

Sylvan Crossword Report 1: 12/8/21 - 12/28/21

Michael Hymowitz

01/02/2022

1) Introduction



Figure 1: Photographic evidence that I, Michael Hymowitz, have friends

Welcome! For no good justifiable reason, I made some pretty graphs and tables. Fun! This is the first installment of the Sylvan Crossword Reports, which will last until either everyone gets sick of crosswords, everyone hates me, I become sufficiently bored, or people bully me for undertaking this objectively meaningless endeavor.

This installment will cover the first 21 days since data collection began, 12/8/21 - 12/28/21, with the participants in this exercise, henceforth being called by their names in the New York Times crossword app, being Anna (annabeans), Bahs (Bahsdaddy), Charlie (Cnewt), Spank (crossword spank), Ellie (elliefich), Henry (grapefruit jones), Liam (liam), Mike Dale (mike dale), and Barnes (mikemikemike). I thought about

including my mom in this exercise, but quite frankly she thoroughly kicked all of our asses, much to her delight, finishing in first place 15 of the 21 days.

The main statistics I look at in this analysis are time to crossword completion, z-scores of time to completion, and daily ranks among the 9 participants. For those who do not know, and because I like to ramble about stats concepts, a z-score is a data transformation that standardizes data to a Standard Normal Gaussian distribution (standard bell shape). Many distributions found in nature are assumed (correctly) to follow a Normal distribution. To amend a canonical example, consider:

- Puzzle A
 - Average solve time of 60 seconds to complete
 - You complete in 70 seconds
 - Your z-score is positive, as your solve time is above the mean
- Puzzle B
 - Average solve time of 150 seconds to complete
 - You complete in 130 seconds
 - Your z-score is negative, as your solve time is above the mean

Despite Puzzle B taking you longer to complete, you actually did “better” on that puzzle once we account for its observed difficulty, as you had a lower z-score on Puzzle B than Puzzle A. For further reading, if your into statistical theory and that whole jazz, take STATS 250 or 280, read the [standard score Wikipedia page](#), or write me a letter at 417 N Thayer St, Ann Arbor, MI, 48104. **The tl;dr of this is that a z-score transformation standardizes the data to allow for comparison of completion times across different crossword puzzles relative to the mean and variance of each individual crossword puzzle.**

This report is quite frankly just a dump of some of the graphs and tables I made which I liked, with some conversation devoted to each individual participant. This report will be structured as follows:

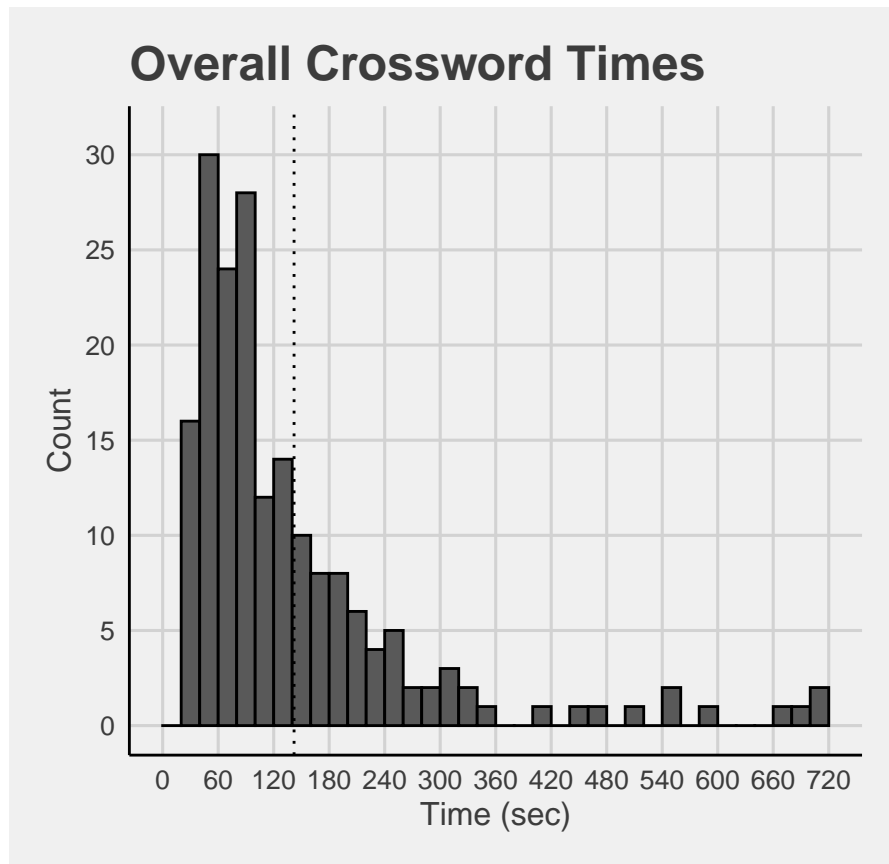
- 1) Introduction
- 2) Methodology
- 3) Summary
- 4) Profiles
- 5) Areas for Future Research
- 6) Declarations of Funding and Competing Interests
- 7) Acknowledgements
- 8) Appendix: Summary Stats Tables

2) Methodology

I really just spent about a week and a half making as many graphs and interesting tables as I could think of that I thought made sense, then spent way too long figuring how to make my code prettier and more efficient as well as continuously making incredibly minute changes to the plots.

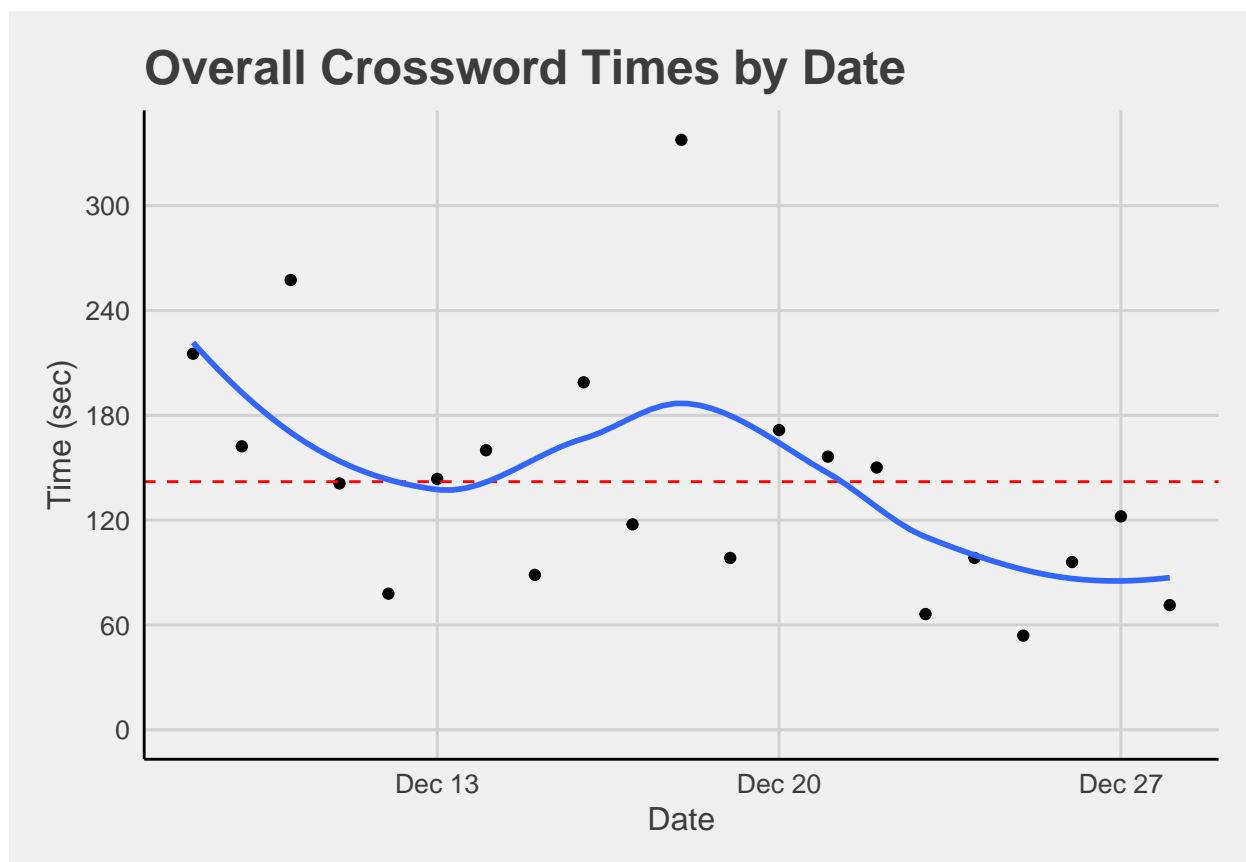
3) Summary

3.1) Overall Trends



Stat	Time (sec)
Min.	21.0
1st Qu.	60.2
Median	94.5
Mean	142.0
3rd Qu.	174.5
Max.	709.0

From this output, as one might have already assumed, crossword times are strongly right-skewed, with a median solve time of 94.5 seconds and a mean of 142 seconds thus far (the mean is the dotted line in the above histogram). The majority of the data falls between 1 and 3 minutes.



Date	Weekday	Time	Week Avg Time
2021-12-19	Sunday	98.3	113.5
2021-12-20	Monday	171.6	113.5
2021-12-21	Tuesday	156.3	113.5
2021-12-22	Wednesday	150.1	113.5
2021-12-23	Thursday	66.2	113.5
2021-12-24	Friday	98.3	113.5
2021-12-25	Saturday	53.9	113.5

Over the past 3 weeks, the average crossword solve time has been steadily improving, particularly over winter break, as reflected by the week of 2021-12-19 being the week with the lowest average solve time of 113.5 seconds.

Now, with this clear improvement of times since the end of fall semester, it is unclear to me if as a group we are generally improving, or we are in the midst of a cheating scandal akin to the 1919 Black Sox scandal or the 2004-06 Serie A Calciopoli scandal. Do I have any evidence to support this claim? No. Is this claim fueled largely by my relative times getting worse and growing self-shame? Oh yeah completely 100%. Anyway, if anyone happens to be cheating, pretty please don't as it would make me sad. Thanks!

3.2) Individuals' Scores



Taking a quick overview look at the data, we see that on the whole grapefruit jones is currently killing the game, and it's not particularly close. The other main point of interest is that everyone's times seem to be improving, pretty much except for mike dale. Sad.

For those who don't know, a boxplot (the top plot above) shows the 25th, 50th, and 75th percentiles of a distribution, with the scattered points labeled over the boxplots representing everyone's individual scores.

Note that in the above boxplots and histograms, the dotted lines represent the overall average, while in the scatterplots, the dashed lines represent each participant's personal average.

Also if you are viewing this on a computer, you can zoom in smoothly on the plots, as they should be vectorized (zooming in does not diminish image quality).

Name	1	2	3	4	5	6	7	8	9	Total Score
annabeans	3	0	5	2	4	1	3	3	0	113
Bahsdaddy	4	3	2	2	4	5	0	1	0	128
Cnewt	0	0	0	0	1	0	0	5	14	29
crossword spank	0	0	1	2	2	4	9	2	1	77
elliefich	3	2	4	2	1	5	1	0	1	112
grapefruit jones	8	8	3	1	1	0	0	0	0	168
liam	2	7	3	3	3	2	1	0	0	139
mike dale	1	2	1	2	1	2	4	6	2	83
mikemikemike	0	0	5	4	3	2	3	4	0	99

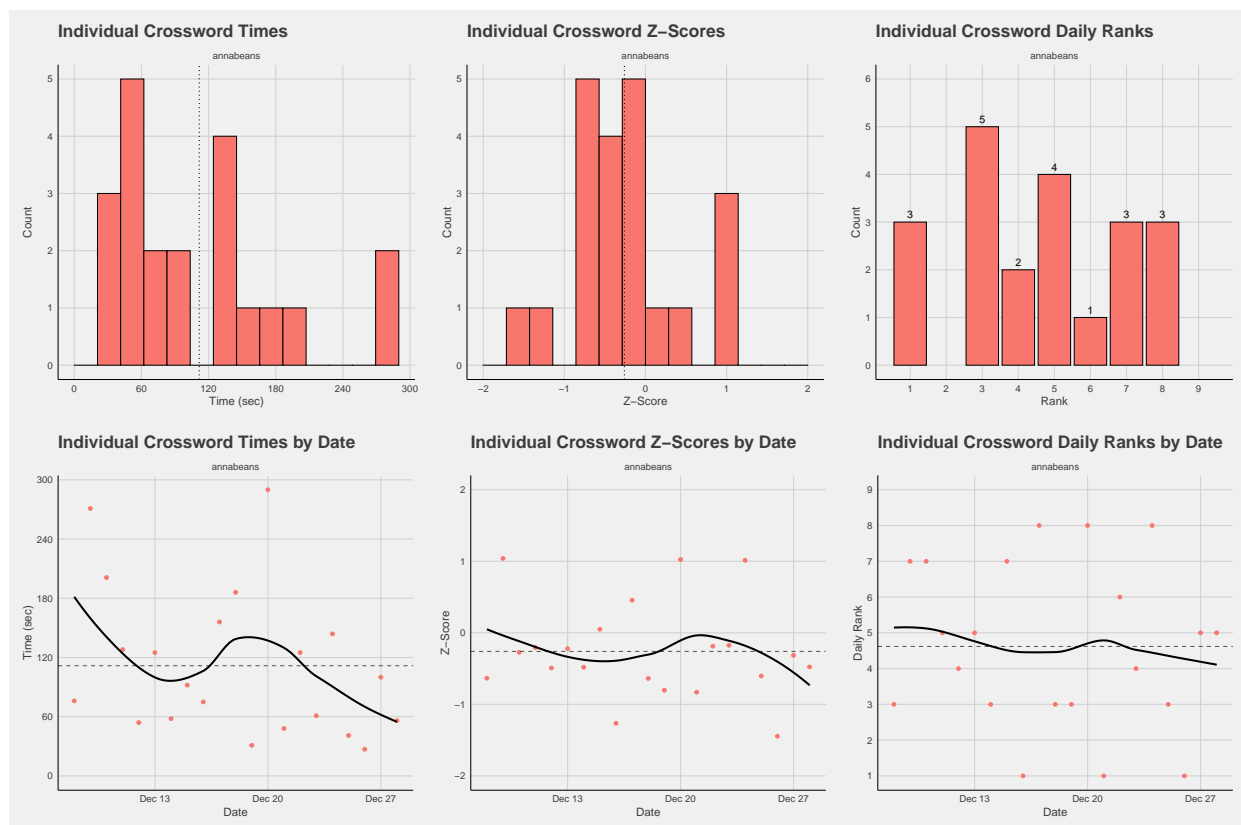
The above table displays the number of times each player has finished at each rank, with the **Total Score** column being the sum of points if a 1st-place finish gets 9 points, 2nd place gets 8, ..., 9th place gets 1 point.

4) Profiles

Now let's dig a little deeper into each participant. Please take any criticism personally, for I only report objective undebatable truths.

Note that in all the plots in this section, the dotted and dashed lines represent the person's personal average.

4.1) annabeans



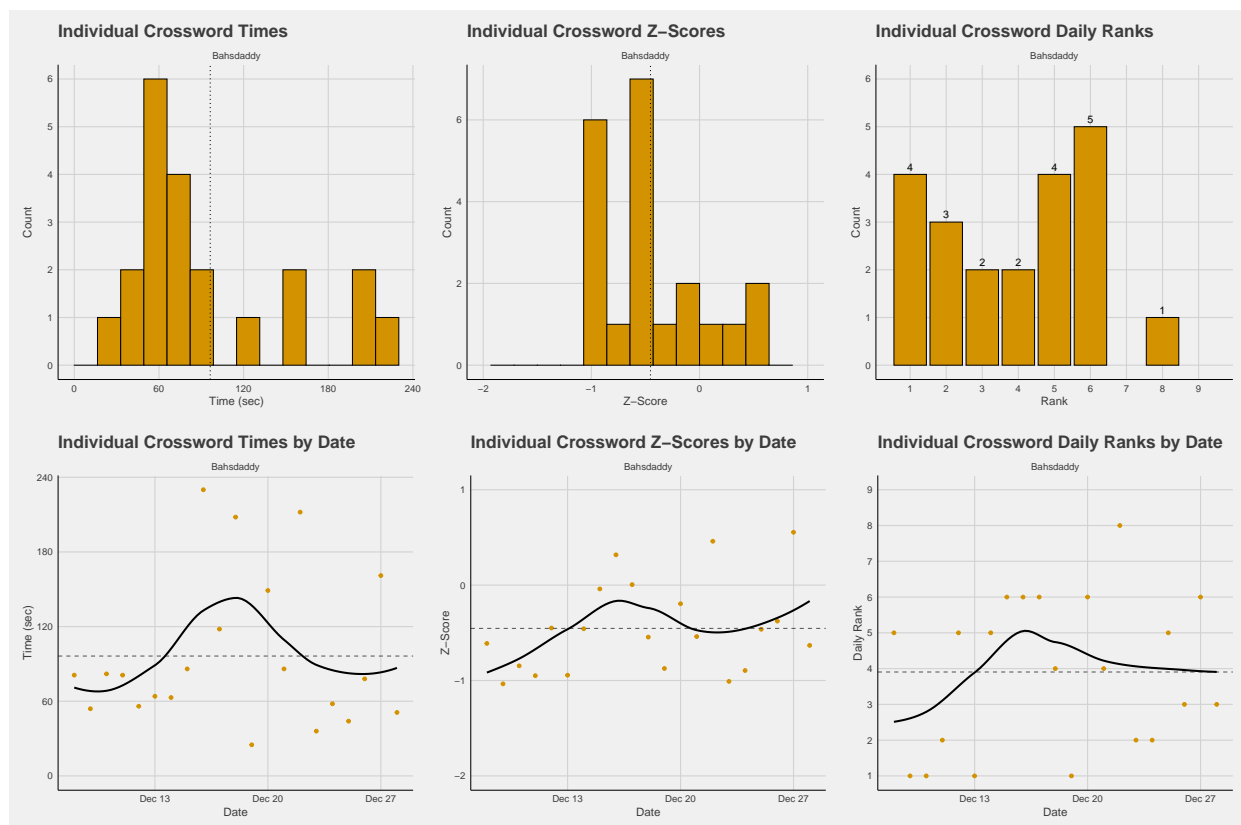
Metric	Min.	1st Qu.	Median	Mean	Trimmed Mean	3rd Qu.	Max.
Time	27.00	56.00	92.00	111.67	106.74	144.00	290.00
Z-Score	-1.45	-0.63	-0.32	-0.26	-0.27	-0.17	1.04
Rank	1.00	3.00	5.00	4.62		7.00	8.00

Date	Weekday	Time	Week Avg Time	Z-Score	Week Avg Z-Score	Rank	Week Avg Rank
2021-12-12	Sunday	54	106.57	-0.49	-0.37	4	4.43
2021-12-13	Monday	125	106.57	-0.22	-0.37	5	4.43
2021-12-14	Tuesday	58	106.57	-0.48	-0.37	3	4.43
2021-12-15	Wednesday	92	106.57	0.05	-0.37	7	4.43
2021-12-16	Thursday	75	106.57	-1.26	-0.37	1	4.43
2021-12-17	Friday	156	106.57	0.46	-0.37	8	4.43
2021-12-18	Saturday	186	106.57	-0.64	-0.37	3	4.43

annabeans comes in with a solid showing thus far, with a very symmetric distribution of scores, on average doing a little better than the mean with her average rank of 4.62.

Highlights include 3 first-place finishes (t-3rd most), having the lowest z-score on a single puzzle with a -1.45 z-score on her 27-second solve on 12/26, and the 4th-lowest z-score at -1.26 with her 75-second solve on 12/16.

4.2) Bahsdaddy



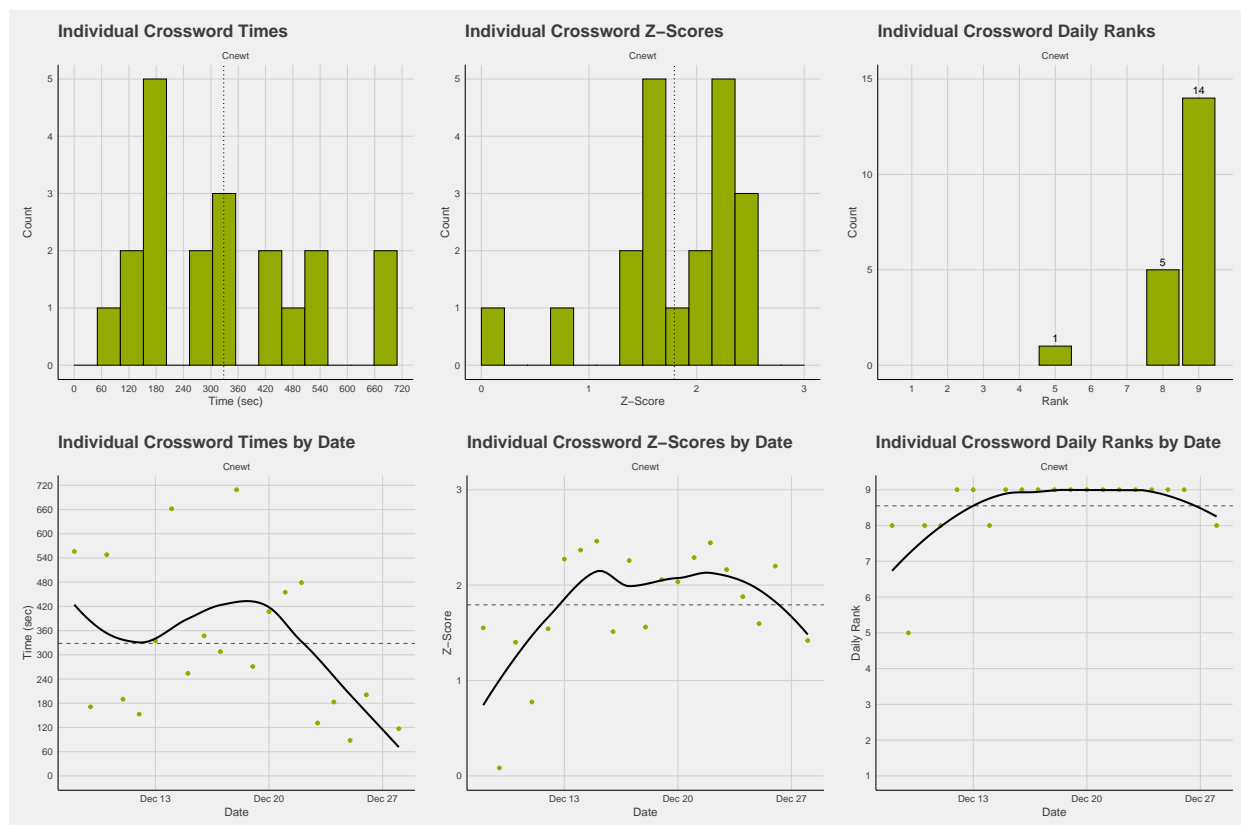
Metric	Min.	1st Qu.	Median	Mean	Trimmed Mean	3rd Qu.	Max.
Time	25.00	56.00	81.00	96.33	93.05	118.0	230.00
Z-Score	-1.04	-0.87	-0.54	-0.45	-0.48	-0.2	0.55
Rank	1.00	2.00	4.00	3.90		6.0	8.00

Date	Weekday	Time	Week Avg Time	Z-Score	Week Avg Z-Score	Rank	Week Avg Rank
2021-12-19	Sunday	25	87.14	-0.87	-0.5	1	4
2021-12-20	Monday	149	87.14	-0.20	-0.5	6	4
2021-12-21	Tuesday	86	87.14	-0.54	-0.5	4	4
2021-12-22	Wednesday	212	87.14	0.46	-0.5	8	4
2021-12-23	Thursday	36	87.14	-1.01	-0.5	2	4
2021-12-24	Friday	58	87.14	-0.90	-0.5	2	4
2021-12-25	Saturday	44	87.14	-0.46	-0.5	5	4

Bahsdaddy has done very well thus far, with a very solid average rank of 3.90 and an average z-score well below 0 at -0.54.

Highlights include 4 first-place finishes (2nd most), 9 top-3 finishes (t-3rd most), and the 2nd-fastest crossword solve, solving the 12/19 puzzle in just 25 seconds.

4.3) Cnewt



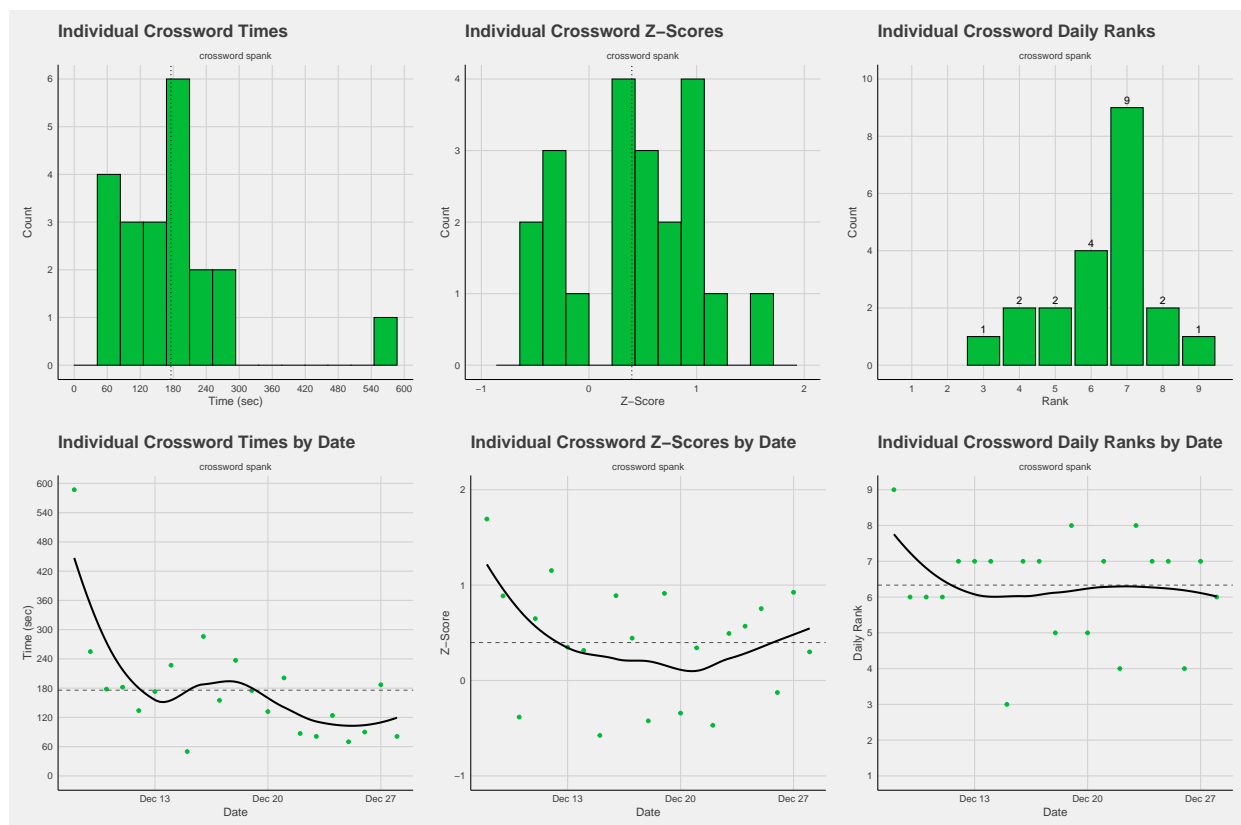
Metric	Min.	1st Qu.	Median	Mean	Trimmed Mean	3rd Qu.	Max.
Time	88.00	180.00	289.50	328.25	320.44	461.00	709.00
Z-Score	0.08	1.54	1.96	1.79	1.85	2.26	2.46
Rank	5.00	8.00	9.00	8.55		9.00	9.00

Date	Weekday	Time	Week Avg Time	Z-Score	Week Avg Z-Score	Rank	Week Avg Rank
2021-12-12	Sunday	153	395.43	1.54		2	9
2021-12-13	Monday	335	395.43	2.27		2	9
2021-12-14	Tuesday	662	395.43	2.37		2	8
2021-12-15	Wednesday	254	395.43	2.46		2	9
2021-12-16	Thursday	347	395.43	1.51		2	9
2021-12-17	Friday	308	395.43	2.26		2	9
2021-12-18	Saturday	709	395.43	1.56		2	9

With all due respect, Cnewt is pulling up the rear thus far, with an impressive median ranking of 9 and mean of 8.55.

Highlights include finishing 5th on 12/9, 2 sub 2 minute finishes, and some clear improvement over the final week!

4.4) crossword spank



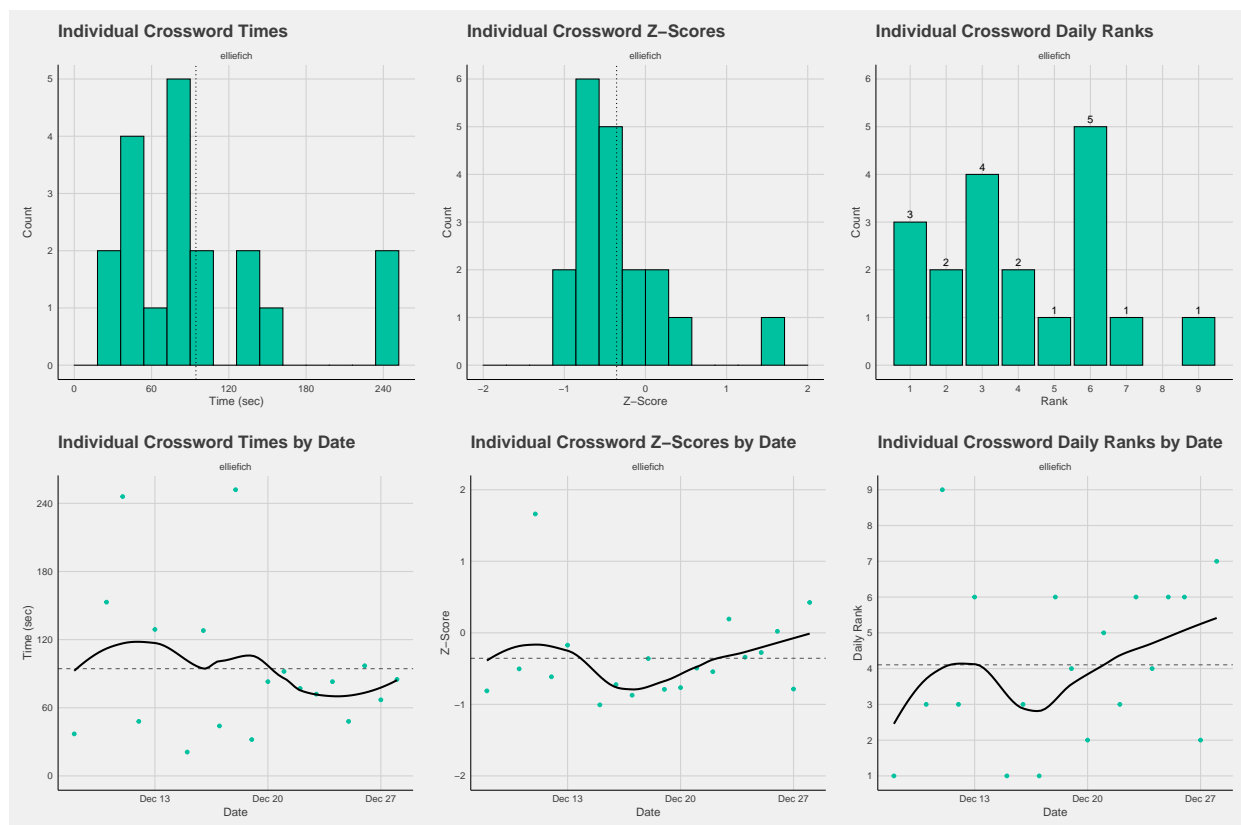
Metric	Min.	1st Qu.	Median	Mean	Trimmed Mean	3rd Qu.	Max.
Time	50.00	90.00	173.00	175.81	160.79	201.00	587.00
Z-Score	-0.58	-0.13	0.44	0.40	0.38	0.89	1.69
Rank	3.00	6.00	7.00	6.33		7.00	9.00

Date	Weekday	Time	Week Avg Time	Z-Score	Week Avg Z-Score	Rank	Week Avg Rank
2021-12-12	Sunday	134	180.29	1.15	0.31	7	6.14
2021-12-13	Monday	173	180.29	0.35	0.31	7	6.14
2021-12-14	Tuesday	227	180.29	0.32	0.31	7	6.14
2021-12-15	Wednesday	50	180.29	-0.58	0.31	3	6.14
2021-12-16	Thursday	286	180.29	0.89	0.31	7	6.14
2021-12-17	Friday	155	180.29	0.44	0.31	7	6.14
2021-12-18	Saturday	237	180.29	-0.42	0.31	5	6.14

crossword spank is resting somewhat below average thus far, although an early rough outlier of 587 seconds on 12/8 is hurting his average, as evidenced by his trimmed mean being 15 seconds below his actual mean.

Highlights include cracking the top 3 on 12/5 and having the most finishes in a single non-last-place spot with 9 7th-place finishes.

4.5) elliefich



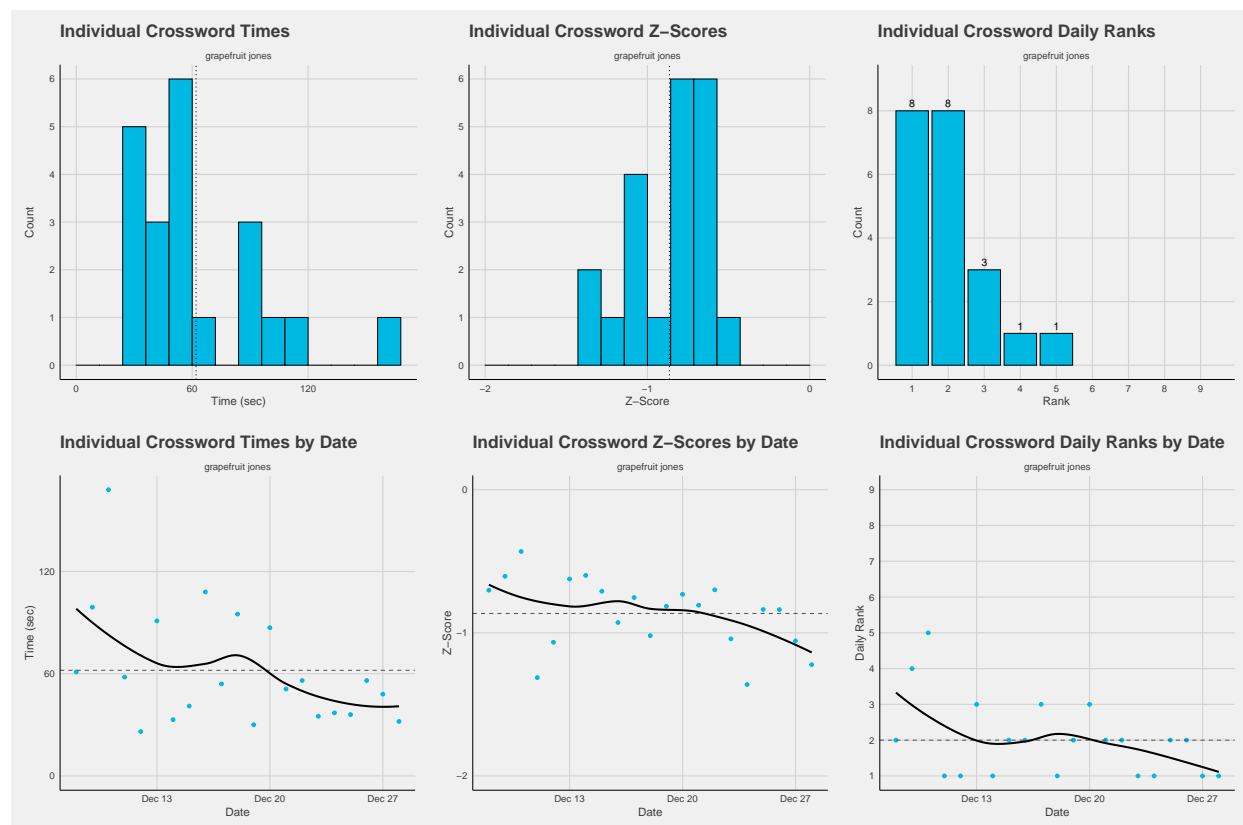
Metric	Min.	1st Qu.	Median	Mean	Trimmed Mean	3rd Qu.	Max.
Time	21.00	48.00	83.0	94.42	94.42	112.50	252.00
Z-Score	-1.01	-0.78	-0.5	-0.36	-0.36	-0.22	1.66
Rank	1.00	2.50	4.0	4.11		6.00	9.00

Date	Weekday	Time	Week Avg Time	Z-Score	Week Avg Z-Score	Rank	Week Avg Rank
2021-12-19	Sunday	32	69.57	-0.79	-0.43	4	4.29
2021-12-20	Monday	83	69.57	-0.77	-0.43	2	4.29
2021-12-21	Tuesday	92	69.57	-0.49	-0.43	5	4.29
2021-12-22	Wednesday	77	69.57	-0.54	-0.43	3	4.29
2021-12-23	Thursday	72	69.57	0.19	-0.43	6	4.29
2021-12-24	Friday	83	69.57	-0.34	-0.43	4	4.29
2021-12-25	Saturday	48	69.57	-0.28	-0.43	6	4.29

elliefich is doing very well thus far, including get off to a hot start before a recent slight uptick of z-scores, averaging a rank of 4.11 and a median rank of 4.

Highlights include having the quickest solve with a 21-second solve on 12/15 and 11 top-3 finishes (t-3rd most) despite missing 2 puzzles.

4.6) grapefruit jones



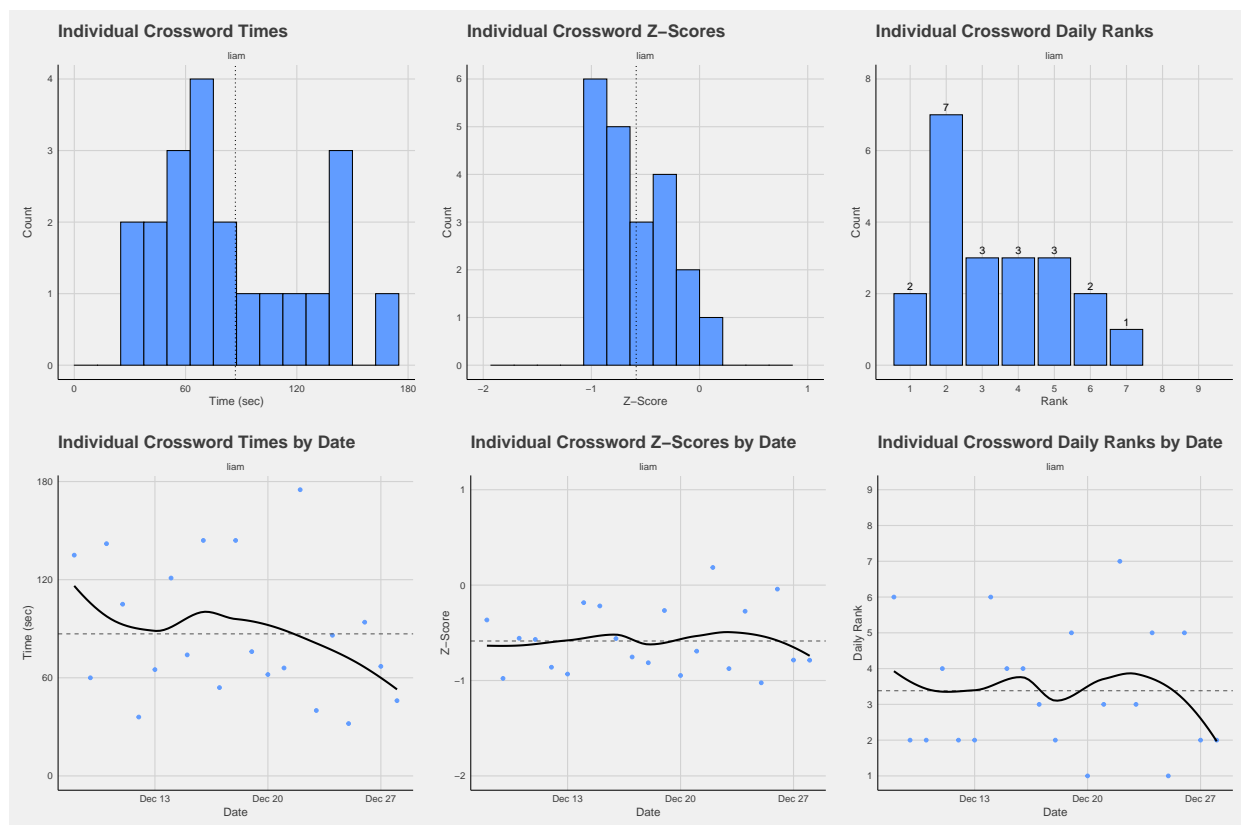
Metric	Min.	1st Qu.	Median	Mean	Trimmed Mean	3rd Qu.	Max.
Time	26.00	36.00	54.00	62.00	58.32	87.0	168.00
Z-Score	-1.36	-1.04	-0.81	-0.86	-0.86	-0.7	-0.43
Rank	1.00	1.00	2.00	2.00		2.0	5.00

Date	Weekday	Time	Week Avg Time	Z-Score	Week Avg Z-Score	Rank	Week Avg Rank
2021-12-19	Sunday	30	47.43	-0.81	-0.9	2	1.86
2021-12-20	Monday	87	47.43	-0.73	-0.9	3	1.86
2021-12-21	Tuesday	51	47.43	-0.81	-0.9	2	1.86
2021-12-22	Wednesday	56	47.43	-0.70	-0.9	2	1.86
2021-12-23	Thursday	35	47.43	-1.04	-0.9	1	1.86
2021-12-24	Friday	37	47.43	-1.36	-0.9	1	1.86
2021-12-25	Saturday	36	47.43	-0.84	-0.9	2	1.86

grapefruit jones is currently annihilating the competition, with an average and median rank of 2 and a maximum z-score of just -0.43, rarely ever finishing outside of the top 2 spots.

Highlights include the most 1st-place finishes with 8 (next closest has 4), the most top-2 finishes with 16 (next closest has 9), finishing in the top 3 all but twice, 6 of the top 8 finishes according to z-score, including spots 2 and 3, more sub -1 z-score finishes than everyone else combined (7 vs 6), the third fastest solve at 26 seconds on 12/12, the only player to have a median sub 1 minute time, etc etc etc he's very good.

4.7) liam



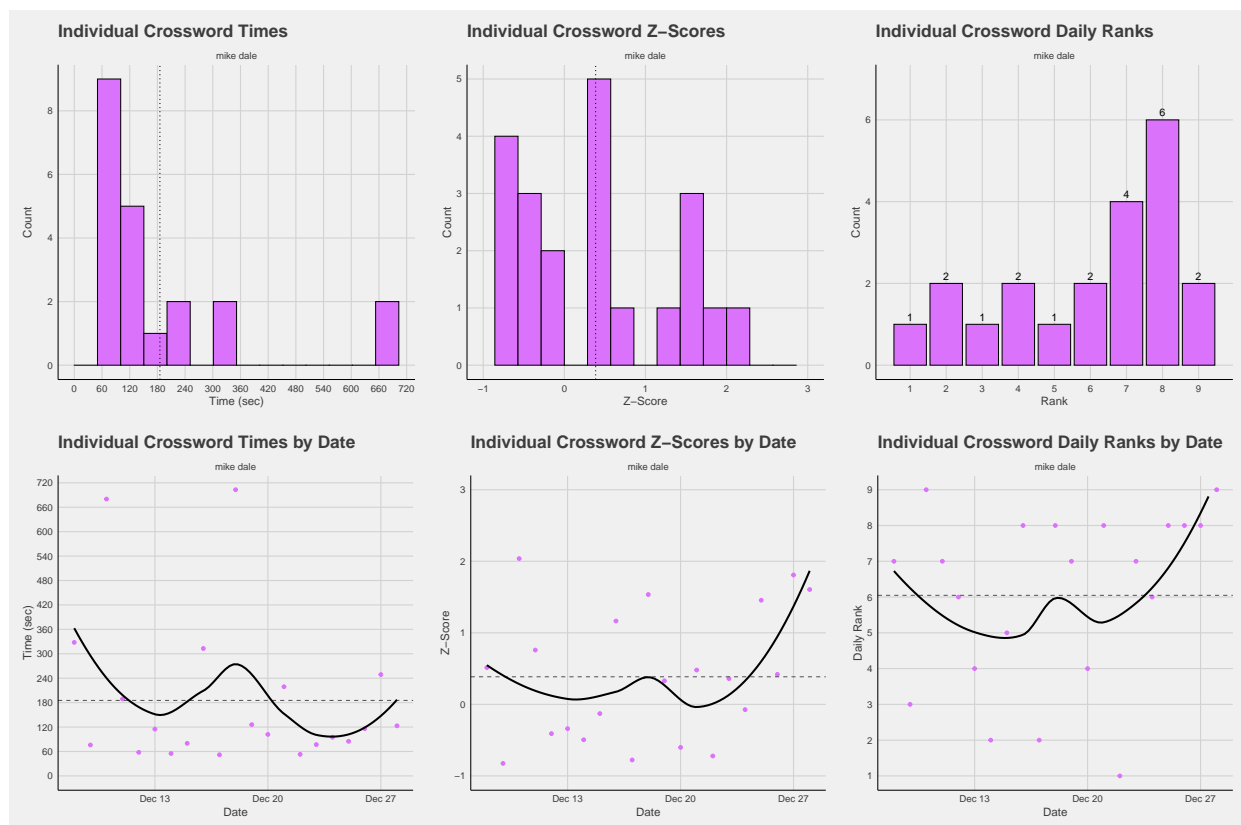
Metric	Min.	1st Qu.	Median	Mean	Trimmed Mean	3rd Qu.	Max.
Time	32.00	60.00	74.00	86.86	85.11	121.00	175.00
Z-Score	-1.02	-0.86	-0.69	-0.59	-0.60	-0.27	0.18
Rank	1.00	2.00	3.00	3.38		5.00	7.00

Date	Weekday	Time	Week Avg Time	Z-Score	Week Avg Z-Score	Rank	Week Avg Rank
2021-12-12	Sunday	36	91.14	-0.86	-0.62	2	3.29
2021-12-13	Monday	65	91.14	-0.93	-0.62	2	3.29
2021-12-14	Tuesday	121	91.14	-0.18	-0.62	6	3.29
2021-12-15	Wednesday	74	91.14	-0.22	-0.62	4	3.29
2021-12-16	Thursday	144	91.14	-0.56	-0.62	4	3.29
2021-12-17	Friday	54	91.14	-0.75	-0.62	3	3.29
2021-12-18	Saturday	144	91.14	-0.81	-0.62	2	3.29

liam is probably the 2nd-best crossworder thus far, with an impressive median rank of 3 and an average rank of 3.38.

Highlights include 7 2nd-place finishes (2nd most, one behind grapefruit jones), 12 top-3 finishes (t-2nd most), finishing below the average solve time 20 out of 21 times, and having the fastest puzzle solve for a non-5x5 puzzle, solving the 6x5 Christmas puzzle in 32 seconds.

4.8) mike dale



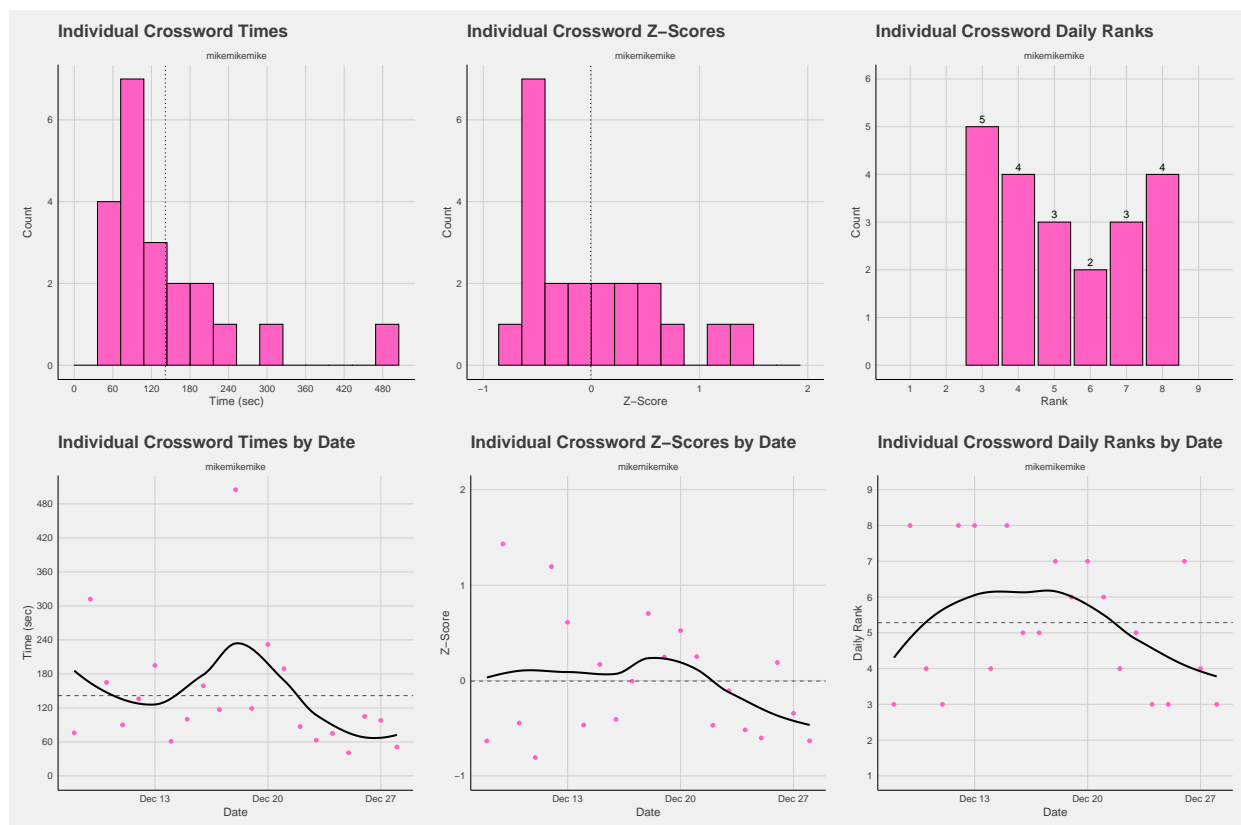
Metric	Min.	1st Qu.	Median	Mean	Trimmed Mean	3rd Qu.	Max.
Time	52.00	77.00	115.00	185.43	165.21	219.00	703.00
Z-Score	-0.82	-0.41	0.36	0.39	0.36	1.16	2.04
Rank	1.00	4.00	7.00	6.05		8.00	9.00

Date	Weekday	Time	Week Avg Time	Z-Score	Week Avg Z-Score	Rank	Week Avg Rank
2021-12-12	Sunday	58	196.57	-0.41	0.08	6	5
2021-12-13	Monday	115	196.57	-0.34	0.08	4	5
2021-12-14	Tuesday	55	196.57	-0.50	0.08	2	5
2021-12-15	Wednesday	80	196.57	-0.13	0.08	5	5
2021-12-16	Thursday	313	196.57	1.16	0.08	8	5
2021-12-17	Friday	52	196.57	-0.78	0.08	2	5
2021-12-18	Saturday	703	196.57	1.54	0.08	8	5

mike dale is resting below average thus far, particularly after a rough stretch of scores during winter break, although like crossword spank, a couple outliers are hurting his average, with his trimmed mean being 20 seconds below his actual mean, the largest gap of any player between their trimmed and actual means.

Highlights include being the only player to have a finish in all 9 ranking spots, having the worst solve time for a 5x5 puzzle with his 680 second solve on 12/5, and having the best fashion sense in the house.

4.9) mikemikemike



Metric	Min.	1st Qu.	Median	Mean	Trimmed Mean	3rd Qu.	Max.
Time	41.00	76.00	105.00	141.71	127.89	165.00	505.00
Z-Score	-0.81	-0.47	-0.11	-0.01	-0.04	0.25	1.43
Rank	3.00	4.00	5.00	5.29		7.00	8.00

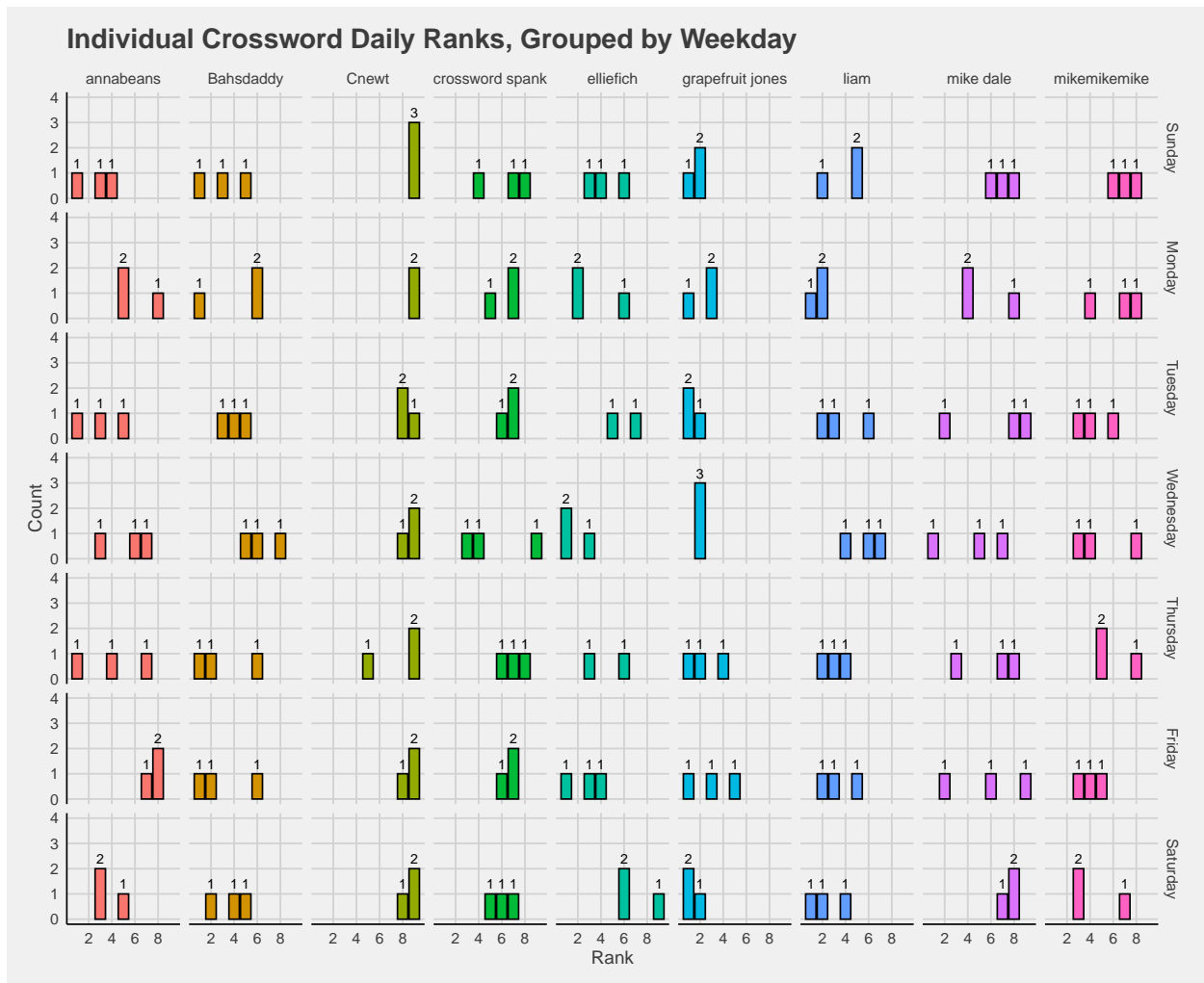
Date	Weekday	Time	Week Avg Time	Z-Score	Week Avg Z-Score	Rank	Week Avg Rank
2021-12-19	Sunday	119	115.14	0.25	-0.1	6	4.86
2021-12-20	Monday	232	115.14	0.52	-0.1	7	4.86
2021-12-21	Tuesday	189	115.14	0.25	-0.1	6	4.86
2021-12-22	Wednesday	87	115.14	-0.47	-0.1	4	4.86
2021-12-23	Thursday	63	115.14	-0.11	-0.1	5	4.86
2021-12-24	Friday	75	115.14	-0.52	-0.1	3	4.86
2021-12-25	Saturday	41	115.14	-0.60	-0.1	3	4.86

mikemikemike is resting basically at the average thus far, with an average z-score of -0.01 and a median ranking of 5, aided by some improved performances over winter break.

Highlights include 5 3rd-place finishes (t-most), 4 4th-place finishes (most of anyone), and being the only player to not have either a 1st- or 9th-place finish.

5) Areas for Future Research

In future reports, I'd like to also look at trends for each day of the week, considering that crosswords typically get more difficult as the week goes on, but seeing as there was only 3 days worth of data for each weekday at this point, the weekday analysis I did so far was pretty unmeaningful. Here's an example of daily ranks for each person for each weekday:



If anyone has any other ideas for interesting things to explore, that would be super helpful and much appreciated.

6) Declarations of Funding and Competing Interests

No one paid me to do any of this.

I mean I guess I'm theoretically pretty biased here seeing as I am a participant in the dataset, but who else is gonna write a whole damn report for y'all. I swear I didn't fudge the data in any way or try to make myself look better in the analyses.

7) Acknowledgements

I'd like to thank everyone for being my friend. Especially those who haven't missed a puzzle yet, missing values are yucky and annoying.

8) Appendix: Summary Stats Tables

The following tables gives each person's quantiles with respect to time, z-score, and daily rank. These are the same data presented individually in each person's subsection of the "Profiles" Section.

8.1) Summary Stats for Time

Name	Min.	1st Qu.	Median	Mean	Trimmed Mean	3rd Qu.	Max.
annabeans	27	56	92.0	111.7	106.7	144.0	290
Bahsdaddy	25	56	81.0	96.3	93.1	118.0	230
Cnewt	88	180	289.5	328.2	320.4	461.0	709
crossword spank	50	90	173.0	175.8	160.8	201.0	587
elliefich	21	48	83.0	94.4	94.4	112.5	252
grapefruit jones	26	36	54.0	62.0	58.3	87.0	168
liam	32	60	74.0	86.9	85.1	121.0	175
mike dale	52	77	115.0	185.4	165.2	219.0	703
mikemikemike	41	76	105.0	141.7	127.9	165.0	505

8.2) Summary Stats for Z-Score

Name	Min.	1st Qu.	Median	Mean	Trimmed Mean	3rd Qu.	Max.
annabeans	-1.45	-0.63	-0.32	-0.26	-0.27	-0.17	1.04
Bahsdaddy	-1.04	-0.87	-0.54	-0.45	-0.48	-0.20	0.55
Cnewt	0.08	1.54	1.96	1.79	1.85	2.26	2.46
crossword spank	-0.58	-0.13	0.44	0.40	0.38	0.89	1.69
elliefich	-1.01	-0.78	-0.50	-0.36	-0.36	-0.22	1.66
grapefruit jones	-1.36	-1.04	-0.81	-0.86	-0.86	-0.70	-0.43
liam	-1.02	-0.86	-0.69	-0.59	-0.60	-0.27	0.18
mike dale	-0.82	-0.41	0.36	0.39	0.36	1.16	2.04
mikemikemike	-0.81	-0.47	-0.11	-0.01	-0.04	0.25	1.43

8.3) Summary Stats for Rank

Name	Min.	1st Qu.	Median	Mean	3rd Qu.	Max.
annabeans	1	3.0	5	4.6	7	8
Bahsdaddy	1	2.0	4	3.9	6	8
Cnewt	5	8.0	9	8.6	9	9
crossword spank	3	6.0	7	6.3	7	9
elliefich	1	2.5	4	4.1	6	9
grapefruit jones	1	1.0	2	2.0	2	5
liam	1	2.0	3	3.4	5	7
mike dale	1	4.0	7	6.0	8	9
mikemikemike	3	4.0	5	5.3	7	8