Autopoiesis and Cummings' Cat

Aaron M. Moe
Washington State University

Abstract
Cummings shattered language, but he did so with precision. The result is a visual poem marked by extreme linguistic upheaval permeated with mathematical and pictorial order—a poem, in other words, that epitomizes linguistic chaos. One such poem explores the acrobatics of a falling cat, "(im)c-a-t(mo)." Because of the tension between order and disorder in the poem, the concepts of autopoiesis and fractals from chaos theory provide helpful language to illuminate the poem's textual dynamics, which then provides a foundation to look deeper into the ideas Cummings explores.

[**Keywords**: Cummings, Autopoiesis, Fractals, Chaos, Visual Poem, Animal]

"Imagine that we are in freefall with zero total angular momentum. Our problem is to reorient ourselves, say right-side-up, by changing our shape. Such a problem is faced by gymnasts, falling cats, satellites, etcetera. Our first objective is to control our net orientation. This can be represented by a rotation matrix g*. Our control variables are the deformations* dx *of our shape. Our possible shapes are represented (locally) by a continuous vector variable* x*.... Let* Q *denote the configuration space of a given deformable body.... The group* g *of rotations about the center of mass remains, and acts on* Q *by rigidly rotating configurations. We write this action as*

$$q \in Q \rightarrow gq = q' \in Q$$

where g *is the rotation...."*

Richard Montgomery
from "Gauge Theory of the Falling Cat"

"…suddenly,for no apparent reason,the animal executes a series of crazily acrobatic antics—'Fall(-)leAps!flOat(-)tumbIIsh?-drlft(-)whirlF(Ul)(IY) &&&'

"…after which,he wanders away looking exactly as if nothing had ever happened...whereas,for me,the whole universe has turned upside-down in a few moments...."

E. E. Cummings
Selected Letters

In *Dreams in the Mirror*, Richard Kennedy discusses Cummings' aversion towards mathematics. It was not a focus in his home schooling, and during his middle school years, he continued struggling with it (29, 30). Cummings' early experiences with math, Kennedy argues, affected his later years as well (29). This may explain why the mathematical statements within Cummings' poetry contain a trickster-like, defiant twist,

such as *two times two is 5* (CP 221), the multiplication of the "sky times earth" (CP 599), and "one's not half two. It's two are halves of one" (CP 556).[1] Quoting Richard Montgomery's mathematical exploration of falling cats may therefore seem counter-intuitive. Unless one is familiar with the mathematical nomenclature, the notation alienates, and before this article even begins, the reader may have moved on. Nonetheless, Montgomery's work establishes one concept. Though a cat's fall through the air is instinctively simple, it is, on the other hand, intensely complex. Montgomery uses advanced math *to begin* articulating the cat's movement. And *begin* is not used lightly, for Montgomery's article is twenty-five pages long, and it accompanies twelve other hefty essays dedicated to the mathematical exploration of falling cats.

E. E. Cummings also explored the gyrations of a falling cat, and although he did not use the signs of mathematics, his poem can be just as alienating. For reasons that will unfold, I approach "(im)c-a-t(mo)" through applying the nomenclature from chaos theory. Chaos theory, specifically the notion of autopoiesis, provides helpful language through which to articulate the surprises that emerge when exploring the textual dynamics of Cummings' cat.

Cummings' chaotic typographies often contain an exclamation mark. A survey of Cummings' repetitive use of the "!" begins to reveal its consistent suggestiveness (CP 348, 396, 421, 423, 429, 487, 653, 655, 722, 1040). Often, an exclamation mark sits within a linguistic tension between upheaval and pattern. This tension epitomizes *chaos*, for *chaos* denotes not randomness but rather a simultaneous presence of both disorder and order (Hayles 216). Often with Cummings' more radical experiments, the linguistic upheaval (disorder) intermingles with either a mathematical or pictorial pattern (order) thereby creating the harmonious tension of what I call "(dis)order," and the presence of (dis)order within "(im)c-a-t(mo)" readily encourages an exploration from the perspective of chaos theory.

Autopoiesis, a term from chaos theory, emerges from the Greek meaning "self-creation" ("auto", "-poiesis"). Chaologists use the term to explore the patterns (and life) that emerge from the *edge of chaos*, or rather, from the most fecund locale within the harmony of (dis)order. Vladimir Dimitrov and Lloyd Fell explain the precarious balance along the edge of chaos that begins when a system (or as I will demonstrate, a poem) is "thrown into an out-of-equilibrium zone" and into an edge between order and disorder ("Autopoiesis"). If the system falls deeper into disorder, the intensity of change threatens to overwhelm it entirely, pushing it into sheer randomness; likewise, if order increases, the system falls back into a predictable pattern ("Autopoiesis"). But if a system remains buoyed up in the edge of chaos, more and more innovative, autopoietic emergences spontaneously happen.

Autopoietic emergences are ubiquitous: the Eye of Jupiter, the eddies of a stream, thunderstorms, thumbprints, and the sand dunes of Colorado. Autopoiesis is even the foundation of one theory concerning the origin of life (Briggs 154-155), and perhaps it is the only convincing theory concerning the *how* of life's origin. Autopoietic happenings are often fractal, exhibiting self-similar patterns across multiple scales (Briggs 90). Significantly, in fractal patterns, the smaller scales exhibit the same level of complexity as the larger scales: "reduction never simplifies" ("Autopoiesis"). In other

words, a fragment always encapsulates the whole. One reason why complexity permeates every scale of a fractal pattern is because each scale exists within the autopoietic, self-creation. Colorado's sand dunes demonstrate the fractal characteristic of a self-created system (Stull):

The wind-sculpted ridges and valleys occur on several scales, for the dunes that are hundreds of feet tall contain smaller systems of dunes within dunes, right on down to the ridges left by a tourist's footprints.

I suggest another example of autopoiesis, the textual dynamics of Cummings' "(im)c-a-t(mo)" (CP 655). Though I use other terms from chaos to explore Cummings' cat (including feedback loops), autopoiesis is the most crucial. It illuminates why a poet may deviate into what looks like sheer nonsense. When prose or the traditions of verse keep language in check by restricting it to predictable patterns, the chaotic flux of language remains latent. Cummings allows the flux to surface, and just as *autopoiesis* signifies the wonders that emerge from the chaos of the earth, it likewise captures the interpretive wonders that emerge from the linguistic edge of chaos epitomized in Cummings' cat poem.

At first glance, the poem seems innocuously motionless—just a bunch of familiar signs arranged in an unfamiliar manner:[2]

    (im)c-a-t(mo)
    b,i;l:e

    FallleA
    ps!fl
    OattumblI

    sh?dr
    IftwhirlF
    (Ul)(lY)
    &&&

away wanders:exact
ly;as if
not
hing had,ever happ
ene

D

But as the reader lingers in the text, the language becomes more dynamic. John Pollock suggests that the linguistic upheaval creates a "mental dislocation," which requires great mental "agility" on the part of the reader (45). The mental acrobatics resemble, then, the physical agility of the cat:

> We struggle to make sense of what's happening with the words before us. Our eyes dart back and forth, spiraling down the page like the gyrations of a plummeting animal. If we're as agile mentally as most cats are physically, we immediately start to restructure our experience by working out what the poem's 'about.' (45)

Pollock establishes the concept that the linguistic upheaval becomes a metaphor, specifically, an experiential metaphor. The reader's mind falling through the poem identifies with the cat's body falling through the air. But focusing upon the text's mimesis of the cat's falling body expands Pollock's insight. The moment the cat falls, it loses its order, its *immobility*. The first three stanzas exhibit great linguistic upheaval thereby suggesting the cat is out of control. The moment the content of the poem reveals that the cat lands, the language becomes increasingly readable. The cat regains complete control and *walks off as if nothing had ever happened*.

However, a paradox permeates the text. Order and disorder coexist. An eerie balance of grouped letters and a mathematical pattern of lines per stanza support the linguistic upheaval:

2   (**im**)c-a-t(**mo**)
       b,i;l:e

       Falll**eA**
3   **ps**!**fl**
       Oattumbll

       sh?**dr**
4   **lf**twhir**lF**
       (**Ul**)(**lY**)
       &&&

       away wanders:exact
       ly;as if
5   not
       hing had,ever happ
       ene

1   D

The presence of mathematical patterns tantalizes the reader, for the first three stanzas are no longer pure disorder. They are infused by a subtle order. The balanced groups of two letters suggest that the cat (and Cummings) never lost complete control, and the observation that the two groups of letters are always split suggests a connection with the cat's front and hind feet, powerfully foreshadowing how the cat, against all odds, pulls off a landing. Despite appearances, order, though diminished, is still present.

Like the balanced letters, the lines-per-stanza intensify the tension between order and disorder.   The poem and the cat begin already out-of-order with two lines composing the first stanza (instead of one). Nonetheless, the progression of lines-per-stanza reinforces the order of the poem and therefore the cat's control during the fall: 2-3-4-5-1. And yet, the fact that the numerical sequence ends with the number one, the beginning, perplexes the order. In chaos theory, feedback signifies the phenomenon where an output is reintroduced back into the system as an input (Briggs 25-26).[3] In the poem, the last stanza (output) becomes the input for counting. The end of the poem begins: 1...2-3-4-5. The feedback loop is strengthened if the reader reads the poem's last letter, the "D" (ln 15), as the first word of the poem, the: *D c-a-t...*, or *the c-a-t*....Both the mathematical pattern and the linguistic playfulness encourage a re-reading of the poem and therefore a re-visiting of the chaotic dynamics of the cat's fall.
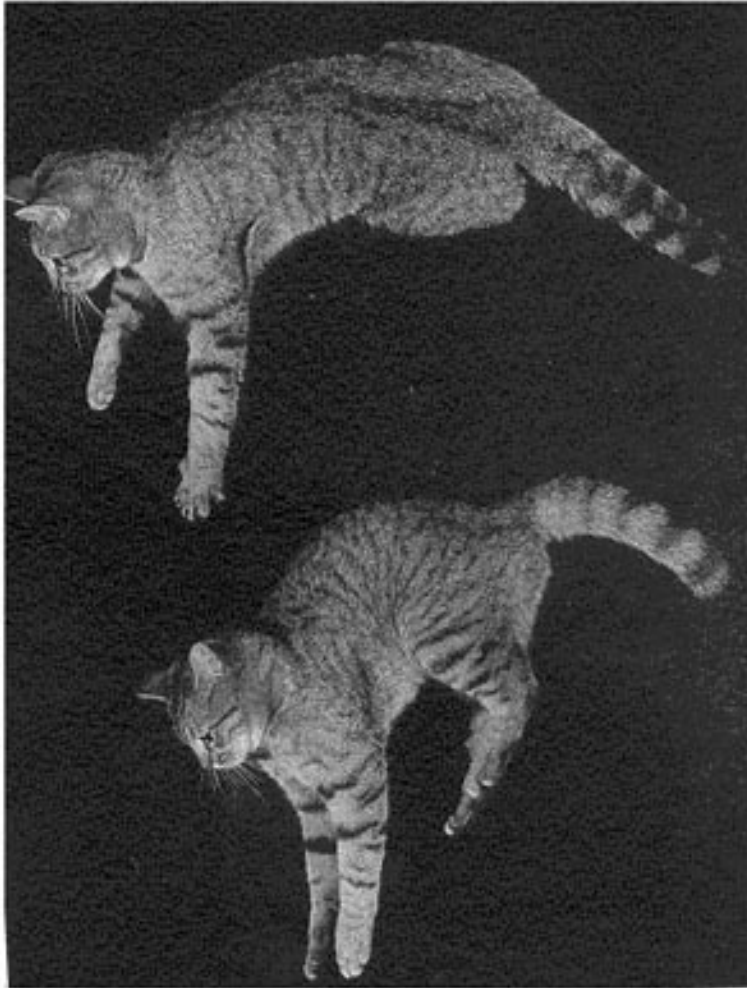
This revisiting reveals at least five iconic moments that emerge autopoietically.[4] The first occurs the moment the poem begins: "(im)c-a-t(mo) / b,i;l:e" (ln 1-2). In a letter to his Japanese translator, Mr. Ishibashi, Cummings provides a clue to the autopoietic iconicity therein: "I am looking at a relaxed "c-a-t";a creature motionlessly alive—'(im)(mo)b,i;l:e'" (*Letters* 231). The iconic discovery occurs when the reader sees the word "c-a-t" fall into the word *immobile*, thereby breaking the immobility in half in order to declare *I'm mobile*. This iconic interpretation emerges autopoietically, for it only exists because the linguistic disorder intermingles with the orderly pattern of paired letters.

Similarly, the following iconic moments emerge from the poem's harmonious (dis)order. Moreover, they are fractal as they explore the recurring motif of the "flip" on four different equally complex scales: the overall poem, the stanza, the line, and the individual signifier. On the macroscale, flipping the poem around and around until it is horizontal reenacts the cat's fall and landing:[5]

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D    ene          away      sh?dr      FallleA    (im)c-a-t((mo)
     hing had,ever happ  wanders:exact  IftwhirlF   ps!fl      b,i;l:e
                   not       ly;as if    (Ul)(lY)   Oattumbll
                             wanders:exact &&&
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The poem tucks its hind legs in (ln 3, 5), while the front legs extend towards the ground (ln 10, 13). I see the first line of the poem as the cat's tale, the third stanza as the cat's

belly, and the last line of the poem as the cat's head (ln 15). A picture helps distinguish the shape (Halliday):

The cat, like the poem, must flip or it will land directly on its head, the "D." But the cat's head only exists because of the tension of (dis)order. If *happened* was not fragmented, and if the poem ended with five lines-per-stanza, then the head would not exist. The poem, though, is an orderly-out-of-order 2-3-4-5-1, the word *happened* is shattered, and thus the pictorial shape emerges autopoietically. The shape of the poem on the macroscale adds another layer to the overall tension of (dis)order. Now, the linguistic upheaval is supported by a mathematical pattern of counting, a balanced pairing of letters, and it is all contained within a pictorial silhouette of the cat's body.

Another flip occurs on the scale of the stanza. In the first stanza, the lowercase i and o in the first line flip around and become uppercase in the last line of the second stanza:

(<u>i</u>m)c-a-t(m<u>**o**</u>)
b,i;l:e

FallleA

       ps!fl
       Oattumbl**l**

The space and time that separates the two lines suggests that, as the cat falls through space and time, it is able to perform, surprisingly, an august, physical gyration. The text, therefore, embodies the motion of the cat as it repositions itself in midair.

      The final two flips occur on the microscale of the individual line and the solitary sign. To frame the iconic moment, one must wrestle with why Cummings had the cat fall, and then leap:

       FallleA
       ps!fl
       Oattumbll

This is the miracle of the cat. Once the cat falls, it seems to push off of nothing but air in order to "leA / p" back into control. The iconic "A" expresses the explosive gesture of the cat to leap in midair, and Cummings places the "A" at the edge of the line near the open space of the page thereby emphasizing the leap's groundless beginnings.[6] Further analysis reveals, though, that the ordering of *fall leaps floats* contains autopoietic flips. Due to the order of balanced letters, and due to the sheer linguistic upheaval, Cummings allows a portion of the word *leaps* to sit on the same line as a portion of the word *floats*. Provocatively, an exclamation mark splits the balanced pair of letters. As suggested earlier, the presence of the exclamation mark within Cummings' visual poems often alerts the reader to both (dis)order as well as the ever present autopoiesis of iconic signs. This line, perhaps more than any other, captures the joy of autopoietic discovery as two flips transform it:

       ps!fl
       fl!ps
       flips

The gyrations of the text embody the gyrations of the cat, and the motif of the flip emerges within the individual line and solitary exclamation mark. The joy is heightened as the linguistic flips end up spelling the word *flips*, and all of this demonstrates the essence of an autopoietic, fractal pattern. The complexity is not diminished even on the microscale of the line and individual punctuation mark.

      And we must not forget that Cummings based part of his poetics upon experiences at Coney Island. What he says of the rollercoaster applies to the poem:

> Whereas at the circus we are merely the spectators of the impossible, at Coney we ourselves perform impossible feats—we turn all the heavenly somersaults imaginable and dare all the delirious dangers conceivable; and when, rushing at horrid velocity over irrevocable precipices, we beard the force of gravity in his lair, no acrobat, no lion tamer, can compete with us. (258)

Cummings emphasizes that the participant becomes a performer:

> We repeat: the essence of Coney Island's 'circus theatre' consists in homogeneity. THE AUDIENCE IS THE PERFORMANCE, and vice versa. If this be formula, let us make the most of it. (259)

It is therefore not enough for the reader to identity the four textual flips within the cat poem; she or he must reenact them. As a performer, I see all four flips occurring simultaneously—the entire poem tumbling off the page and leaping in mid air, the i / o orbiting through the stanza, the "ps" and "fl" gyrating, and the exclamation mark flipping—all at once, not unlike an Olympic diver who twists, turns, and somersaults into the water, swimming off as if nothing had ever happened.

The autopoietic flips throughout the poem are striking in their own right, but a realization that the poem revisits a common motif in Cummings' work adds another layer to the poem's interpretive richness.[7] In "Eco-iconicity in the poetry and poem-groups of E. E. Cummings," Terblanche and Webster explore the "i/o dance" (157) in several poems.   The neologism "eco-iconicity" emerges through applying an ecological perspective to the interplay between iconic elements in Cummings' individual and grouped poems:

> If in iconicity 'form mimes meaning,' then in eco-iconicity formal elements like syntax, word division, visual placement on the page, the use of white spaces, and what might be called a transformational semantics all work together to mime the dynamic processes of the ecosystem. (155)

As an iconic sign, the "o" in Cummings' work is Protean as it can be seen "as a moon, as eyes, as an entrance, as an icon of completeness and circular motion, as a marker of the female force or tendency in collaboration with the male 'i', and more" (156). Cummings' famous "i" is often a symbol for the self-transcendence of the alive-individual (*nonlectures* 81).

When we approach "(im)c-a-t(mo)" within the context of the "i/o dance," the autopoietic interpretation deepens. As explored above, the poem expresses an iconic gyration as the lowercase "i" and "o" reverse and become uppercased in the fifth line. The "i", the cat, the alive-individual, realizes its exclamatory potential through entering the openness of possibilities ("o") that such a fall becomes. During the fall, the "i" and "o" must orbit one another in order to flip, and therefore the word "dance" aptly describes their iconic motion. As the dance progresses, the "i" merges with the exuberant sign of the exclamation mark, and when the reader's imagination flips the "!" into an "i" thereby conflating them, the reader can infer that the cat is, indeed, the self-transcendent individual. Through entering the openness of the fall ("o"), the cat ("i") experiences the completeness of being "!"—which is not unlike Cummings' leaf in "l(a":

l(a

le
af
fa

ll

s)
one
l

iness   (CP 673)

Whereas the leaf falls into loneliness thereby arriving (paradoxically) at the self-transcendence of *iness*, so the cat falls and experiences what could be termed *!ness*.

However, none of these autopoietic surprises would happen if the poem did not dwell within an linguistic edge of chaos. Indeed, one step further into disorder, and the poem would fall into "a deep chaos in which it may be overwhelmed with change" ("Autopoiesis"); likewise, one step closer towards pattern, and the poem would regain order thereby diminishing the surprise and mystery of a fractal landscape inhabiting an edge of chaos. But the poem perpetually hovers in an edge of chaos, creating a fertile ground for reader performance and reader interpretation. The poem reveals that language can be just as chaotic and wonderfully complex as the natural world itself, and as a result, the reader is (hopefully) inspired not only to look at the poem, but also to turn her or his eyes to witness the self-creations of the earth.

I wonder what Richard Montgomery would think of Cummings' "(im)c-a-t(mo)." Would he dismiss it simply because of its arcane typography? Would he glimpse the tension of order and disorder? Would a textual flip surprise him? Would his curiosity become frustrated (much like mine when looking at his math) due to the fact that tracing the linguistic maneuvers requires more than a cursory knowledge of poetics? I would like to discover what captures the mystery of a cat's fall more, Montgomery's math or Cummings' poem. Regardless, a cat's fall is sublime enough for mathematicians and a trickster-poet to explore with utter bewilderment.

Notes

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[1] Provocatively, well before Mandelbrot created the term *fractal* in 1975, Cummings used math to clearly articulate a fractal statement: "one's not half two. It's two are halves of one" (CP 556). A "wholeness," signified by the number "one," is present on all scales. The number "two" is whole, but even if it is divided in half, each half contains its own wholeness. The part is just as complex as the whole. We will see this in Cummings' "(im)c-a-t(mo)," but another great example of it is the Mandelbrot set, discovered in the complex plane of mathematics. Though the Mandelbrot set informed much of my understanding of autopoiesis, I find that integrating an explicit discussion of it ends up usurping too much space—so awesome is its infinite landscape. An excellent introduction to it, however, can be viewed here..

[2] My initial observations of Cummings' cat poem appear in "Chaos & the 'New' Nature Poem: A Look at E. E. Cummings' Nature Poetry."

[3] Strikingly, a mounting thunderhead exhibits a feedback loop as well when a down draft becomes an input for an internal updraft, thereby augmenting the growth of the storm. Countless autopoietic surprises emerge from thunderheads, which is one reason why we sit rapt before them. Likewise, the feedback loop in the poem, which leads the reader back into the linguistic (dis)order, generates many surprises for the patient reader.

[4] The three ampersands, "&&&" (ln 9), are iconic for the path of the falling cat as well, and this interpretation is strengthened by Cummings' acrobat poem. After establishing the somersaults and aerial acrobatics of the trapeze artists, he has two meet: "&meet&" (CP 539). The reader

readily infers that the path of the ampersands reenacts the path of the acrobats who suddenly become one, clasping hand to forearm. The cat, as an acrobatic creature, creates similar paths during its fall. However, I am not including these iconic signs in the body of the essay because they are not created autopoietically. In other words, the ampersands are not dependent upon the edge of chaos in order to emerge. That said, the ampersands contribute to the poem's fractal dimension as they reinforce the self-similar pattern of flipping and gyrating through the air on the scale of the individual sign.

[5] Skeptics may doubt and dismiss this observation, passing it off as merely finding whatever shape one wants while "cloud gazing." Cummings, though, loved that "precision which creates movement" (CP 221). Any careful reader, at some point, will wonder, "Why are lines ten and thirteen so long? Huh, strange"—or something to that effect. With Cummings, one must pursue these questions that often emerge only for a flash from the subconscious before the conscious mind reasons them away.

[6] A similar use of the explosive "A" can be seen in "r-p-o-p-h-e-s-s-a-g-r" (CP 396) where the grasshopper ":l / eA / !p: / S" (ln 7-10). In many respects, Cummings' poetics involves a kind of composting, or recycling, of myriad signifiers and gestures. He places the same signifier in a different context thereby making it gesture in different ways.

[7] Too often, unseasoned readers dismiss Cummings thinking that once we "get the gimmick," there is nothing else left to say. Like all poets, Cummings developed themes, motifs, and ideas. Here, we enjoy the iconicity, but then we must move into a discussion of the ideas. Cummings' cat poem has, quite arguably, just as much to say about the "still point of the turning world" (ln 62) as T. S. Eliot's "Burnt Norton," but this connection cannot be made unless we move from the iconicity to the idea. Strikingly, Eliot makes an ontological statement about language in "Burnt Norton,"

> Words strain,
> Crack and sometimes break, under the burden,
> Under the tension, slip, slide, perish,
> Decay with imprecision, will not stay in place,
> Will not stay still. (ln 149-53)

...which is something Cummings knew and celebrated.

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Aaron M. Moe is a PhD Student, English Literature Washington State University.