

GEO-POESY

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Introduction: Recent theoretical work suggests a strong link between geography and poetry. A simple computation allows any line of poetry to be positioned in two-dimensional space. The entire poem may be mapped as a set of points joined by straight-line segments. By implication, maps are poems and poems are maps.

Terminology: The link between geography and poetry may be explained with reference to *prosody*, the inexact science of linguistic rhythms. Essentially, a poem is a collection of lines, which are collections of words, which are in turn collections of syllables (Preminger 1986). Prosody shows that these syllables may be differentiated according to the presence or absence of stress. In poems, stress tends to recur in cyclical patterns. Analysis of these patterns is known as *scansion*, and the taxonomical characterization of patterns is based on *meter*. Meter is measured in terms of a unit known as a *foot*. Feet are defined by particular patterns of stressed and unstressed syllables. For instance, an *iambic* foot contains two syllables, the first unstressed and the second stressed, as in the following example taken from Chaucer:

That slip / 'ry sci / ence stripped / me down / so bare

Following conventional symbology, a stressed syllable is denoted with a diacritical dash (-), an unstressed syllable with a diacritical cusp (H), a division between two feet with a virgule (/), and a division between two syllables with a hyphen (-) or with a blank space if the division occurs between two words.

In addition to iambic, there are three other common types of feet encountered in English-language poetry (Nims 1974). *Trochaic* foot is the transpose of iambic. *Anapestic* foot is characterized by two unstressed syllables followed by a stressed syllable, while in *dactylic* foot, a stressed syllable is followed by two unstressed syllables.

Meter also depends on the number of feet per line. In the iambic example presented above, there are 5 feet per line. This means that the line is denoted as I. *pentameter*. Similarly, a trochaic foot with 3 feet per line would be denoted as T. *trimeter*, an anapestic foot with 1 foot per line would be denoted as A. *monometer*, etc. Although the number of feet per line is always an integer, it is not uncommon for a poem to contain several feet that lack one or more syllables. Such fractional feet are called *catalectic* (Bain et al, 1981).

Mathematical Representation: The particular diacritical symbols used to denote whether a syllable is stressed or unstressed are wholly arbitrary. Thus one can safely replace these symbols with any others, so long as they are capable of differentiating between two discrete states. If one assigns a "1" to a stressed syllable and a "0" to an unstressed syllable, then any line of poetry can be represented by a string of *bits* (binary digits).

For example, the string for I. *pentameter* is

0101010101

This bit string is the binary (i.e., base 2) representation of a number whose digital (i.e., base 10) representation happens to be 341. Any line of poetry may be represented mathematically in this manner.

The Link with Geography: These observations are closely linked to developments in modern geography pertaining to the tessellation of two-dimensional space. Tessellation refers to the partitioning of space into a set of regular, non-overlapping, spatially exhaustive cells. Typically these cells are square in shape, by other shapes may also be used.

While tessellation itself is a relatively straightforward concept, the optimal method of assigning index numbers to the cells is the subject of debate (Goodchild 1989). A host of different indexing systems have been proposed, but most of these

have not been widely applied. The number of potential indexing systems is enormous. If there are r rows and c columns of cells, then there are $rc!$ unique ways to arrange index numbers.

One indexing system that has proved useful, however, is that proposed by G. M. Morton (Morton, no date). In Morton's system, there is an implicit relationship between the location of a cell and its index number. More specifically, the row and column positions of the cell are embedded as interleaved bit strings in the binary representation of the cell index number. The figure below illustrates this relationship for cell number 7 in Morton two-space, for which the row and column positions are 3 and 1 respectively.

A corollary of this relationship is that any bit string is associated with one and only one cell in Morton two-space. Since any line of poetry can be represented as a bit string, it follows that any such line can be uniquely located in Morton two-space. Furthermore, since a poem is composed of one or more lines, it is possible to locate each line in Morton two-space, join these locations with straight-line segments, and call the resulting product a map.

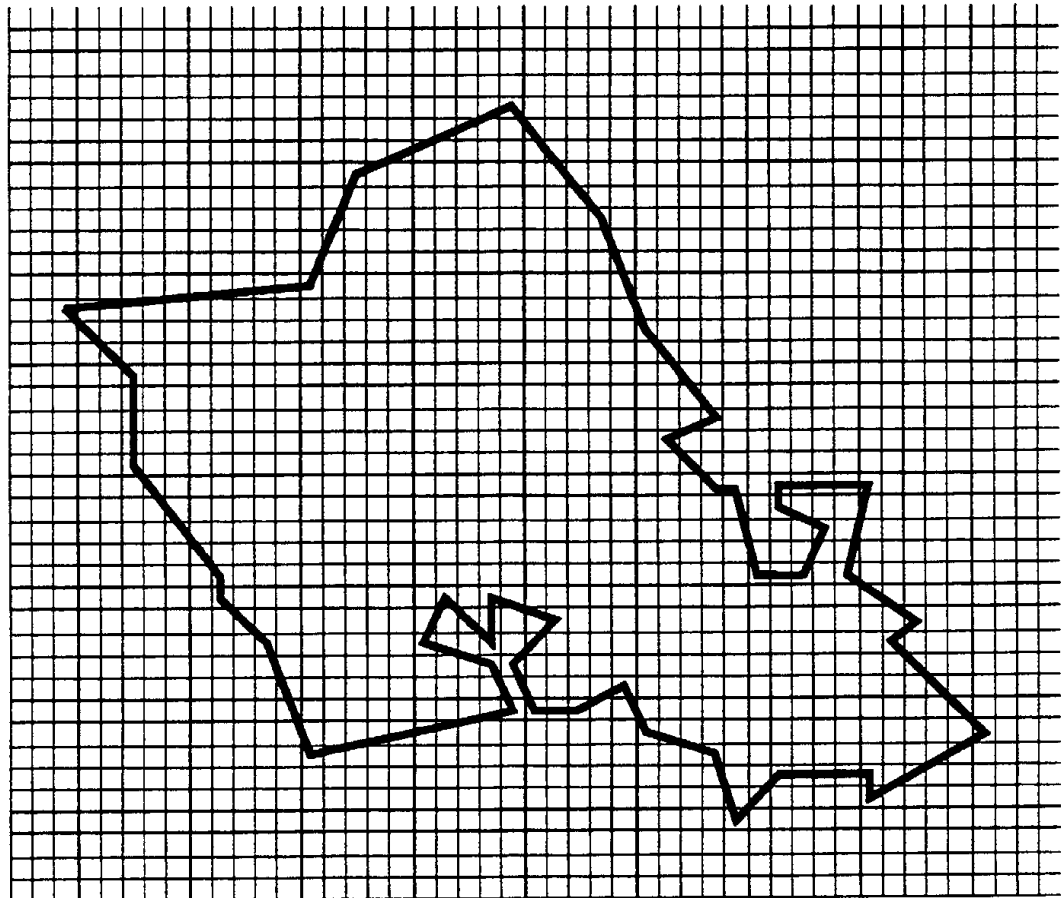
5	17	19	25	27	49	51
4	16	18	24	26	48	50
3	5	7	13	15	37	39
2	4	6	12	14	36	38
1	1	3	9	11	33	35
0	0	2	8	10	32	34
	0	1	2	3	4	5

Decimal		Binary		Decimal
3	→	0 0 0 0 0 0 1 1		
1	→	0 0 0 0 0 0 0 1		
		0000000000000111	→	7

An Illustration: As an illustration, consider J. Diefenbaker's poem, "The Scientist's Lament", the first six lines of which are reproduced below.

U U U - U - U U - - U U
 I am a / sci-en-tist, / not a Frank / en-stein, Ed.
 U U U - - - - U U - - -
 I'm not an / old sewn-up / corpse with a / re-claimed head,
 U - U U - U - U - U - U - U
 A flat-top / type hair-do, / bolts pro-trud / ing, skin sort
 U - - - U U U - U - - U -
 Of green-grey / (or is it / blue?), a big / hair-y wart,
 U U - - - - U - - - - U U
 And a pet / dog named Boo / Boo. But my / brain, it longs
 U U - - - - U U U U -
 For a cold, / old, dark, dank / grave. Hey, where / are my thongs?

The entire poem has been mapped into Morton two-space based on the principles described above. The result, as shown in the figure below, is an accurate map of Oahu, Hawaii. The first line of the poem is Kaena Point, the most westerly point on the island. The poem then proceeds in a clockwise direction.



References

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