

Stats Class "Stanza Part" with Poetry!



Larry Lesser

UTEP Distinguished Teaching Professor
The University of Texas at El Paso



if I were introduced....

- He's a Professor in the Mathematical Sciences Dept. of UTEP, an open-access, R1, Hispanic-serving university
- hey, Professor rhymes with Lesser!
- interviewed about career in March 2020 *J. of Statistics Education*
- national (ASA's 2021 Waller DTC) and state teaching awards
- 1st-place awards in ASA, CAUSE, MoMath song/poetry contests
- 60+ of his published poems (one was selected by Albuquerque's Poet Laureate for a 2021 NEA Big Read event) are centered in math/statistics

poetry across the curriculum

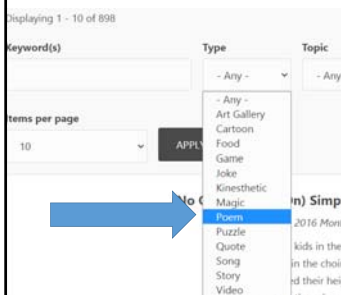
- P. A. Connor-Greene et al. (2005). Poetry: It's not just for English class anymore. *Teaching of Psychology*, 32(4), 215-221.
- R. Keller & D. Davidson (2001). The **math** poem: Incorporating mathematical terms in poetry, *Mathematics Teacher*, 94(5), 342-347.
- J. LaBonty & K. E. Danielson (2005). Writing poems to gain deeper meaning in **science**, *Middle School Journal*, 36(5), 30-36.

my recent work on statistics/math poetry

<https://larrylesser.com/poet-larry-ate/>

- L. Lesser (2021). Presenting mathematical poetry across disciplinary lines. *Bridges 2021 Proceedings*. Tessellations Publishing.
- G. Karaali & L. Lesser (in print, 2021; online, 2020). Arts of the heart: Mathematics and poetry. *Handbook of the Mathematics of the Arts and Sciences* (13 pp.). Springer.
- **L. Lesser (2020). Statistical poetry. *J. of Humanistic Mathematics*, 10(1), 533-539.**
- L. Lesser (2017). Moving between inner and outer worlds. *J. of Humanistic Mathematics*, 7(1), 275-284.
- L. Lesser (2014). Mathematical lyrics: Noteworthy endeavours in education. *Journal of Mathematics and the Arts*, 8(1-2), 46-53.

Poems (about 60) are among 13 types of educational fun in CAUSEweb.org



Possible benefits

- make content memorable (e.g., through rhyme or emotion)
- prioritize/consolidate concepts (to fit a concise form)
- contrast everyday and statistical language

Also...

- break stereotypes
- lower anxiety
- build classroom community
- easier to write/perform than, say, song

minimal research on poetry in statistics class

- fall 2013 student-randomized **experiment** (July 2016 *JSE*) included 1 poem: [CAUSEweb.org/cause/resources/fun/poems/very-able-know-each-variable](https://causeweb.org/cause/resources/fun/poems/very-able-know-each-variable), to distinguish a value of a numerical variable from a tally of a category of a categorical variable
- 3 percentage point improvement on exam item between "no insert" ($n_1 = 88$) and "insert" ($n_2 = 80$) groups

JOURNAL OF STATISTICS EDUCATION
2016, VOL. 48, NO. 2, 13-42
<http://dx.doi.org/10.1080/15227882.2016.1181792>



OPEN ACCESS

Assessing Fun Items' Effectiveness in Increasing Learning of College Introductory Statistics Students: Results of a Randomized Experiment

Lawrence M. Lesser¹, Dennis K. Peard², and John J. Weber, III³

¹Department of Mathematical Sciences, The University of Texas at El Paso, El Paso, Texas, USA; ²Department of Statistics, The Pennsylvania State University, University Park, Pennsylvania, USA; ³Department of Mathematics, Computer Sciences, and Engineering, Fortson College at Georgia State University, Clarkston, Georgia, USA

types* and corresponding uses

(*adapting Emmons 2017 taxonomy)

Types* of statistics poetry

- Statistics as major subject
- Statistics language applied to something non-statistical
- Statistics-informed structure

Uses of statistics poetry

- Explore pieces of statistics content
- Discuss use of language in statistics
- Analyze poem's statistical structure

Parallels in types and uses

Types of statistics poetry

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By Design (Lesser, Jan. 2020 *JHM*)

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

"Matched Pairs" (Lesser, 2021, CAUSEweb)

The ends of lines
Are grouped by rhymes;

Within each pair,
Two treatments shared.

If something lurks,
This plan still works,

But it takes time
To match the lines

And if one leaves....

- How do the end-rhyme couplets convey tradeoffs of a design with matched pairs?
- Are all rhymes perfect rhymes? So what?
- What meaning is there in the final couplet having only one line?

"Systematic Sample from a Children's Song" (Lesser, 2020, *JHM*)

Twinkle star
wonder are
the high diamond sky
little I
you

Twinkle Twinkle Little Star

Twinkle, twinkle, lit-tle star, how I won-der what you are!

Up a-bove the sky so high, like a dia-mond in the sky.

Twin-kle, twin-kle, lit-tle star, how I won-der what you are!

inspiration for that
 “sampling” poem:

“**erasure**” – a type of “**found poetry**”
 made by deleting words
 from a larger piece of text,

(e.g., 2017-2019 US Poet Laureate Tracy Smith
 created “Declaration” by selecting from
 US Declaration of Independence)

Parallels in types and uses

<p>Types of statistics poetry</p> <ul style="list-style-type: none"> • Statistics as major subject • Statistics <u>language</u> applied to something non-statistical • Statistics-informed structure 	<p>Uses of statistics poetry</p> <ul style="list-style-type: none"> • Explore pieces of statistics content • Discuss use of <u>language</u> in statistics • Analyze poem’s statistical structure
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Lesser (2020)
J. of Humanistic Mathematics

Multivariate

by Lawrence Mark Lesser

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

“Mindful Means”
 (Lesser, April 2018 *Amstat News*)

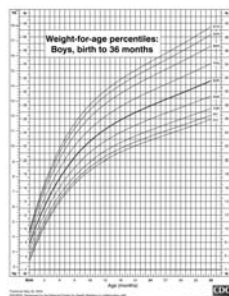
For each underlined word,
 are **statistical** and **mindfulness** meanings
 aligned, opposite, or unrelated?

(Note: The original text contains several underlined words such as 'regression', 'statistical', 'mindfulness', 'correlation', etc.)


Parallels in types and uses

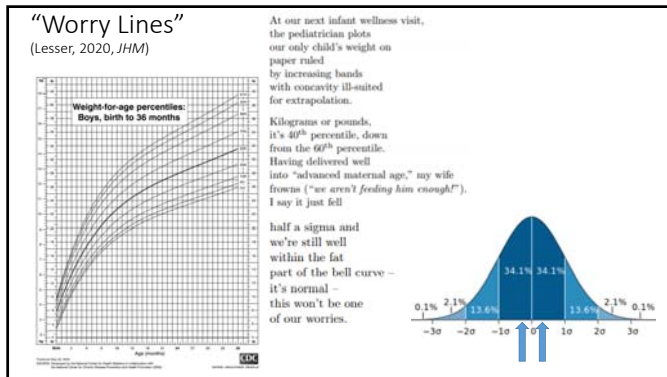
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“Worry Lines” (Lesser, 2020, *JHM*)



Explain why percentile bands
 have negative concavity
 and increasing spacing;
 explain how falling from
 60th percentile to 40th percentile
 is “half a sigma”





my Simpson's Paradox poem "Confounded" (originally in *The Mathematical Intelligencer*, 2010) has lesson support in fall 2019 *Teaching Statistics*:

- Verify that $3/8 > 1/3$ and $2/3 > 3/5$, but $5/11 < 4/8$, thus showing reversal of comparison
- Create a physical or visual representation of this reversal
- Does the word "confounded" in the poem align with its everyday meaning, its statistical meaning, or both? Explain.
- For an enrichment challenge: Can you change the numbers in the poem so that reversal still happens with a smaller grand total?

Short poems help recall of definitions

Lesser (2005; MASA 2011)

What P-Value Means

Lyric ©2005 Lawrence Mark Lesser;
May sing to tune of "Row, Row, Row Your Boat"

It is key to know
What p-value means --

It's the chance
(with the null)
you obtain
data that's

At least that extreme!

**"Variance has a 'square' routine:
Mean of the squares minus square of the mean."**

Poems can prompt use of process

<https://www.causeweb.org/cause/resources/fun/poems/what-ask-about-study> summarizes 7 critical components in J. Utts' *Seeing Through Statistics*

What to Ask About a Study

by Lawrence Mark Lesser (2015)

- Who had contact? Who gave the money?
- How did they pick who was studied?
- What was the setting? What was asked?
- How else did the groups contrast?
- What was the size of the effects –
- Did it matter in a practical sense?