

Simplified PAR Sheet Example: "The Reel Game"

Kiril Hristov

03/06/2025

1 Introduction

In this paper I will attempt to create a simple 3 reel game with no bonus rounds. I will try to make an RTP(Return to player) sheet. I have made it around 90 percent return as , this is . In these simulations we also use my personal computer Random Number Generator , which isn't very random(the computer has a pseudo random generator) , but can do certain amount of simulations.

Game Overview

- **Game Name:** "The Reel Game"
- **Game Type:** 3-Reel, 1-Payline Slot
- **Number of Reels:** 3
- **Number of Paylines:** 1 (Center Line)
- **Bet Per Line:** 1 Coin (for simplicity in this example)

2 Reel Strip Layout (Virtual Reel Strips) - Symbol Counts

This section summarizes the frequency of each symbol on the virtual reel strips. (*Full, stop-by-stop listings for each reel can be found in a complete PAR sheet appendix.*)

Symbol	Reel 1		Reel 2		Reel 3	
	Count	Prob.	Count	Prob.	Count	Prob.
7	8	8/30	6	6/32	5	5/35
CHERRY	10	10/30	12	12/32	15	15/35
BAR	9	9/30	10	10/32	12	12/35
BLANK	3	3/30	4	4/32	3	3/35
Total Stops	30	1.00	32	1.00	35	1.00

3 Pay Table (Payouts per 1-Coin Bet)

You win money **ONLY** if you get these exact combinations. All other outcomes pay 0 coins.

Combination (Reel 1 - Reel 2 - Reel 3)	Payout (Coins)
7 - 7 - 7	100
BAR - BAR - BAR	5
CHERRY - CHERRY - CHERRY	1
All other combinations	0

Probability and Payout Calculation

We calculate the expected return for only the specified winning combinations.

Total Possible Combinations: $Reel_1Stops \times Reel_2Stops \times Reel_3Stops = 30 \times 32 \times 35 = 33,600$

A. Combination: 7 - 7 - 7

- Count of 7 on R1: 8
- Count of 7 on R2: 6
- Count of 7 on R3: 5
- **Frequency (over 33,600 spins):** $8 \times 6 \times 5 = 240$
- **Probability:** $240/33,600 \approx 0.007142857$
- **Payout:** 100 coins
- **Contribution to RTP:** $240 \times 100 = 24,000$ coins

B. Combination: BAR - BAR - BAR

- Count of BAR on R1: 9
- Count of BAR on R2: 10
- Count of BAR on R3: 12
- **Frequency:** $9 \times 10 \times 12 = 1,080$
- **Probability:** $1,080/33,600 \approx 0.032142857$
- **Payout:** 5 coins
- **Contribution to RTP:** $1,080 \times 5 = 5,400$ coins

C. Combination: CHERRY - CHERRY - CHERRY

- Count of CHERRY on R1: 10
- Count of CHERRY on R2: 12
- Count of CHERRY on R3: 15
- **Frequency:** $10 \times 12 \times 15 = 1,800$
- **Probability:** $1,800/33,600 \approx 0.053571428$
- **Payout:** 1 coin
- **Contribution to RTP:** $1,800 \times 1 = 1,800$ coins

—

Summary of Payouts and RTP

Combination	Frequency	Payout (Coins)	Total Payout (Coins)
7 - 7 - 7	240	100	24,000
BAR - BAR - BAR	1,080	5	5,400
CHERRY - CHERRY - CHERRY	1,800	1	1,800
TOTAL Win Occurrences	3,120		
TOTAL Coins Returned (Payouts)			31,200

Total Bet (over 33,600 spins at 1 coin/spin): $33,600 \times 1 = 33,600$ coins

Theoretical Return to Player (RTP): $RTP = \frac{\text{Total Coins Returned}}{\text{Total Coins Wagered}} = \frac{31,200}{33,600} \approx 0.928571 = 92.86\%$

***Note on RTP:** With these specific reel strip counts and payout values, the game's RTP is approximately 92.86%. This falls within a commonly accepted range for casino slot machines, especially in land-based settings, though it is at the lower end. The game remains very high volatility due to the infrequent wins and the top prize contributing a significant portion of the overall return.*

Simulation Experiment

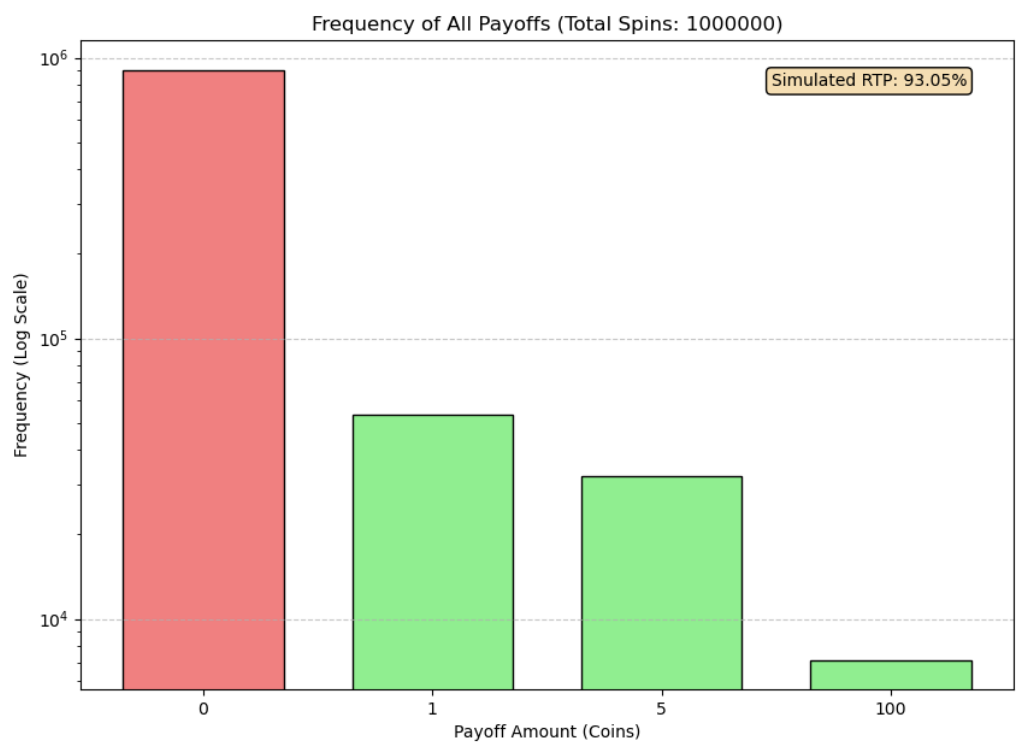
- **Simulated RTP:** 93.05%
- **Number of simulated spins:** 1,000,000

Payoff Summary Table

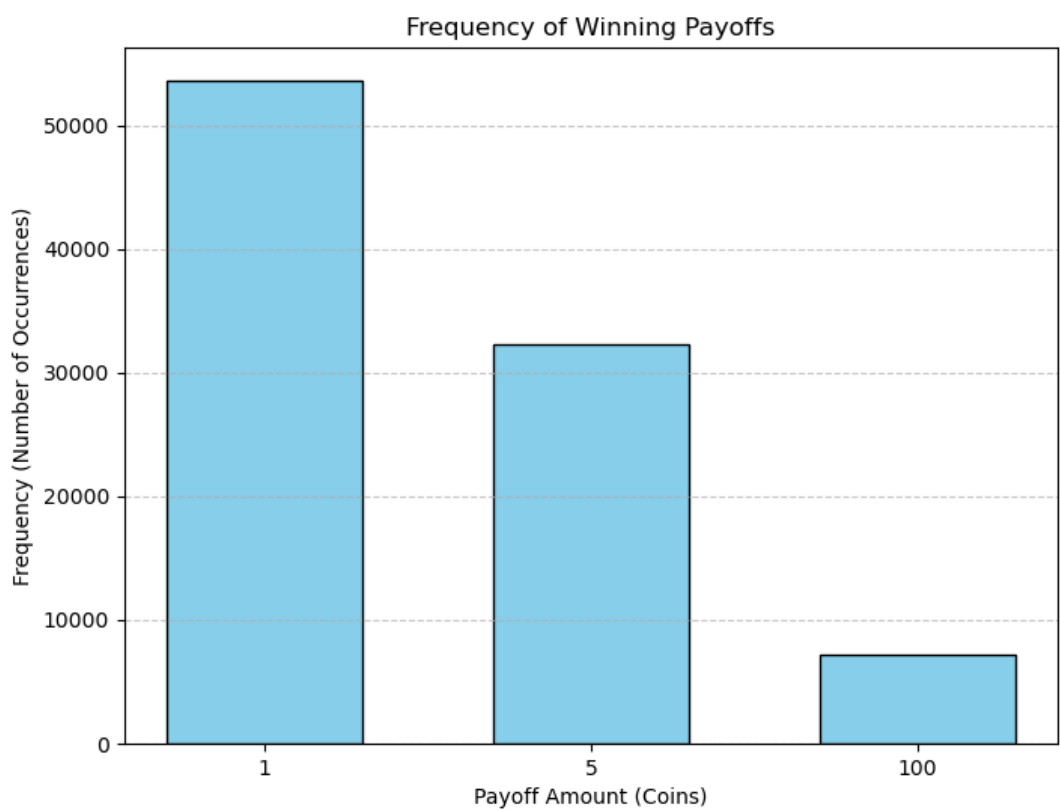
This table presents the results from the simulation, detailing the frequency and contribution of each payoff amount.

Table 1: Simulated Payoff Distribution for Ultra Classic Sevens

Payoff (Coins)	Frequency	Probability (%)	Total Payout (Coins)	Contribution to RTP (%)
0	906 896	90.69	0	0.00
1	53 658	5.37	53 658	5.37
5	32 292	3.23	161 460	16.15
100	7154	0.72	715 400	71.54
TOTAL	1 000 000	100.00	930 518	93.05



Frequency of All Payoffs



Frequency of Winning Payoffs

Figure 1: Distribution of Payoffs for The Reel Game .

5. Volatility Indicators

- **Overall Hit Frequency:** Total winning combinations / Total possible combinations $\approx 3,120/33,600 \approx 9.29\%$
- **Nature of Payouts:** This game is characterized by **extremely high volatility**. Wins are scarce, occurring on less than 10% of spins. The RTP is heavily weighted towards the highest jackpot (3x 7s), meaning players will experience long periods of no wins in pursuit of that single, larger prize.

Currently, I am trying to make a game that is less volatile and adds more rounds. I see most games have bonus rounds.

Thank you for reading , Kiril Hristov

Of course! Here are those references formatted for a LaTeX bibliography, using the thebibliography environment. This is a common way to manually manage bibliographies in LaTeX for shorter documents.

References

- [1] Newall, P.W.S., Walasek, L., Ludvig, E.A., & Rockloff, M.J. House-edge information yields lower subjective chances of winning than equivalent return-to-player percentages: New evidence from support forum participants.
- [2] Newall, P.W.S., Walasek, L., & Ludvig, E.A. Equivalent gambling warning labels are perceived differently. Archived <https://web.archive.org/web/20211224163939/https://onlinelibrary.wiley.com/doi/abs/10.1111/add.15340> at the Wayback Machine.
- [3] Collins, D., Green, S., d'Ardenne, J., Wardle, H., & Williams, S-K. Understanding of Return to Player messages: Findings from user testing. (October 2014).
- [4] Electronic gaming machines – return to player (RTP) policy. Archived <https://web.archive.org/web/20220325064506/https://www.dlgsc.wa.gov.au/departments/publications/publication/electronic-gaming-machines-return-to-player-policy> at the Wayback Machine. Department of Local Government, Sport and Cultural Industries, Government of Western Australia.
- [5] Newall, P.W.S., Byrne, C.A., Russell, A.M.T., & Rockloff, M.J. House-edge information and a volatility warning lead to reduced gambling expenditure: Potential improvements to return-to-player percentages.
- [6] Lammer, O. Are Highest RTP Slots More Popular? Archived <https://web.archive.org/web/20220218080345/https://www.slotsup.com/blog/are-highest-rtp-slots-more-popular> at the Wayback Machine.
- [7] "Return to Player (RTP) and Hit Frequency: What Do These Mean?". Archived from the original on 2022-05-26. Retrieved 2022-07-23.