How many encounters does it take to catch all shiny Pokemon?

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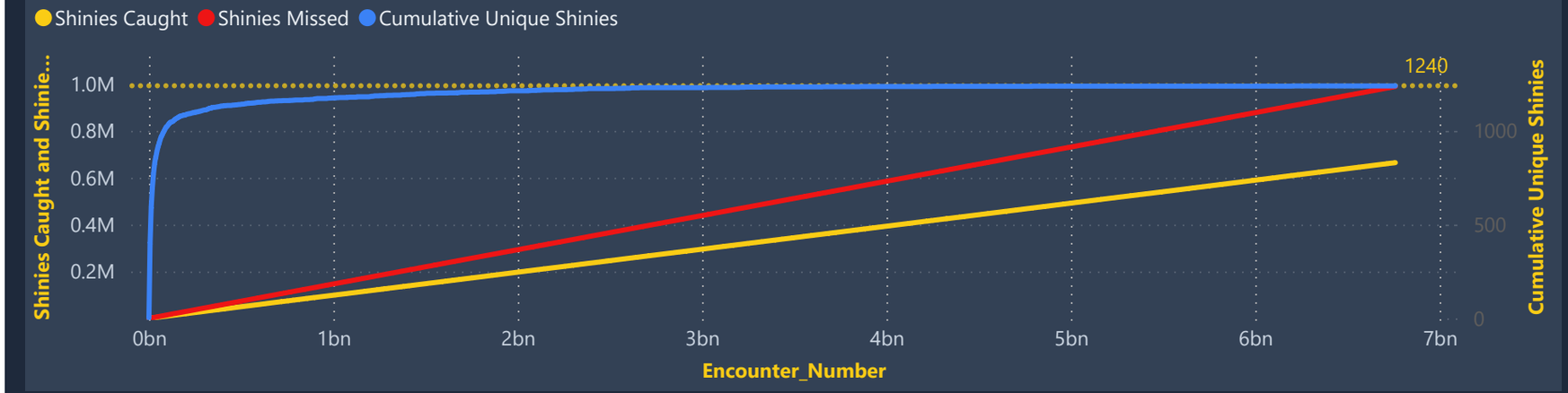
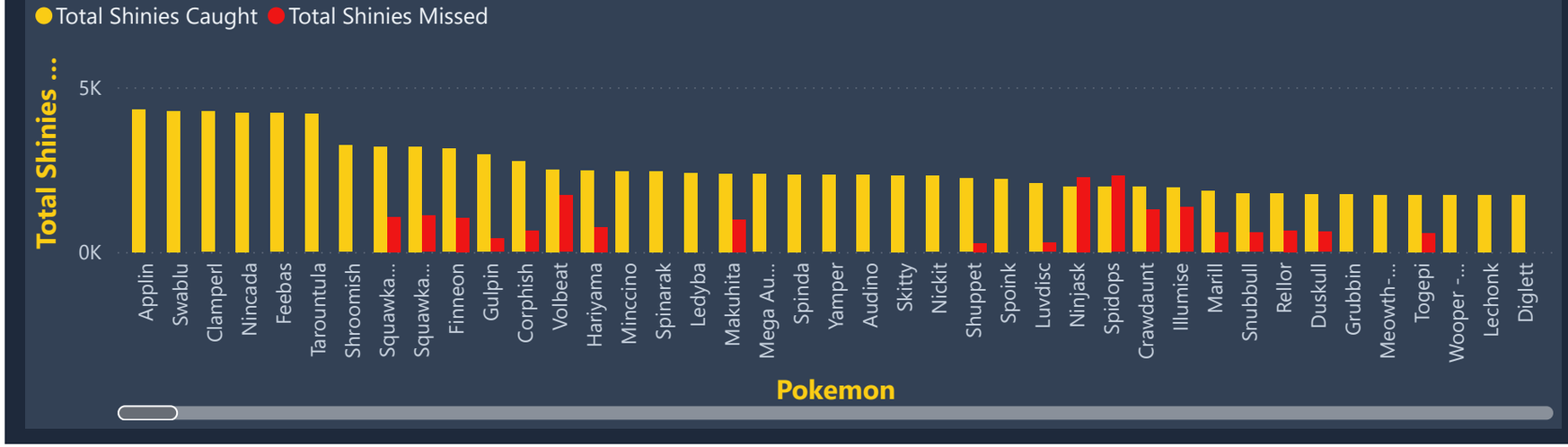
The core challenge of this simulation is a famous statistical puzzle known as the **Coupon Collector's Problem**. The problem asks: "*On average, how many attempts are needed to collect a complete set of unique items?*" The key finding, which this simulation clearly demonstrates, is that the process is not linear. While the first few unique items (or shiny Pokémon) are found relatively quickly, the time and number of encounters required to find the *last few* missing items increase exponentially. This is because you are far more likely to get duplicates of what you already have, leading to a long and difficult "end game" to complete the collection. The curve on the "Sum of Unique Shinies Over Encounters" chart is a perfect visualization of this statistical phenomenon in action.

Sum of Unique Shinies Over Encounters



Total Shinies Caught and Total Shinies Missed by Pokemon



Summary

6,759,893,105 Encounters	664,018 Shinies Caught
988,798 Total Shinies Missed	5,451,526.70 Avg Enc. Per Unique Shiny
4,089.92 Avg Enc Per Shiny	1,240 Unique Shinies Caught
1,652,816 Total Shiny Encounters	6,758,240,289 Total Normal Catches
0.0245% Shiny Rate	40.17% Shiny Catch Rate
Cradily Most Common Shiny	Arceus-Fairy Most Stubborn Shiny
72.4 Sim Duration Hours	Shinx Luckiest Find

Experience Type

All

Catch Rate (bins)

All

Pokemon

All

How did Experience Type Effect the Simulation?

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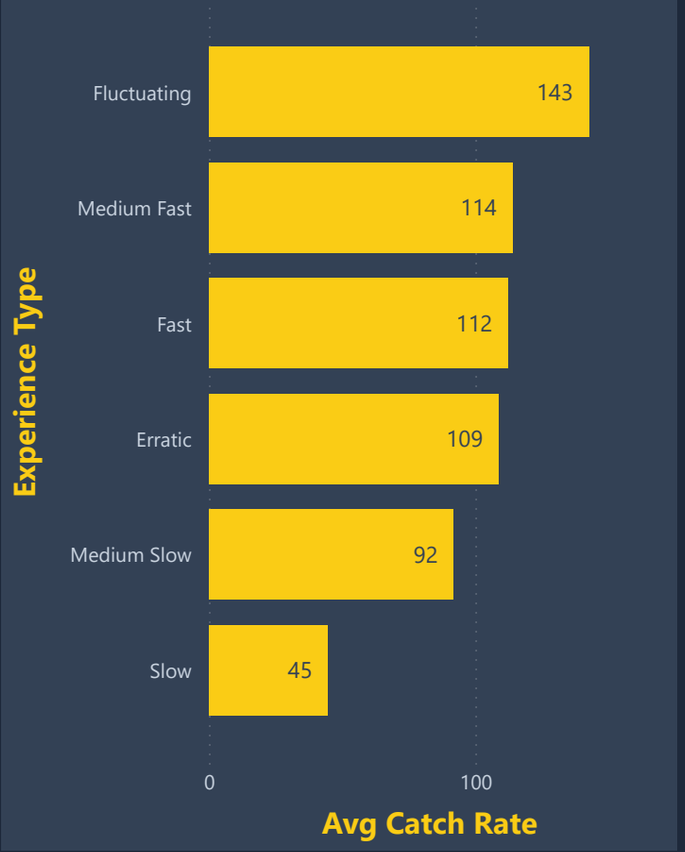
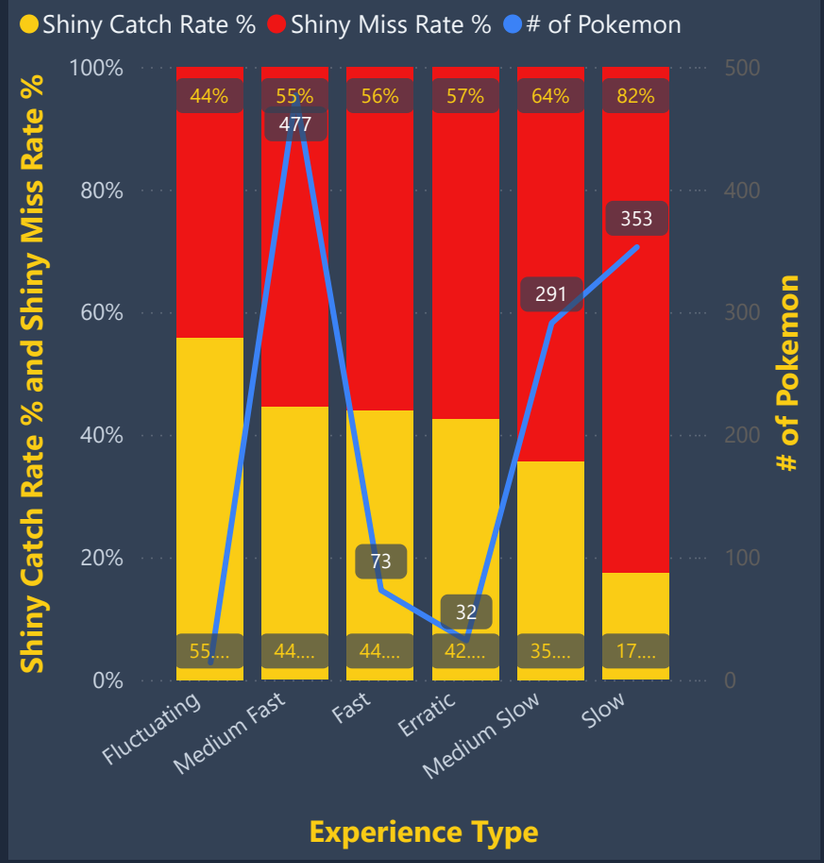
- **Experience Type as Rarity:** The simulation successfully used "Experience Type" to model rarity. Pokémon with "Slow" or "Medium Slow" types had significantly lower spawn rates, proving the weighted encounter system worked as designed.
- **Catch Rate Disparity:** The large gap between missed and caught shinies, especially in the "Erratic" group, clearly indicates that some Pokémon are inherently harder to catch than others, regardless of how often they are encountered.
- **Visualizing Variance:** The scatter plot effectively visualizes the simulation's probabilities. The wide vertical spread within the more common groups ("Erratic" and "Fluctuating") is a direct result of their higher encounter frequency, which generates more data points and reveals a greater range of outcomes.

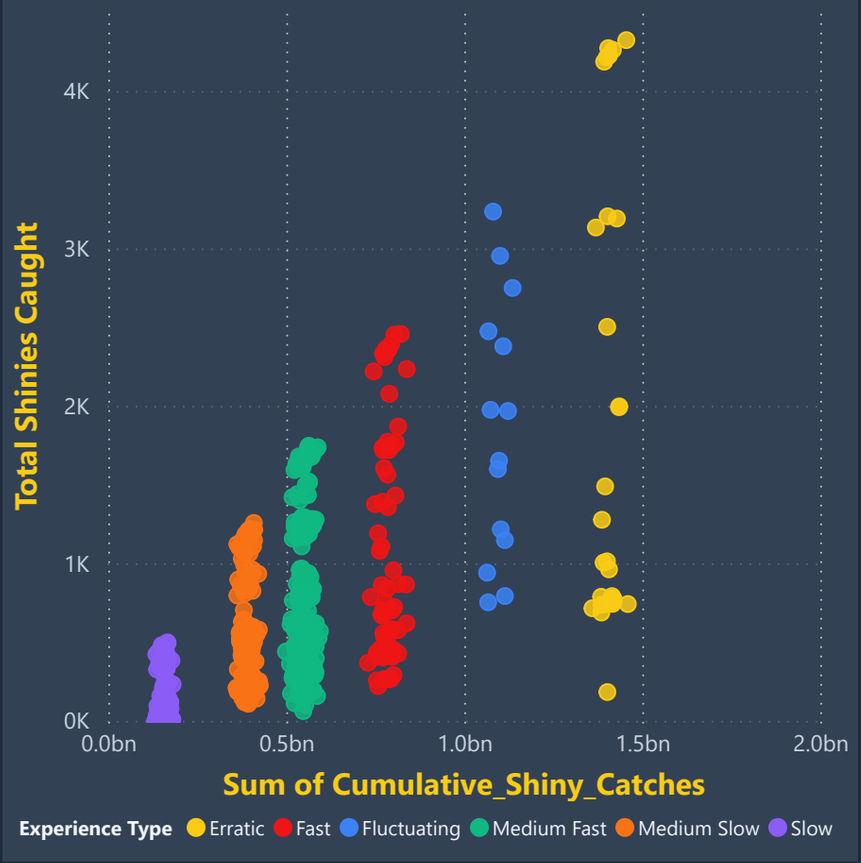
Avg Catch Rate by Experience Type



Total Shinies Caught by Exp Type



Shinies Caught by Exp Type and Encounters



How did Catch Rate Effect the Simulation?

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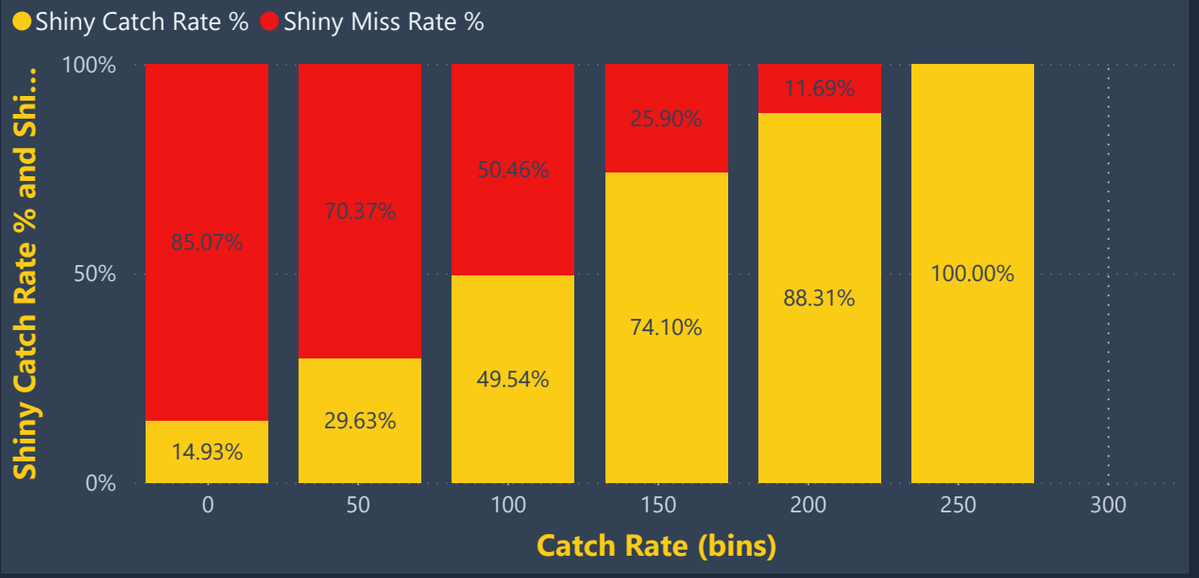
Catch Rate (bins)	Experience Type	Pokemon Catch Rate	Sim Catch Rate	Total Shinies Caught	Total Shinies Missed
153	Erratic	189.75	74.10%	170060	59442
255	Erratic	255.00	100.00%	165897	
51	Erratic	74.79	29.63%	115339	273868
0	Erratic	32.47	14.93%	100036	570107
102	Erratic	125.39	49.54%	79512	80989
204	Fast	226.92	88.31%	33174	4392
Total	**Erratic**	**89.02**	**40.17%**	**664018**	**988798**

Catch Rate Is a Critical Factor: This simulation proves that a Pokémon's base catch rate is a major factor in the difficulty of a shiny hunt. The "Shiny Catch Rate %" chart clearly shows a direct correlation: as the base catch rate goes up, the chances of a shiny getting away plummet. For Pokémon with the highest catch rates (255), a shiny encounter was a guaranteed catch every time.

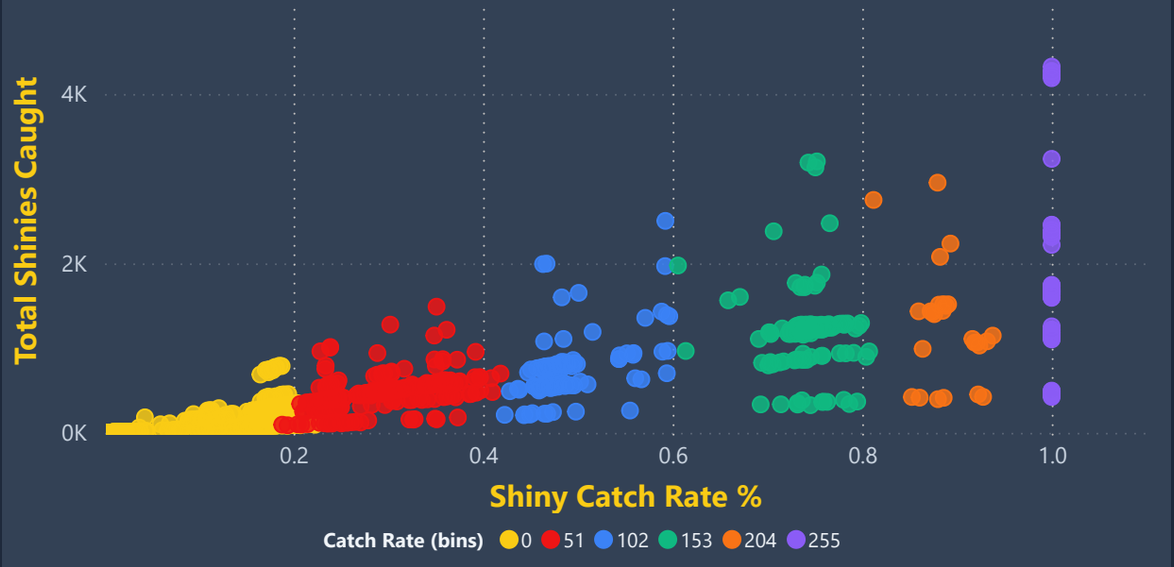
Finding is Only Half the Battle: The data reveals that simply encountering a shiny is not enough. Pokémon like **Zangoose** and **Yanma**, despite being found over 100 times, had simulated catch rates below 30%. This highlights the frustrating reality that for many species, the real challenge begins *after* the shiny has already appeared.

Data Validation: The scatter plot successfully visualizes the direct impact of the catch rate. It shows that while shiny encounters happened across all rarity and catch rate levels, the actual successful catches (the individual points) are heavily influenced by this crucial stat, validating the simulation's catch-and-flee mechanic.

Shiny Catch Rate % and Shiny Miss Rate % by Catch Rate (bins)



Total Shinies Caught by Number of Encounters and EXP type



Fun Stats for Nerds

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Erratic Experience Type	Applin Most Caught	4322 Total Shinies Caught	17378220 Total Encounters
Fast Experience Type	Minccino Most Caught	2456 Total Shinies Caught	9660481 Total Encounters
Fluctuating Experience Type	Shroomish Most Caught	3233 Total Shinies Caught	13508218 Total Encounters
Medium Fast Experience Type	Grubbin Most Caught	1746 Total Shinies Caught	6755761 Total Encounters
Medium Slow Experience Type	Pidove Most Caught	1256 Total Shinies Caught	4830591 Total Encounters
Slow Experience Type	Necrozma Most Caught	497 Total Shinies Caught	1933354 Total Encounters

Best Shiny Catch Rate

Applin

17378220 Total Encounters	4322 Total Shinies Caught	(Blank) Total Shinies Missed	100.00% Shiny Catch Rate %

Worst Shiny Catch Rate

Arceus-Fairy

1931256 Total Encounters	1 Total Shinies Caught	0.20% Shiny Catch Rate %	494 Total Shinies Missed

Least Encountered

Carvanha

1926165 Total Encounters	1925700 Total Normal Catches	412 Total Shinies Caught	0.89 Shiny Catch Rate %

Least Encountered

Carvanha

1926165 Total Encounters	1925700 Total Normal Catches	412 Total Shinies Caught	0.89 Shiny Catch Rate %

Stats Table

Experience Type	First Experience Type	Total Shinies Caught	Avg Catch Rate	Total Shinies Missed	Total Encounters	Total Shiny Encounters	Shiny Catch Rate %	Shiny Miss Rate %	Encounter Rank	Avg Encounters Per Shiny	Encounters for First Shiny	Shiny Rate	Total Normal Catches	Count of Pokemon
⊞ Fluctuating	Fluctuating	25,820	142.50	20,444	189,201,616	46,264	55.81%	44.19%	1	4,089.61	7,519,091	0.0245%	189,155,352	14
⊞ Medium Fast	Medium Fast	352,519	113.83	436,926	3,223,532,534	789,445	44.65%	55.35%	1	4,083.29	201,860,265	0.0245%	3,222,743,089	477
⊞ Fast	Fast	75,966	112.22	96,364	704,768,853	172,330	44.08%	55.92%	1	4,089.65	90,657,324	0.0245%	704,596,523	73
⊞ Erratic	Erratic	57,913	108.59	77,684	556,092,452	135,597	42.71%	57.29%	1	4,101.07	91,485,201	0.0244%	555,956,855	32
⊞ Medium Slow	Medium Slow	122,648	91.68	220,146	1,404,706,561	342,794	35.78%	64.22%	1	4,097.82	236,779,000	0.0244%	1,404,363,767	291
⊞ Slow	Slow	29,152	44.61	137,234	681,591,089	166,386	17.52%	82.48%	1	4,096.44	6,759,893,113	0.0244%	681,424,703	353
Total	**Erratic**	**664,018**	**89.02**	**988,798**	**6,759,893,105**	**1,652,816**	**40.17%**	**59.83%**	**1**	**4,089.92**	**6,759,893,113**	**0.0245%**	**6,758,240,289**	**1240**

Thank you from the bottom of my heart for checking out my work. This was a learning experience for me, and one I poured some true passion into.

I learned a great deal about Python, Power BI, and Data Analytics in general. It was a fantastic journey, and I'm happy to share these results with anyone who would appreciate and learn from them.

GitHub Repo: https://github.com/rela82me/shiny-encounter-simulation

Check out the GitHub repo for more info about the simulation and visit https://joshualown.org for more experiments like this!