other hand, returning to Pound's definition of the image as an "intellectual and emotional complex in an instant of time," free from normal physical and perceptual limits, could also be read as an indication of his desire to move beyond simply understanding time and space as points on a Cartesian grid—to move behind and around a given instant of time. The interpretation is bolstered by his closing warning that we must "[g]o in fear of abstractions," abstraction being the lifeblood of Cartesianism (and again, by extension, also the lifeblood of Euclideanism).

By 1914, partly in an attempt to dissociate himself from Amy Lowell's claim to Imagism or, as Pound disparagingly called what he saw as her misappropriation "Amygism," he turned his energies to Vorticism. As he writes in the September issue of the *Fortnightly Review*, later reprinted in *Gaudier-Brzeska*: "a radiant node or cluster, it is what I can, and must perforce call a VORTEX, from which, and through which, and into which ideas are constantly rushing."<sup>56</sup> In other words, "a Vortex is a circulation with a still center: A system of energies drawing in whatever comes near," first represented by Pound in an article in 1912 and accompanied with the image of a cone intersected from top to bottom by a wire.<sup>57</sup> In April of that year, with both Wyndham Lewis and Pound at the helm, the first issue of *BLAST* was published.<sup>58</sup> Pound's contributions to the issue included, as other critics have already pointed out, a series of strikingly bland poems, formally conventional and thematically straightforward works denouncing, for example, "the smugness of 'The Times.'"<sup>59</sup> The issue also included two of his most renowned essays

55. Rotman, *Mathematics as Sign* (above, n. 28), p. 127.

56. Ezra Pound, *Gaudier-Brzeska: A Memoir* (1916; reprint, New York: New Directions, 1970), p. 92.

57. Hugh Kenner, *The Pound Era* (Berkeley: University of California Press, 1971), p. 239.

58. While my focus is necessarily only on those works that Pound published in *BLAST*, given the early twentieth century's exploration of hyperspace, or simply fluid, shifting, emergent space, it is also worth noting that all issues of *BLAST* blatantly disturb the rigid visual field of the page; no longer a uniform surface with homogeneously sized letters, proceeding horizontally across the page and mappable by  $x$  and  $y$  axes, the type on the pages of *BLAST* shifts from large to small, dense to slight, and extends both vertically and horizontally. Certainly, the design of these pages was a foundational influence for later concrete poets, and even for later digital poets.

59. Ezra Pound, "Salutation the Third," in *BLAST 1*, ed. Wyndham Lewis (Santa Barbara, CA: Black Sparrow Press, 1981), p. 45.

on Vorticism, "Vortex. Pound" and "Vortex. Gaudier Brzeska." There is much evidence in both essays to support the notion that Pound's exploration of alternative spaces/spacing conspicuously draws from both earlier and contemporary paradigms in science and mathematics. "Vortex. Pound" opens with the point-blank statement that "[t]he vortex is the point of maximum energy," language that in hindsight seems clearly drawn from work on thermodynamics and other nineteenth-century sciences of energy that preceded Einstein's theory of relativity. At the same time, Pound visualizes "maximum energy" as a single point, one of the conceptual mainstays of analytic geometry, for which a point is not a thing, but a place, an exact position on the ideal space of a plane. Further upsetting any easy interpretation of his Vorticism, Pound closes "Vortex. Pound" with the injunction for poets to "use only the primary media. . . . The primary pigment of poetry is the IMAGE. The Vorticist will not allow the primary expression of any concept or emotion to drag itself out into mimicry."<sup>60</sup> Likewise, while Pound's essay on sculptor Henri Gaudier-Brzeska seems more oriented toward the new physics—with opening references, once again, to energy, "masses in relation," and plasticity<sup>61</sup>—it too promotes a renewal of past forms (particularly geometric forms) with the invocation of "the absolute" and a definition of the vortex as "THE POINT ONE AND INDIVISIBLE."<sup>62</sup>

As critics such as Patricia Rae have pointed out, only in the second issue of *BLAST* (published in July 1915) do we find a single poem by Pound, "Dogmatic Statement on the Game and Play of Chess (Theme for a Series of Pictures)," that is not so much obviously Vorticist—after all, without digital animation, how *could* a poem exemplify a whirlpool with a still center?—as it is an attempt at a rhythmic enactment of a vortex and an exploration of the metaphor of the chess game to demonstrate certain tenets of Vorticism. Taking place on the Cartesian grid of the chessboard—a perfect embodiment of a Euclidean plane that is "homogenous, uniform, pre-given, and always the same,"<sup>63</sup> with chess pieces all mappable by their positions on *x* and *y* axes—the first three lines indeed seem to enact the logical neatness of the game and even to exemplify through rhythm the robotic regularity one might associate with the "pure" math of analytics.<sup>64</sup>

60. Ezra Pound, "Vortex. Pound," in *ibid.*, pp. 133–154.

61. Ezra Pound, "Vortex. Gaudier Brzeska," in *ibid.*, p. 155.

62. *Ibid.*, p. 156.

63. Rotman, *Mathematics as Sign* (above, n. 28), p. 148.

64. It is also no coincidence that Pound's interest in chess is related to analytic mathematics—especially as chess later became one of the first games to be used as a test of an

The first line moves across the page in three iambs that consist of an adjective followed by a noun ("Red knights," "brown bishops," "bright queens"); the second line reverses and doubles the previous pattern (departing from patterning parts of speech) so that there are now six feet—two pairs of the combination of an iamb followed by its reversal, the trochee, completed by two more iambs ("Striking the board, falling in strong 'L's' pf colour"). The third line returns to the three-foot pattern of line 1, this time with two dactyls followed by an iamb ("Reaching and striking in angles"). Pound signals, however, that this careful patterning is about to be disrupted with the indentation of the fourth line and its series of three ominous-sounding, heavily accented trochees ("Holding lines of one colour"), after which the poem is transformed into a series of randomly accented lines. Now it is a game "alive with light" whose pieces are "living in form" and whose "moves break and reform the pattern" instituted by the two  $x$  and  $y$  axes:

Clashing with "x's" of queens,  
 Looped with the knight-leaps.  
 "Y" pawns, cleaves, embanking,  
 Whirl, centripetal, mate, King down in the vortex:  
 Clash, leaping of bands, straight strips of hard colour,  
 Blocked lights working in, escapes, renewing of contest.<sup>65</sup>

Again, the first four lines point to Pound's attraction to the unbounded possibilities suggested by the objective workings of pure math, workings that exist, like the chess pieces and the rules that determine where they can and cannot move, in a realm entirely independent of humans (and note the absence of any players in the poem)—not unlike "the circle free in all space, unbounded, loosed from the accidents of time and place."<sup>66</sup> But the rest of the poem, particularly the *final* four lines, shows his attraction to the unbounded possibilities suggested by the "whirling," relational energetics animating the new geometry and the new physics: the game is now not so much about the purity of ideal forms, or the ideal space of the grid, so much as it is a means to study vibrating, squirming matter/

artificial intelligence that was first conceived as operating by top-down and "controlled by a pre-given plan or 'mind' from above" (ibid., p. 142). In other words, the way in which chess nurtures his love of the Platonic seems directly traceable to future book-bound and digital poets' love of the computer-generated art work.

65. Ezra Pound, "Dogmatic Statement on the Game and Play of Chess (Theme for a Series of Pictures)," in *BLAST 2*, ed. Wyndham Lewis (Santa Barbara, CA: Black Sparrow Press, 1993), p. 19.

66. Pound, *Early Writings* (above, n. 19), pp. 193–194.

material objects (embanking, whirling, clashing, leaping, renewing, and so on) that occupy space, which now should be understood more as a series of “changes of position” (as Poincaré puts it).

Interlude: “Diagrams Series 6” by Jim Rosenberg

“If you would ask me ‘What adjective do you want in front of the word poet, in reference to yourself?’ Um, I would not disown terms like ‘new media poet,’ or ‘digital poet’ . . . but the adjective that I would really prefer is none at all. I see the work that I do as simply poetry. . . . I started using visual means because it was the only way I knew how to achieve the result of putting words on top of one another and having something readable, and putting words on top of one another and having something that could then be put into a larger unit the same way that a word can. . . . There’s a visual notation and so forth. But I’m not doing this to supplant the level of things like syntax, semantics and so forth.”

—Jim Rosenberg<sup>67</sup>

Jim Rosenberg began his lifelong interest in what he calls “non-linear poetic forms” in 1966, an interest that soon evolved from bookbound experiments into digitally mediated diagram poems. As he puts it: “The diagrams began as an effort to support word clusters, by analogy to the musical concept of tone clusters; because the juxtaposition of words in a cluster disrupted syntax, an alternate channel was necessary for syntax.”<sup>68</sup> Rosenberg implements these diagrams in the open-source programming system Squeak, the result of which are a series of fully interactive works that not only juxtapose words (akin to juxtaposing individual musical tones), but also phrases (akin to “tone clusters,” or a musical chord comprised of consecutive tones), clusters of words, even clusters of words within other clusters or individual words. In other words, these diagrams exemplify what Rosenberg calls “hypertext in the open air”: they are self-conscious reworkings of the literary possibilities inherent to the hypertext link as well as a means of foregrounding the perpetually shifting spatiality that underlies both hypertext (where spatiality is normally hidden from the reader, whose experience of the text may in fact feel more temporal than spatial, as clicking on links replaces one screen with another and seems to unravel a textual tapestry) and individual or juxtaposed letters/words/sentences.

While Theodor Nelson initially termed “hypertext” to mean “a body of written or pictorial material interconnected in such a complex

67. Jim Rosenberg, “An Interview on Poetics: Sandy Baldwin Interviewing Jim Rosenberg.” [http://www.as.wvu.edu/clcold/loop/nu\\_dex/interview.html](http://www.as.wvu.edu/clcold/loop/nu_dex/interview.html).

68. Jim Rosenberg, “Jim Rosenberg.” <http://www.well.com/user/jer/bio.html>.

way that it could not conveniently be presented or represented on paper,"<sup>69</sup> the popularization of the Internet has since narrowed our understanding of a hypertext link to mean simply the bit of code that connects one word or phrase, usually highlighted in blue, with another. No doubt partly because of his computer-programming expertise, Rosenberg is acutely aware of the many ways in which this chunk-style of hypertext is writer/programmer-driven (in a way that works against the reversal of the active writer/passive reader that is so often touted as the advantage offered by the interactivity of hypertext), as well as linearly structured so that it very often excludes a nonlinear or polylinear linking among concepts as well as words and phrases. Thus "Diagrams Series 6" contains a series of ten diagrammed poems that, in turn, contain interactive palimpsests: as is evident in the screenshot (fig. 6) from the first diagram poem in the series, each chunk of palimpsest may be viewed as a whole, as a series of overlapping and intertwining lines and phrases, or each layer of the palimpsest may be viewed individually as one among several layers.<sup>70</sup>

On the other hand, the poem also consists of larger chunks of texts that are palimpsests layered within palimpsests within which may lie layer-upon-layer of scraps of text. However, unlike conventional hypertext, which insists that the user both place the cursor over the linked object and then click the object, Rosenberg's diagrams involve a more fine-tuned, self-conscious interactivity from the reader/user, no doubt partly to work against the increasing invisibility of the point-and-click structure of most web sites; merely running the cursor over the palimpsest (demonstrated in the screenshot in figure 7) instantly results in legible, clearly layered scraps and lines of poetic text (demonstrated in the screenshot in figure 8) and thus forces us to a recognition of our physical relation to text, whether bookbound or virtual. The reader/user only clicks onto the larger, overarching diagram inside of which rests smaller palimpsests such as those indicated in figures 7 and 8. The result is a diagram notation that "acts as a kind of external syntax, allowing word objects to carry interactivity deep inside the sentence. Interactivity, in turn, allows for juxtapositions to be opened so that the layers in cluster can occupy the same space and yet be legible."<sup>71</sup>

69. Theodor H. Nelson, "A File Structure for the Complex, the Changing, and the Indeterminate," in *The New Media Reader*, ed. Noah Wardrip-Fruin and Nick Montfort (Cambridge, MA: MIT Press, 2003), p. 138.

70. Jim Rosenberg, "Diagrams Series 6." <http://www.well.com/user/jer/d6/readMe.html>.

71. Jim Rosenberg, "Interactive Works (Hypertext)." [http://www.well.com/user/jer/inter\\_works.html](http://www.well.com/user/jer/inter_works.html).

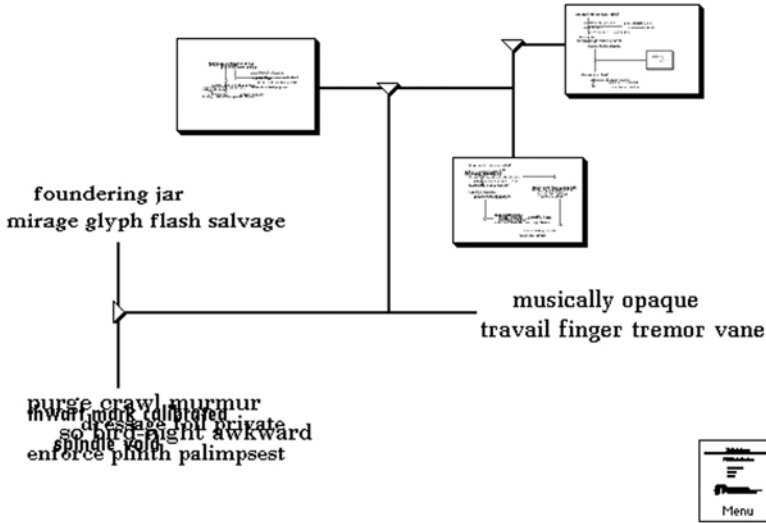


Figure 6. Screenshot of Jim Rosenberg’s “Diagrams Series 6 #1.”

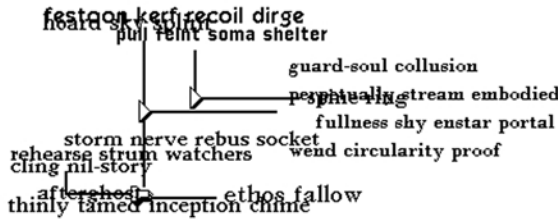


Figure 7. Screenshot of Jim Rosenberg’s “Diagrams Series 6 #1.”

But the complex structure of Rosenberg’s deeply interactive diagram poems also results in a series of poems within poems within poems whose emphasis is simultaneously on the visual, objecthood of the language—our material, earthbound relationship to language—and on the semantic connections between physical chunks of text. If we look at the excerpt reproduced in figure 7, we see that the phrase “festoon kerf recoil dirge” must be viewed visually and read

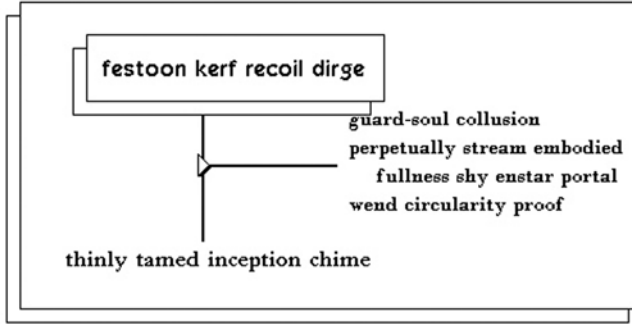


Figure 8. Screenshot of Jim Rosenberg's "Diagrams Series 6 #1."

semantically alongside "hoard sky splint" and "pull feint soma shelter"; on the right, "festoon kerf recoil dirge" must also be read on its own, as must "hoard sky splint," which lies underneath though which, once scrolled over, may be the primary title or governing concept out of which comes either "thinly tamed inception chime" or "guard-soul collusion," and so on. However, this multilayered complexity is increased many times over by the fact that the description (not even a reading) I have just provided of "Diagrams Series 6 #1" is only one of the two layers (see the image in figure 8) that constitute this one larger layer structure that, in turn, is one of three of these larger layer-structures constituting this one poem. Thus the reading that results from the juxtaposed text-chunks I describe above must further be enacted in relation to the second layer beneath the card reproduced in figure 8—a layer that in turn consists of two additional textual layers. In conversation, Rosenberg has stated that he imagines each text-chunk to be a part of speech that might appear in a sentence diagram; whereas the conventional sentence diagram would visually map, for example, the subject and verb of a sentence, in "Diagrams Series 6," the reader is invited to imagine "festoon kerf recoil dirge" as a moveable, shifting part of speech unto itself—perhaps the verb of the subject "thinly tamed inception chime," in turn leaving us trying to imagine the action described by a four-word phrase. Even if our language were flexible enough that we may treat it as a three-dimensional object with breadth and depth, is it flexible enough that we may reimagine what is constituted by a verb or a subject?

Pound continued to write of the creative possibilities of analytical geometry in his 1916 *Gaudier-Brzeska: A Memoir*; however, here we find more indications of a change in his understanding of how the philosophies underlying Euclidean and non-Euclidean mathematics might now inflect his work. While he makes it clear that statements of analytics (such as  $a^2 + b^2 = c^2$ ) still define ideal forms, he now adds the qualification that the equations themselves do not *create* forms;<sup>72</sup> furthermore, while the image, the primary pigment of any given work of art, similarly creates forms, it is not *equivalent* to equations:

The statements of “analytics” are “lords” over fact. They are the thrones and dominations that rule over form and recurrence. And in like manner are great works of art lords over fact. . . . They cause form to come into being. By the “image” I mean . . . not an equation of mathematics, not something about a, b, and c, having something to do with form, but about sea, cliffs, night, having something to do with mood.<sup>73</sup>

Here, art (as if a transcendent realm itself out of which individual works of art emerge), like the still point in the center of the vortex, is a catalyst—participating in the reaction, the creation of particular forms, without being altered itself or becoming part of the product of the reaction it catalyzes. But note also that the *image*—again, what Pound refers to as art’s primary pigment—must bear some relation not to abstract qualities, but to the range of particulars that make up a given instant: “sea, cliffs, night, having something to do with mood.” Since “art” is nothing without the particulars (i.e., the image), the movement here from the abstract to the particular is the exact opposite of Pound’s 1912 celebration of the move from particulars to abstractions quoted earlier, of how “the consideration of particular circles formed by my inkwell” inevitably leads to the higher “contemplation of the circle absolute, its law.”<sup>74</sup>

Only three years later, at the end of his Vorticist period, the shift from a philosophy grounded in abstraction to one grounded in particularities was almost complete. Throughout the fall of 1919, Pound published Fenollosa’s “The Chinese Written Character as a Medium for Poetry” in installments in *Little Review*, also the same year that Einstein’s general theory of relativity came to the forefront of public awareness. Note in the following passage from Fenollosa (one that must have rang true for Pound) the almost complete disavowal

72. Pound, *Gaudier-Brzeska* (above, n. 56), p. 91.

73. *Ibid.*, pp. 91–92.

74. Pound, *Early Writings* (above, n. 19), pp. 193–194.

of pure, transcendent, abstract concepts in favor of *particular, ever-changing relations among material objects*:

A true noun, an isolated thing, does not exist in nature. Things are only the terminal points, or rather the meeting points, of actions, cross-sections cut through actions, snap-shots. Neither can a pure verb, an abstract motion, be possible in nature. The eye sees noun and verb as one: things in motion, motion in things.<sup>75</sup>

This passage from Fenollosa is also strikingly similar to certain passages found in the 1911 English translation of Bergson's *Matter and Memory*, which Pound most certainly read at the urging of Hulme. Here, Bergson argues that "[a]ll division of matter into independent bodies with absolutely determined outlines is an artificial division";<sup>76</sup> even more striking is Bergson's reference to "vortex rings" in his discussion of nineteenth-century physicists Michael Faraday and Lord Kelvin and their theories of matter:

For Faraday the atom is a center of force. He means by this that the individuality of the atom consists in the mathematical point at which cross, radiating throughout space, the indefinite lines of force which really constitute it. . . . Lord Kelvin, moving in another order of ideas, supposes a perfect, continuous, homogeneous and incompressible fluid, filling space: what we term an atom he makes into a vortex ring, ever whirling in this continuity, and owing its properties to its circular form, its existence and, consequently, its individuality to its motion.<sup>77</sup>

Regardless of the source of Pound's Vorticism, the presence of non-Euclidean geometry in the public imagination directly or indirectly made possible the shift to understanding objects no longer in terms of their purity, their separation from humans/subjects, and no longer in terms of a "transcendentally external viewpoint," but instead from the "bottom-up, from an always prior and intrinsic materiality."<sup>78</sup> By the 1930s, Pound's critical writing indicates that Einstein had become a defining force in his work. In his 1934 *ABC of Reading*, he aligns himself with an unnamed French commentator on Einstein, who had written that Einstein clarified the purpose of science so that it no longer consisted "in inventing a number of more or less abstract entities corresponding to the number of things you

75. *Ibid.*, p. 310.

76. Henri Bergson, *Matter and Memory* (New York: Zone Books, 1988), p. 196.

77. *Ibid.*, p. 201.

78. Rotman, *Mathematics as Sign* (above, n. 28), p. 147.

wish to find out.”<sup>79</sup> By 1938, he not only seems to have completely rejected Platonism—referring to it in *Guide to Kulchur* as a kind of “inebriety” that may result when one attempts to discuss ideas “in a species of vacuum”<sup>80</sup>—but, continuing on in the same passage, he seems to want to sever his ties with philosophy altogether: “In our time Al Einstein scandalized the professing philosophists by saying, with truth, that his theories of relativity had no philosophic bearing. (Pause here for reflection.)” (34).<sup>81</sup>

And with this order to pause for reflection, with Pound’s work now contextualized as engaging the fluctuating, flexible particularities of materiality—which, I would argue, applies as much to individual objects as it does to the individual material qualities of letters and words—perhaps we can also now see certain kinetic, spatialized digital poems as retroactively prefiguring such a reading of Pound (the present, saturated in the digital, as unavoidably enframing any reading of the past), as well as seeing Pound’s work as laying the groundwork for these twenty-first-century digital poems. Think of Pound’s Vorticist work by way of digital poetry, and digital poetry by way of Pound as Lord Kelvin’s atoms by way of Bergson: each a kind of “vortex ring, ever whirling in this continuity, and owing its properties to its circular form, its existence and, consequently, its individuality to its motion.”<sup>82</sup>

79. Pound, *ABC of Reading* (above, n. 34), p. 18.

80. Ezra Pound, *Guide to Kulchur* (New York: New Directions, 1952), p. 34.

81. To name a few, see Jerome McGann’s foundational essay, “The Cantos of Ezra Pound, the Truth in Contradiction,” in *The Poetics of Impersonality: T. S. Eliot and Ezra Pound*, ed. Maud Ellmann (Cambridge, MA: Harvard University Press, 1987), and Robert Hass’s essay, “(Re)Reading Bergson: Frost, Pound, and the Legacy of Modern Poetry,” *Journal of Modern Literature* 29:1 (2005): 55–75.

82. Bergson, *Matter and Memory* (above, n. 76), p. 201.