

Quantitative Strategy Report

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1. Probability Estimation: Monte Carlo Engine

To ensure compliance with the strict 40-second time limit, my bot utilizes a customized Monte Carlo Simulation engine. For every decision, it runs 800 randomized rounds against the opponent's range. This specific sample size was calibrated to provide a stable Equity score (Standard Error < 3%) while maintaining a total execution time of approximately 15 seconds, ensuring a safe buffer against disqualification.

2. Strategy: Balanced Expected Value (EV)

The core strategy is 'Balanced Aggression.' It seeks to maximize long-term Expected Value (EV) without falling into the trap of over-bluffing:

- Trash Filter: To preserve capital, the bot utilizes a hard stop-loss mechanism. It immediately FOLDS if the hand equity is below 0.35 (bottom 35% of hands).
- EV Decision Logic: It dynamically calculates the financial value of Raising vs. Calling based on the opponent's historical fold frequency.

3. Key Assumptions

- Bayesian Prior: I assume the opponent is rational but unknown. The bot starts with a prior assumption that the opponent folds 30% of the time, and updates this probability dynamically as real match data is collected.
- Risk Neutrality: The bot does not tilt. It executes the mathematically profitable play regardless of previous results, trusting the Law of Large Numbers over $N=1001$ rounds.

4. Risk Modelling

- Variance Control: Raising increases variance. To model this risk, I implemented a 'Profit Margin' requirement. The bot only selects RAISE if the Expected Value exceeds the EV of Calling by at least +0.10. This ensures we only escalate the stakes when we possess a statistically significant edge.
- Latency Management: The 800-sim cap guarantees we never exceed the computation limit.

5. Why is this Quantitative?

This strategy is purely quantitative because it rejects static heuristics (e.g., 'Raise if Pair') in favor of probabilistic modeling. Every action is a derivative of hard data: Monte Carlo Equity + Observed Fold Frequency + Risk-Adjusted EV.