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Statistical Poetry

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POETRY FOLDER

♢

Statistical Poetry

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JHM readers recently learned from [20] how statistical approaches help writers maximize their publications. Statistics can also help assess a written work's readability [15] or resolve authorship disputes [4, 7]. No less interesting to me are people who use their statistical background to inform the writing of their own poetry, such as Eveline Pye [1]. A key way in which statistics differs from mathematics is the importance of context [2], and context aligns well with poetry, in the spirit of the title of [5]. Some statistics poetry takes the form of literal shapes such as my bell-curve-shaped poem [11] that gives a contemporary take on [21]. Another visual poem [8] represents two conceptual models (balance point and leveling value) of the mean, and metaphors for measures of center in turn spawned a poem about mindfulness [9]. Sometimes the use of form is not visual but a literal manipulation by statistical principles, such as how the punchline of "Permutation" [10] is itself a permutation – of the letters in the word *permutation*. A famous example of poetry created from combinatorics is OULIPO co-founder Queneau's 14-line sonnet in French on each of 10 pages with each line on its own flap, so the 10 options (with the same rhyme scheme and rhyme sounds) for each line yield 10^{14} possible sonnets [18]. A curated, searchable collection of poetry oriented to teaching statistics is at [3].

Here now is context for the poems in this current folder.

"**Systematic Sample from a Children's Song**" is the result of a sampling method in which the sample comprises elements from a population picked using fixed, periodic intervals from a randomly-chosen starting point. In other words, from a starting point chosen from the first k elements, you select every k^{th} item from the list of all elements of a population. When I applied this strategy to the words of the well-known children's song "Twinkle Twinkle Little Star," using a skip (or sampling interval) of $k = 3$ and with the lyric's first word as my starting point, I was stunned by how poetic the result seemed. My inspiration was viewing this poem as a structured type of "erasure" – a type of found poetry made by deleting words from a larger piece of text, such as how 2017-2019 United States Poet Laureate Tracy Smith [19] created "Declaration" by selecting words from the United States Declaration of Independence.

"**By Design**" was in a collection of nine "poetry puzzles" designed by Lisa Lajeunesse for attendees of the 2019 Bridges Conference (on mathematical connections in art, music, architecture, education, and culture) in Linz, Austria. Each puzzle was a square poem (n lines of n words each), but to know the intended order of that poem's words, the reader first had to complete an $n \times n$ array so that each digit from 1 to n appeared exactly once in each row and exactly once in each column. Such an array is called a Latin square; these are combinatorial objects used in experimental design to remove or control variation from two sources. Because of the form of the associated puzzle, I wanted the content of my poem to refer to Latin squares. The poem appears here in its "solved" form.

"**Stochastic Terrorism**," like [12], is inspired by recent events in the United States and a statement by United Nations experts at https://www.ohchr.org/EN/NewsEvents/Pages/DisplayNews.aspx?NewsID=24875. Its title, apparently coined a decade ago by an anonymous blogger, refers to using demonizing mass communications that incite unspecified individuals to commit violent acts that can be viewed as statistically likely in an aggregate population, though unpredictable in terms of the individual actors or victims. Another real-world poem is "**Fail to Reject**," inspired by imagined dialogue with a potential critic when I first applied "teaching mathematics for social justice" to the domain of statistics [14]. "**Fast Facts**" is a playful reflection on language in probability and statistics, including the idiomatic use of *run* explored in [16].

The last three poems relate to attempts to navigate life. "**This Function Dysfunction**" explores the metaphor of a constant function – the most trivial example of a deterministic relationship (where the value of x determines the value of y). A deterministic relationship is interesting to include because statisticians generally focus on statistical relationships, which have natural variability. As noted in [17, p. 8], "the word *variation* refers to a major theme in statistics (beyond any one specific measure of it, such as range or standard deviation), but the first academic context where a student heard the word variation was likely a high school algebra lesson on direct, inverse, or joint variation (e.g., $A = \pi r^2$, $I = k/d^2$, or $V = \pi r^2 h$, respectively), all of which are deterministic relationships—that is, with no variation in the statistical sense." But whether or not there is variability in a bivariate data set, a linear regression model's predictor variable has no usefulness if the slope is indistinguishable from zero, which happens iff the correlation between the two variables is indistinguishable from zero.

"**Multivariate**" is a haiku that juxtaposes everyday and statistical meanings of the word *confounded* as I also did in [13]. Multivariable thinking is a major emphasis in recent statistics education recommendations [6].

"**Worry Lines**" was inspired by curved graph paper that caught my eye when my wife and I took our son for an infant wellness visit two decades ago. The pediatrician kindly gave me a blank sheet of his National Center for Health Statistics growth chart graph paper (which now can be found online) and I enjoy using it

as a personal and practical example when I teach students about percentiles and the normal distribution.

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Systematic Sample From a Children's Song

Twinkle star
wonder are
the high diamond sky
little I
you

By Design

An	experimental	poem	designed
with	two	blocking	factors,
neither	of	them	gender:
it's	a	Latinx	square.

Stochastic Terrorism

Some maintain hate
Speech doesn't cause
Violence, that
Casualties aren't

Causal-ties
'Cause we can't
Predict the
People:

Yet another othering
When words trigger
Someone past the post hoc
Point of madness.

This "random" violence isn't:
Did the shooter flick
A spinner to choose
His aim?

Fail to reject

He asks, “How can you mix social justice with teaching statistics?”
I’m thinking: how can you *not*?
How better to illuminate
deviation from expected values?

He says, “But it’s not neutral.”
Like it’s natural and neutral to teach from books
based on baseball, playing cards, and flatscreen TVs
rather than view by neighborhood things like

incidence of asthma or
incidents of racial profiling.
We’ve been testing
a null that dulls

by what’s normalized
as if the type
1 error
is always worse.

When he says social justice is beyond our scope,
I want to ask: do you mean
our discipline or
our humanity?

Fast Facts

Statistics must be *fast*...
'cause my newspaper gives numerical nuggets as "fast facts"
'cause my doctor's orders say STAT when she wants a test done now
'cause velocity is a big feature of big data

'cause some statisticians
do accelerated testing,
fast Fourier transforms,
or a Tukey's quick test

'cause statisticians
run studies,
run simulations,
and run tests (like a runs test)

and those who run are fast, even
in the long run

This function dysfunction

When any x you try
Yields the same y,
That's still a function.

The dysfunction
Is the constant
Perseveration:

Daily seeking
New outcomes
(In work or love)

From plugging more values
Into that parent function
Now that you know,

Or trying to fit
A line
Falling flat.

Multivariate

So many factors
in my life changing at once:
I am confounded.

Worry Lines

At our next infant wellness visit,
the pediatrician plots
our only child's weight on
paper ruled
by increasing bands
with concavity ill-suited
for extrapolation.

Kilograms or pounds,
it's 40^{th} percentile, down
from the 60^{th} percentile.
Having delivered well
into "advanced maternal age," my wife
frowns ("*we aren't feeding him enough!*").
I say it just fell

half a sigma and
we're still well
within the fat
part of the bell curve –
it's normal –
this won't be one
of our worries.