



The Fourth Strike: Red Hot or Red Herring?

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ABSTRACT *This study examines the effect of the Fourth Strike decree in Internet League Baseball Season 3. For the 367 games where the Fourth Strike prevented a strikeout, we simulate how those games would be different without the Fourth Strike. Rescoring those games shows that the Millennials and Lovers benefited the most from the Fourth Strike - each originally won their division and made the playoffs, but would not have without it. The Breath Mints and Sunbeams were also helped significantly by the Fourth Strike, but accomplished less with that help. Removing the Fourth Strike leads to extra strikeouts that help a few pitchers improve their standing on the strikeout leaderboard, but the overall leaders are still unbeatable.*

KEYWORDS

Fourth Strike
Re-scoring
Simulation

INTRODUCTION

In Internet League Baseball, fans of each team are able to purchase Votes that can be spent during an off-season election to democratically select Decrees - rule changes which take effect the following season.

In the Season 2 Election, the voters of Baseball enacted the Decree "The Fourth Strike", which granted an extra strike to the bottom four teams in the Internet League. The New York Millennials, San Francisco Lovers, Kansas City Breath Mints, and Hellmouth Sunbeams all gained the leeway of requiring four strikes in order to strike out.

We compare the results of the real Season 3 (or **Season 3 Classic™**) with our simulation of a Fourth-Strikeless season (or **Season 3β**) to see which teams benefited the most and least from the Fourth Strike.

METHODOLOGY

Season 3's regular season featured 367 games where 3 strikes occurred during an at-bat that was not a strikeout. The list of "game events" for those games (as stored in the SIBR database¹) was analyzed by a program called **Rescorer** (lilserf 2020b). Rescorer consumes a list of game events for a given game, and outputs a modified list of game events denoting what would have happened without the Fourth Strike decree. It keeps track of score and baserunner state, as well as whether the game has diverged from reality.

Since the top and bottom of an inning don't directly affect each other, Rescorer runs two independent copies of the rescoring algorithm - one for the home team's batting events, and one for the

away team's batting events. After each team's events are processed, they are re-combined into a single list of events for the game.

Rescorer checks each game event in order, looking for 3 strikes. When an event with 3 strikes is found, the pitch list is checked to confirm that a third strike happened on a called or swinging strike, not a foul ball. If so, the event is changed to a strikeout.

If the event had previously been a simple out with no runners advancing, there is no need for Rescorer to take any further action at this time - the same batters will still bat with the same number of outs in the same innings. The only effect from a strikeout in this case is on the statistics of the pitcher and batter, not the outcome of the game.

If the event was not previously a simple out, Rescorer will then "diverge from reality". Starting from the current state of score and baserunners, the remainder of the game is simulated based on the original events. Each batter from the original game bats in the same order, and has the same result (such as SINGLE, OUT, FIELDER'S CHOICE, etc) of their appearance. Because of the presence of extra strikeouts, these batting appearances could take place in different innings or with different outs than in Season 3 Classic™, altering the baserunners and score from the original game events. Some plate appearances may even no longer happen because the game now ends earlier!

Because situations can now occur that had no direct equivalent in the original game, Rescorer must simulate the results of some appearances. For example, in the original game, an event may occur late in an inning with runners on base. A new strikeout early in the inning could push that appearance to the next inning, with different baserunners.

Figure 5 shows an example Rescorer summary where a new strikeout pushes several events from the 2nd inning into the 3rd, and changes the number and placement of baserunners. Because

Rescorer has no exact game event featuring this situation from the original game, it cannot directly tell how the runners on base would have advanced in this case. It uses the following rules to resolve these cases:

- Triples and Doubles score all current baserunners.
- Singles score all runners in scoring position², and the runner on first advances based on that player's past performance in all games present in the SIBR database³:
 - A weighted coin is flipped based on the number of times that player advanced 1 base vs 2 bases.⁴
- With less than 2 outs:
 - On a Fielder's Choice, the leading force runner is out and the batter reaches first. Any non-forced-out runner on 3rd will score.
 - On a ground out, runners advance 0 or 1 bases by flipping a weighted coin based on their past performance.
 - On a fly out, runners tag up (or don't) and advance 0 or 1 bases by flipping a weighted coin based on their past performance.

For all cases that use a runner's past performance, the league average performance is used if the runner has a low number of occurrences.

After the events have been modified and recombined, Rescorer determines where the game would have ended by checking each inning starting at the 9th, and discards any events that take place after the game would have ended. This can result in many plate appearances by Fourth Strike team batters being discarded. For the 367 games Rescorer processed in this study, 1,067 batter appearances were discarded. Per game, about 2.9 appearances were lost - or 3.8% of the average appearances per game (76.7).

Because the score of a game can change, some games that previously ended as a normal win are now tied at the end of all available innings. With no further batter events available, Rescorer can't guess what would have happened, and those games must now be recorded as tied.

RESULTS

In 367 games, Rescorer found 966 batter appearances that were "saved" by the Fourth Strike and which are now strikeouts in Season 3β. Almost exactly half of these originally ended in an out, and thus were unaffected. Of the remainder, singles and walks were the major casualties of 3 strikes, although 33 triples, 31 home runs, and 14 doubles were also prevented (Table 1).

The 367 games processed by Rescorer can be broken into several categories based on the old and new scores (Table 2):

- **Same Score:** Both teams score the same as the original game
- **Same Win:** Same team won by the same margin of victory, but different scores for both teams (for instance, originally 2-1 and now 3-2)
- **Smaller Win:** Winning team still wins, but by a smaller margin
- **Bigger Win:** Winning team still wins, but by a bigger margin

² "Scoring position" is 2nd or 3rd base

³ no space (2020)

⁴ For instance, let's say Sam Scandal advanced from first to second 75% of the time and got to third 25% of the time during Season 3 Classic™. We generate a random number from 0 to 1; if it's less than or equal to 0.25, he advances to third in our simulation. If it's greater, he only reaches second.

⁵ Some game updates are missing, resulting in at-bats that can't be correctly classified automatically

■ **Table 1** Events that became strikeouts

Event	Occurrences	Percent of Total
Out	484	50.10%
Single	171	17.70%
Walk	147	15.22%
Fielder's Choice	60	6.21%
Triple	33	3.42%
Home Run	31	3.21%
Double	14	1.45%
Stolen Base	10	1.04%
Unknown ⁵	9	0.93%
Caught Stealing	7	0.72%

- **Reversed:** Original losing team now wins
- **Tied:** Teams are now tied, unable to determine a new winner

■ **Table 2** Rescored game results

Type	Occurrences	Percent of Total
Same Score	177	48.2%
Smaller Win	75	20.4%
Bigger Win	54	14.7%
Reversed	40	10.9%
Tied	12	3.3%
Same Win	9	2.5%

Ultimately 315 (85.8%) of the rescored games ended with the same winner as the original game, 40 (10.9%) ended differently and another 12 (3.3%) had the potential to end differently. But those 40 games have quite an impact on some of the Fourth Strike teams' seasons.

ANALYSIS

Because ties don't happen in normal play⁶, we examine the two extremes for each Fourth Strike team: first counting all ties as wins, then as losses. This gives a range of records each team could have achieved in Season 3β.

New York Millennials

The Millennials were the most successful of the Fourth Strike teams, posting a 65-34 record and finishing first in the Good League in Season 3 Classic™. They benefited heavily from the Fourth Strike - in Season 3β, they finish with only 51 wins and 5 ties, meaning their possible records range from 56-43 to 51-48. At best, they finish 3rd in the Good league behind the Charleston Shoe Thieves and Dallas Steaks. At worst, they miss the playoffs entirely!

This loss of at least 9 and at most 14 wins, combined with their position in the league, makes them the team that benefited most from the Fourth Strike.

⁶ The Commissioner is doing a great job

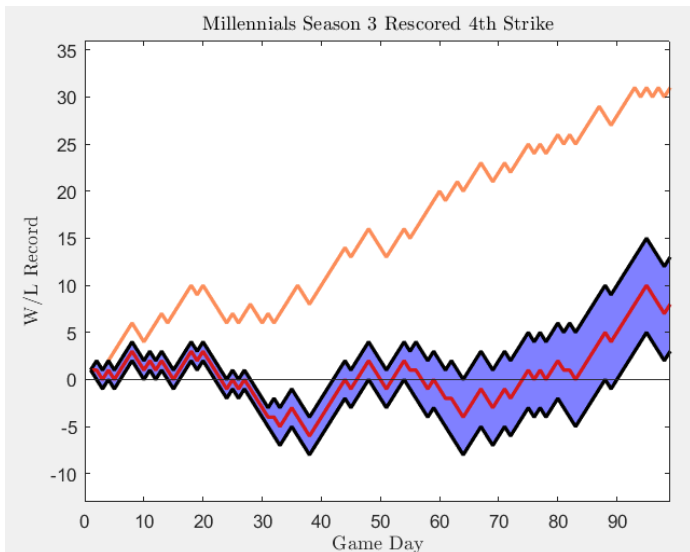


Figure 1 New York Millennials Season 3

San Francisco Lovers

The Lovers also finished strong in Season 3 Classic™, taking the top spot in the Lawful Good division and 3rd place overall in the Good League. Our simulation shows that they were clearly helped by the Fourth Strike, as they rack up 7 fewer wins in Season 3β. Unlike the Millennials, most (6) of these games become losses, with only one tie, making the Lovers our most certain rescored team in Season 3β.

With an adjusted 53-46 or 52-47 record, the Lovers finish 5th in the Good League - and miss the playoffs - when using their best record. If, however, we award all Fourth Strike teams their worst possible record, the Lovers actually finish above the Millennials who get clobbered when losing all ties. In this situation, the Lovers eke out 4th in the Good League just ahead of the Hawaii Fridays.

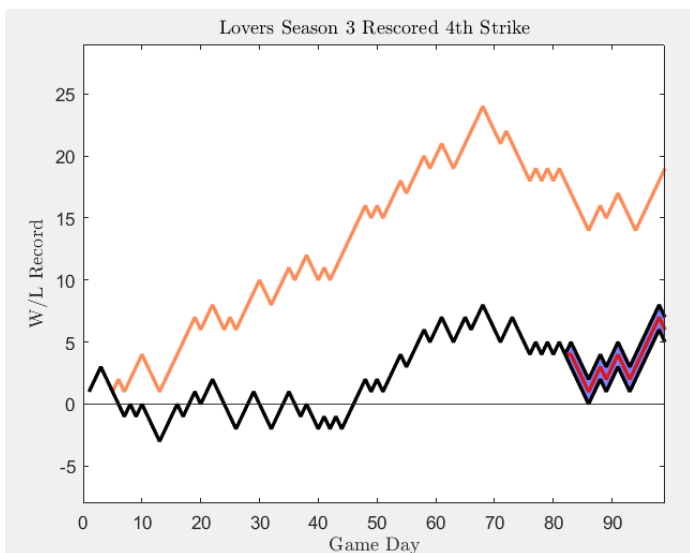


Figure 2 San Francisco Lovers Season 3

Kansas City Breath Mints

The Breath Mints finished 6th in the Good League in Season 3 Classic™, and fare even worse in Season 3β. Like the Lovers, they

lose 7 wins, but with more uncertainty - 2 are certainly losses, but 5 games are now ties. This puts them at 47-52 (dropping to 7th in the Good) at best, and 42-57 (finishing 8th) at worst.

While benefiting just as much as the Lovers in terms of wins, the Mints' weaker overall record in both Season 3 Classic™ and Season 3β shows that their problems run deeper than the Fourth Strike can correct. It helped - but not enough.

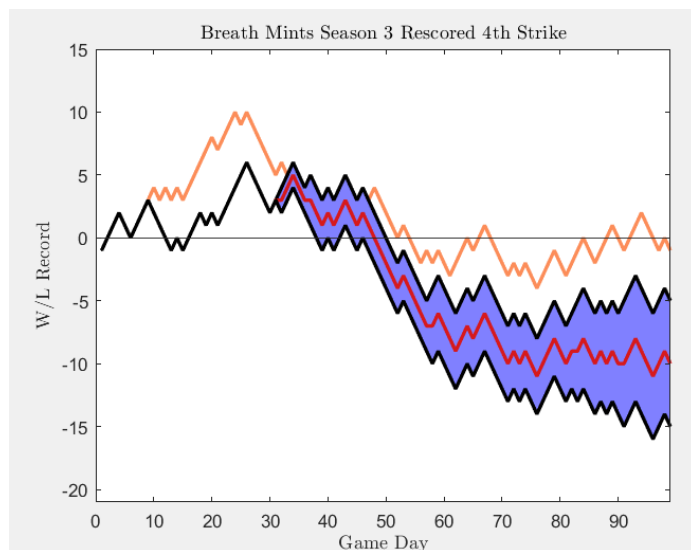


Figure 3 Kansas City Breath Mints Season 3

Hellmouth Sunbeams

The Sunbeams actually lose more wins (9 in all) than the Lovers or Mints in Season 3β - with 6 becoming losses and 3 becoming ties. Unfortunately for the Sunbeams, those 9 wins didn't help them reach the playoffs in Season 3 Classic™, but instead made the difference between the terrible season they had and a colossally, historically terrible one.

In Season 3β, the Sunbeams still finish dead last in the Evil League, with a best record of only 32 wins and 67 losses. Their worst record is only 29 wins, finishing 41 games under .500⁷. This puts the Sunbeams dead last of all 20 teams in the Internet League overall in either case⁸.

⁷ The Hades Tigers finished 43 games above .500 in the same league in Season 3 Beta, putting the Sunbeams an amazing 42 games (nearly half a season) behind the Tigers

⁸ Good news for the Chicago Firefighters!

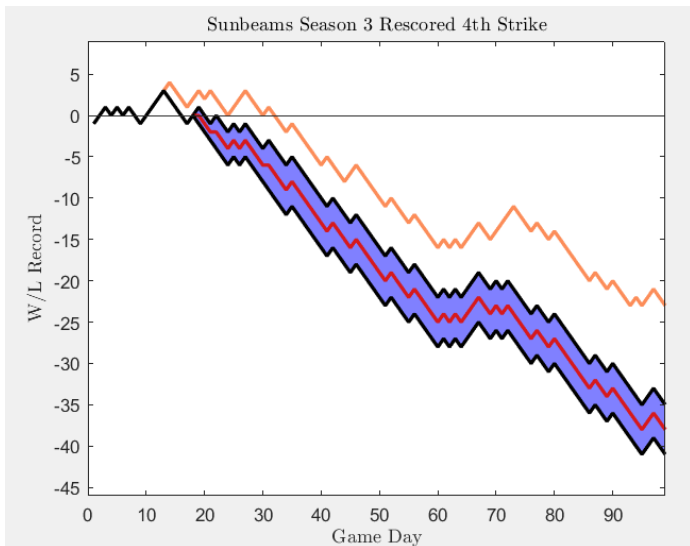


Figure 4 Hellmouth Sunbeams Season 3

Table 3 Standings | Ties are Wins for Fourth Strike teams

Good League		Evil League	
Team	W/L Record	Team	W/L Record
Charleston Shoe Thieves	63-36	Hades Tigers	71-28
Dallas Steaks	58-41	Philly Pies	55-44
New York Millennials	56-43	Canada Moist Talkers	55-44
Yellowstone Magic	55-44	Houston Spies	49-50
San Francisco Lovers	53-46	Breckenridge Jazz Hands	49-50
Hawaii Fridays	49-50	Seattle Garages	48-12
Kansas City Breath Mints	47-52	Baltimore Crabs	45-54
Boston Flowers	47-52	Mexico City Wild Wings	44-55
Unlimited Tacos	41-58	Miami Dalé	40-59
Chicago Firefighters	36-63	Hellmouth Sunbeams	32-67

Table 4 Standings | Ties are Losses for Fourth Strike teams

Good League		Evil League	
Team	W/L Record	Team	W/L Record
Charleston Shoe Thieves	66-33	Hades Tigers	71-28
Dallas Steaks	59-40	Philly Pies	55-44
Yellowstone Magic	55-44	Canada Moist Talkers	55-44
San Francisco Lovers	52-47	Breckenridge Jazz Hands	50-49
Hawaii Fridays	51-48	Houston Spies	49-50
New York Millennials	51-48	Seattle Garages	49-50
Boston Flowers	47-52	Baltimore Crabs	45-54
Kansas City Breath Mints	42-57	Mexico City Wild Wings	45-54
Unlimited Tacos	41-57	Miami Dalé	40-59
Chicago Firefighters	37-62	Hellmouth Sunbeams	29-70

The Rest of the League

Benefits to other teams in the league varied (Table 5). The Shoe Thieves fared best in terms of losses averted, turning 6 losses into 3

wins and 3 ties. The Flowers were nearly as good and much more certain - turning 5 losses directly into wins.

The Good League had 5 of the top 6 results for losses averted (unsurprising since 3 of the 4 Fourth Strike teams are in the Good League), with the Wild Wings taking the prize for most improvement in the Evil League. Notably, the Houston Spies and Miami Dalé each had zero games affected and finished the same in Season 3 β as Season 3 Classic™.

The most interesting result for non-Fourth Strike teams is the Breckenridge Jazz Hands, who fail to avert any losses in Season 3 β , and are the only team to actually lose a win as their game against the Hellmouth Sunbeams on Day 21 becomes a tie!

Table 5 Losses Averted

Team	Losses Averted	Wins Gained	Ties Created
Charleston Shoe Thieves	6	3	3
Boston Flowers	5	5	0
Dallas Steaks	4	3	1
Mexico Wild Wings	3	2	1
Hawaii Fridays	3	1	2
Unlimited Tacos	3	3	0
Philly Pies	2	2	0
Canada Moist Talkers	2	2	0
Yellowstone Magic	2	2	0
Chicago Firefighters	2	1	1
Hades Tigers	1	1	0
Seattle Garages	1	0	1
Baltimore Crabs	1	1	0
Houston Spies	0	0	0
Miami Dalé	0	0	0
Breckenridge Jazz Hands	0	-1	1

Table 7 shows the key innings where extra strikeouts actually helped the Sunbeams. This net improvement of 1 run by the Sunbeams due to lucky strikeout positioning makes this game a tie instead of a win by the Jazz Hands.

The Prestige

One notable game that is reversed in Season 3 β is the famous Shoe Thieves / Breath Mints game from day 57. In both timelines, the Shoe Thieves are winning 6-3 in the bottom of the 2nd when ace pitcher Matteo Prestige is incinerated and replaced by zero-star pitcher Gunther O'Brian. In Season 3 Classic, the Thieves go on to score 10 runs but give up 18 to the surging Breath Mints, losing the game 21-16.

But in Season 3 β , the result is very different⁹! The Breath Mints add 5 strikeouts, shuffling their early runners on base at the cost of runs. Most harmfully, the previously-6-run bottom of the 9th is severely disrupted, scoring only 1 run instead. In the end the Breath Mints lose 11 runs in Season 3 β , and lose the game 16-10.

⁹ <https://bit.ly/2Yx4sLW> has the full Rescorer summary for all the gory details

See Table 8 for an inning-by-inning breakdown of what happened to the Mints without the Fourth Strike.

It's undeniable that Matteo Prestige's incineration was tragic and that Gunther O'Brian's first appearance¹⁰ was rough, but the Breath Mints dodged 5 strikeouts and gained 11 extra runs due to the Fourth Strike - Shoe Thieves fans, take heart.

Player Statistics

Pitching: Yeong-Ho Garcia of the Yellowstone Magic¹¹ was the pitcher most robbed by Fourth Strike teams. In Season 3 β , they rack up 25 additional strikeouts, bringing them to 115 on the season. An impressive improvement, but nowhere close to the top 10 list for Strikeouts.

That list doesn't change too drastically in Season 3 β , as Season 3 Classic™ leader Sandoval Crossing extends their lead by adding 10 new strikeouts.

Three pitchers, however, do make big improvements on the leaderboard (Table 6):

- Oscar Vaughan racks up 14 extra strikeouts to rise from 6th to 3rd
- Yosh Carpenter gets 19 extra strikeouts to rise from 10th to 6th
- Patty Fox gets 21 extra strikeouts to sneak in at 10th and knock fan-favorite Math Velazquez out of the top 10
- Honorable mention: Theodore Cervantes was +12 to get to 11th, also beating Math Velazquez

■ **Table 6** Season 3 β Strikeout Leaders

Player	Strikeouts	Ks Gained	Previous Rank	New Rank
Sandoval Crossing	182	+10	1	1
PolkaDot Patterson	170	+4	2	2
Oscar Vaughan	160	+14	6	3
Zack Sanders	158	+5	3	4
Dunlap Figueroa	156	+4	4	5
Jenkins Good	153	+2	5	6
Yosh Carpenter	153	+19	10	7
Greer Lott	152	+6	6	8
Karato Bean	147	+7	8	9
Patty Fox	147	+21	Unranked	10

Batting: Mclaughlin Scorpler has the dubious honor of being the batter most helped by the Fourth Strike. In Season 3 β , Scorpler struck out a whopping 46 more times than in Season 3 Classic™. Helga Burton was the only other batter above +40 strikeouts, at +41. Don Mitchell lost the most home runs in Season 3 Beta, with 4 turning to strikeouts.

FUTURE WORK

Full summaries of rescored games, as well as complete before-and-after JSON files for each game, are available at [lilserf \(2020a\)](#). A future project could calculate full individual player statistics for both realities, including complete leaderboards.

Alternately, a future project could expand on this study's use of a weighted coin to determine runner advancement by running

a Monte Carlo simulation of multiple versions of Season 3 β with different random seeds.

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¹⁰ Relief appearance?

¹¹ The Magic played 33 games against Fourth Strike teams, giving Garcia ample opportunity to rack up Ks in Season 3 β .

Inning 2							
Sigmund Castillo hit a ground out to Hotbox Sato.	0 out	OUT	1-0	1-0	OUT	0 out	Sigmund Castillo hit a ground out to Hotbox Sato.
Knight Urlacher hits a Single!	1 out	SINGLE	1-0	1-0	SINGLE	1 out	Knight Urlacher hits a Single!
Theo King draws a walk.	1 out	WALK	1-0	1-0	STRIKEOUT	1 out	Theo King draws a walk.
Helga Moreno hits a Single!	1 out	SINGLE	1-0	1-0	SINGLE	2 out	Helga Moreno hits a Single!
Helga Burton hit a sacrifice fly. Knight Urlacher tags up and scores!	1 out	OUT	1-0	1-0	OUT	2 out	Helga Burton hit a sacrifice fly. Knight Urlacher tags up and scores!
Kichiro Guerra hits a Double! 2s score.	2 out	DOUBLE	2-0				
Kennedy Meh hits a Single!	2 out	SINGLE	4-0				
Ortiz Lopez hit a flyout to Matheo Carpenter.	2 out	OUT	4-0				
Castillo Turner hit a ground out to Theo King.	0 out	OUT	4-0	1-0	OUT	0 out	Castillo Turner hit a ground out to Theo King.
Jacob Haynes hits a solo home run!	1 out	HOME_RUN	4-0	1-0	HOME_RUN	1 out	Jacob Haynes hits a solo home run!
Beck Whitney hit a ground out to Sigmund Castillo.	1 out	OUT	4-1	1-1	OUT	1 out	Beck Whitney hit a ground out to Sigmund Castillo.
Jorge Ito hit a ground out to Helga Burton.	2 out	OUT	4-1	1-1	OUT	2 out	Jorge Ito hit a ground out to Helga Burton.
Inning 3							
Ortiz Lopez hit a ground out to Beck Whitney.	0 out	OUT	4-1	1-1	DOUBLE	0 out	Kichiro Guerra hits a Double! 2s score.
Don Mitchell hit a flyout to Jorge Ito.	1 out	OUT	4-1	1-1	SINGLE	0 out	Kennedy Meh hits a Single!
Sigmund Castillo hit a flyout to Castillo Turner.	2 out	OUT	4-1	2-1	OUT	0 out	Ortiz Lopez hit a flyout to Matheo Carpenter.
			2-1	OUT		1 out	Ortiz Lopez hit a ground out to Beck Whitney.
			2-1	OUT		2 out	Don Mitchell hit a flyout to Jorge Ito.

Figure 5 Example of events shifting between innings. Three batters now have their appearances in the 3rd inning instead of the 2nd, with different runners on base. As a result, only 1 run is scored as a result of these events instead of 3. (Screenshot from Rescorer game summary)

Table 7 Jazz Hands lose a win | Season 3, Day 21

Inning	Extra Runs Scored by Sunbeams	Notable Events
Bottom of 2nd	0	2 outs and a walk becomes 3 straight strikeouts, pushing a single into the 3rd.
Bottom of 3rd	1	That previously-useless single from the bottom of the 2nd puts a runner on 3rd that can score on Nagomi Nava's hit into a Fielder's Choice.
Bottom of 6th	1	A single and walk previously scoring nobody in the bottom of the 5th now put 2 extra runners on base, causing Igneus Delacruz's walk to score a run.
Bottom of 8th	-1	Some quirk or missed data in the original game updates awarded the Sunbeams 3 runs on a 2-run homer, but Rescorer correctly gives the Beams 2 runs here.

For a complete summary of this game, see <https://bit.ly/3jrlAtt>

■ **Table 8** The Prestige | Season 3, Day 57

Inning	Runs (Season 3 Classic™)	Runs (Season 3β)	Notable Events
Bottom of 1st	1	0	A walk and a Fielder's Choice are replaced with strikeouts, leading to no run scored.
Bottom of 2nd	3	3	The strikeouts in the 1st move a single into the 2nd, putting an extra runner on base and letting the Mints catch up to Season 3 Classic™.
Bottom of 3rd	3	3	3 straight outs.
Bottom of 4th	8	4	An out moves into this inning and a walk becomes a strikeout, losing 2 runners that originally scored. Whit Steakknife's homer originally scoring 2 moves into the 5th instead.
Bottom of 5th	10	7	This inning is an improvement over Season 3 Classic, now featuring a solo homer plus a single, double and triple, but the Mints are still behind.
Bottom of 6th	11	7	This inning used to feature a Triple followed by a single for 1 run, but those have been pushed into the 7th.
Bottom of 7th	11	8	That triple and single score 1 here.
Bottom of 8th	15	9	Hewitt Best's previous 2-run homer is pushed into the 9th. The other reshuffled events produce only 1 run from a series of singles and Fielder's Choice, due to another single becoming a strikeout.
Bottom of 9th	21	10	A whopping 6 plate appearances, originally featuring a single, a walk, and a 3-run homer, don't happen at all. The game ends before those batters come up, because 2 outs have been pushed into the 9th and a Fielder's Choice for Boyfriend Monreal becomes a strikeout here. Hewitt Best's homer from the original 8th inning is the sole score here, and now it happens with no one on base.

For a complete summary of this game, see <https://bit.ly/2Yx4sLW>