

Counter-Strategy Simulator Report

CSAS Data Challenge 2026

December 10, 2025

1 Executive Summary

The Counter-Strategy Simulator optimizes defensive decision-making in Mixed Doubles Curling.

- **Freeze Tap Dominance:** The Freeze Tap is statistically the most effective response.
- **Execution Matters:** The Guard Wall is a safer alternative for lower execution levels.
- **Situational Adaptability:** Strategies should adjust based on the score (Conservative vs. Aggressive).

2 Methodology

2.1 Opponent Clustering

We used Gaussian Mixture Models to group teams. (See `outputs/cluster_scatter.png`)

2.2 Empirical Priors

We analyzed over 26,000 shots to determine real-world success rates.

3 Analysis Results

3.1 Score Distributions

The Freeze Tap prevents big ends effectively. (See `outputs/score_distributions.png`)

3.2 Execution Sensitivity

We analyzed the risk/reward trade-off. (See `outputs/execution_risk_scatter.png`)

3.3 Stress Testing

The strategy remains robust even as execution quality drops. (See `outputs/stress_test_matrix.png`)

4 Recommendations

The Risk Playbook suggests "Freeze Tap" for most scenarios, but "Guard Wall" for risk-averse situations.