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# On Mathematics in Poetry

John S. Lew  
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Many poems of mathematical interest choose one of two paths: either they play games with mathematical jargon, or they express wonder at mathematical beauty. Good examples of these types are Lewis Carroll's "The Hunting of the Snark" (specifically, "The Beaver's Lesson") and Edna St. Vincent Millay's sonnet "Euclid alone has looked on beauty bare." I feel that more recent attempts tread these same paths too often, yielding results that far fail to match the classics. Moreover, such results make only slight emotional connections between mathematics and the larger world, whereas ideally the poet would so naturally feel mathematical concepts that such concepts might become metaphors even for "humanistic" things.

Few poets have achieved such integration — perhaps only John Donne, who knew little mathematics, but who, in his poems, now and then used its concepts quite expressively. On a dead nobleman he lamented: "O soul, O circle, why so quickly be / Thy ends, thy birth and death, closed up in thee?" In his famous "A Valediction: Forbidding Mourning", author and dead friend become two points in a plane, not wholly separated by death, but connected in a higher dimension: his friend the fixed point of a compass, he the point still free to move.

As another example I submit a short poem of my own, which, perhaps more accurately, presents not mathematics but physics as metaphor. Naturally, I like it, but I do not press its merits. Rather, I offer it here because it further illustrates my point, and because, with some authority, I can state the intentions of the author. The tale behind the poem is that at a party, unmarried, I met an attractive woman, that I dated her a few times, and that she dropped me. Such tales, after all, inspire a good part of all human poetry — and the Age of John Donne produced some great examples of that genre.

Ruefully, my post-mortem on this failed relationship concluded that I had "come on too strong." At that time comet Kouhoutek had recently passed by, flouting expectations of a great show among the night stars. The conjunction of these events yielded the following tetrameter sonnet (a precedent for whose form is Shakespeare's Sonnet No. 145.) Here, obviously, my erstwhile date is the sun, while I am the comet, rushing toward her, yet fated mathematically to swing round and drift away beyond the most distant planet. After the poem I note some less obvious things.

## The Comet John Lew

Near from infinity I came  
    Drawn to your strong, unmoving light  
By some ascendance of its flame  
    That charms the planets through their night.  
The distance melts, my spirit thaws,  
    Sublimes, and in your radiance flies  
Soon, by the old, unchanging laws,  
    An exhalation through the skies.  
Sweet perihelion! May we touch,  
    Our auras intermingle? No,  
The impulse of my flight too much,  
    I must again to darkness go;  
While you may stand, and watch my face  
    Dwindle through trans-Plutonian space.

The linear momentum of a body is its mass times its velocity; and if one prolongs a straight line through the velocity vector of the comet, then one can find the minimum distance from this line to the sun. However, a comet will not hit the sun unless its momentum times this distance (the angular momentum) is sufficiently small. For simplicity, my poem makes (disguised) reference only to momentum, but the astronomical image yields the moral: like a comet, I lost the desired union by aiming not close enough — and by coming on too strong.

Two gravitating bodies circle an intermediate point, but if one body has negligible mass then the pivot is almost the center of the other; whence the sun is a "strong, unmoving light". Critics of Newton griped that the concept of gravitation just reduced planetary motion to a deeper mystery; whence that attraction, in my poem, becomes an "ascendance", i.e. a mystic power that "charms the planets" — whose "night" is the darkness of space.

Supposedly, a comet is a "dirty snowball", i.e., a mass of frozen water (and other stuff) surrounding a small, rocky core. As this body nears the sun, its rising surface temperature frees surface material, and the solar wind sweeps this away into the familiar tail. Hence "thaws" and "sublimes"; to "sublime" is to make a direct transition from solid to gas. Likewise, the

comet's tail becomes "spirit", then "exhalation", then "aura", while clearly the sun's "aura" is its corona — a dim glow visible only when other light is excluded. Perihelion is the point of closest approach; even then the comet's lost material cannot touch the corona: ultimately, comet and sun cannot come close enough even to mingle their spirits. Thus the exclamatory lines 9 and 10 — evoking this closest approach and its human analogue — should be the poem's climax.

Another pun draws the moral. "Impulse" is the time integral of force, and a theorem of mechanics says that impulse = momentum. Too much impulse means too much momentum and just that behavior — coming on too strong — sends the comet back to outer space. The sun remains fixed while the comet retreats — necessarily keeping its face toward the sun because the solar wind blows its tail away from the sun. Far, far retreats the comet, past all the planets, into a dark void where the sun attracting it is only one more dim star in the black firmament.

Years later, I found almost the same image in Kenneth Rexroth's poem "Inversely, as the Square of Their Distances Apart". Once favored by his beloved but now estranged, Rexroth pictures himself as a small, frozen outer planet moving slowly, yet still in distant orbit, about his personal Sun. Once again, the science becomes a metaphor that expresses the poet's loss.

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