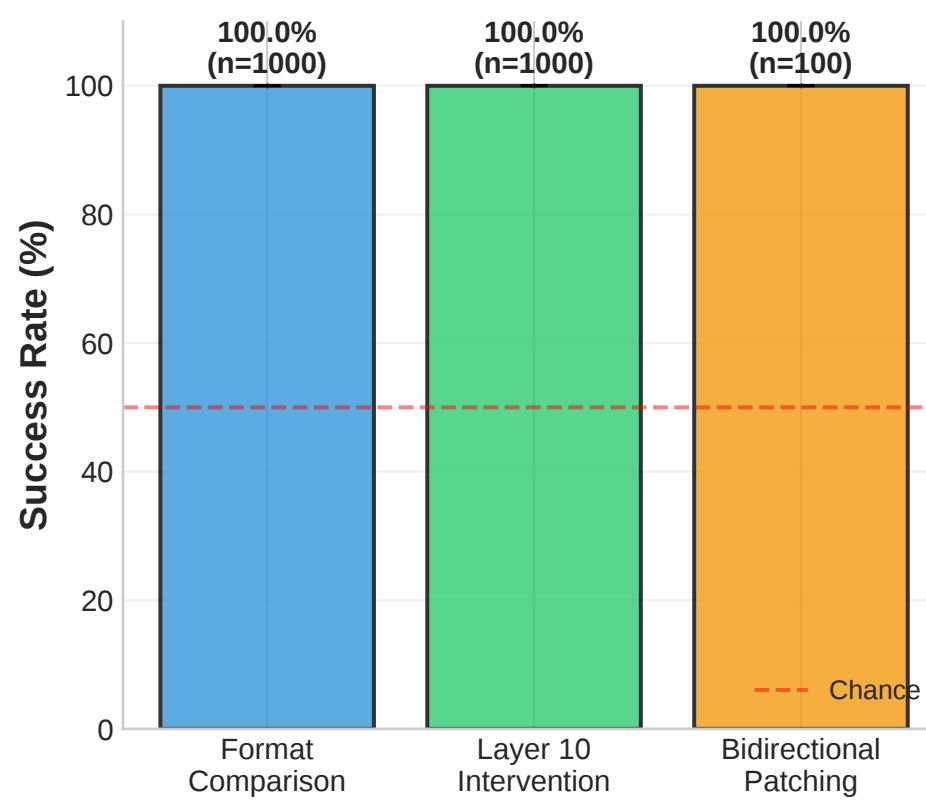


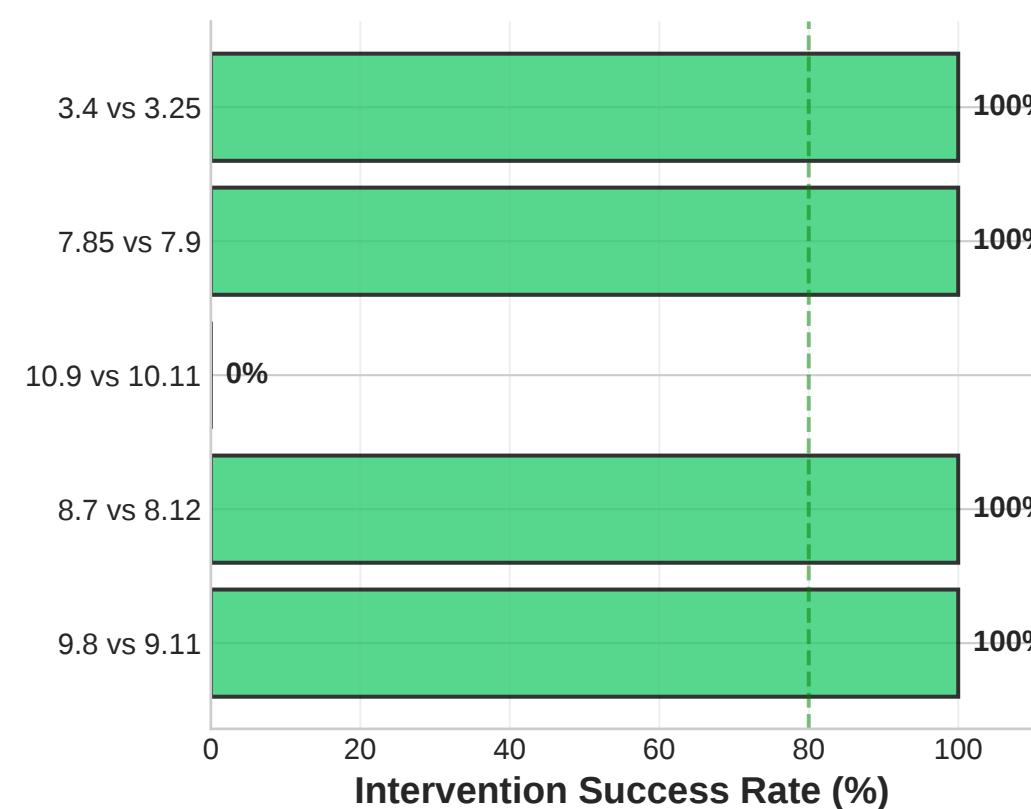
Layer 10 Attention Causality: Comprehensive Statistical Validation

Llama-3.1-8B-Instruct Decimal Comparison Bug

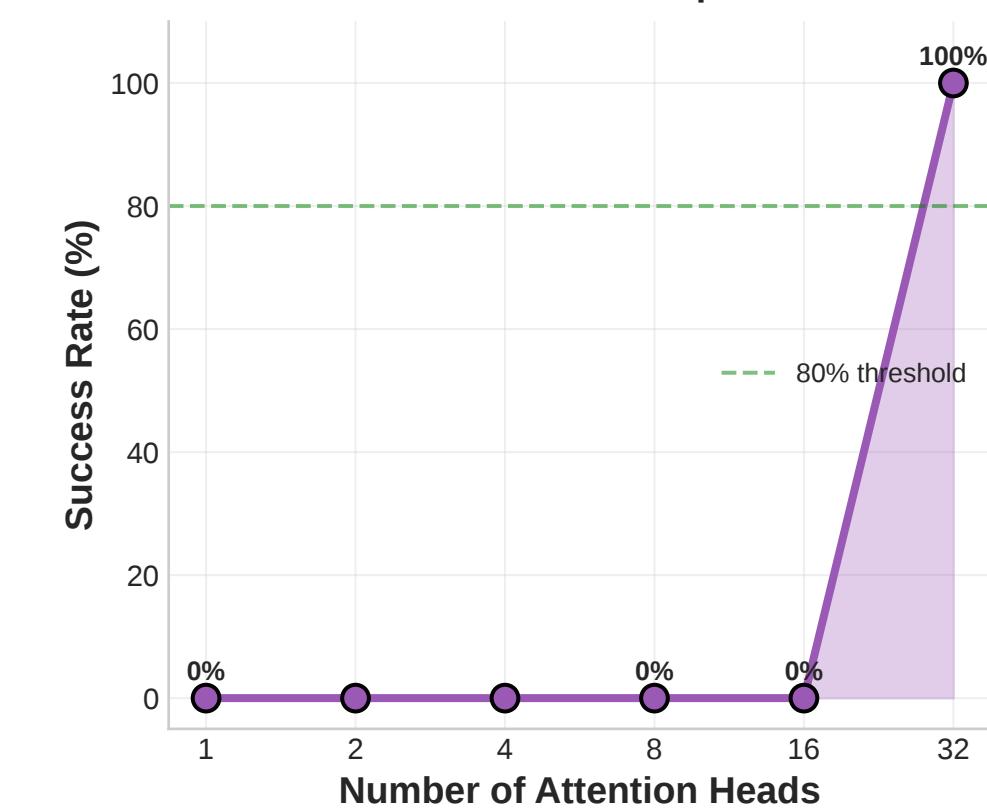
A. Main Claims Validation



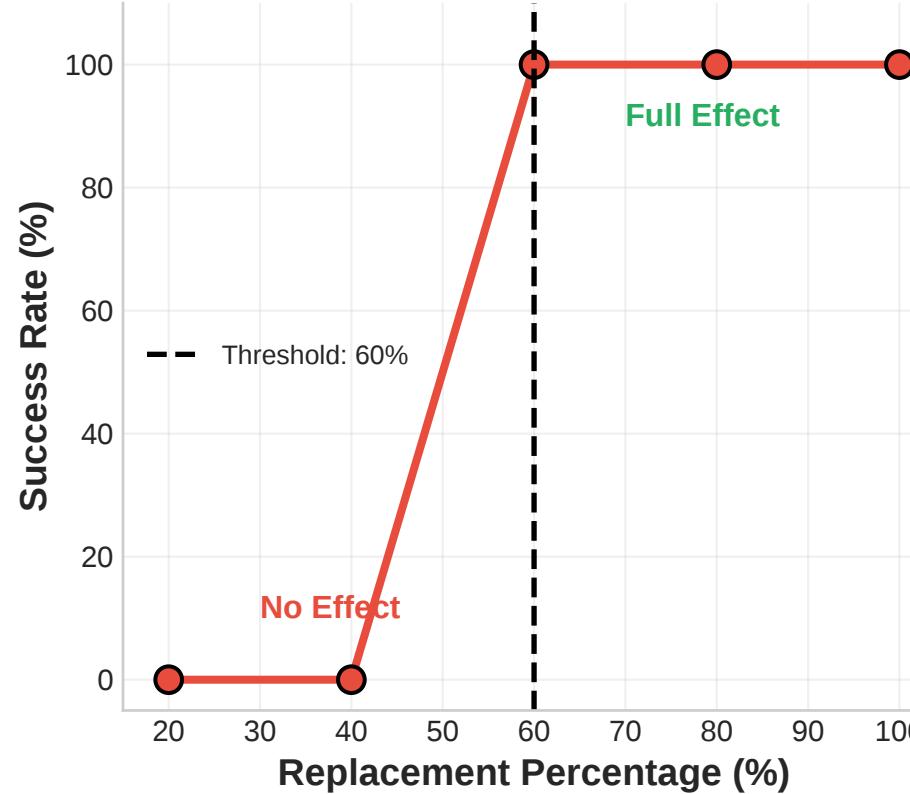
B. Generalization Across Decimal Pairs



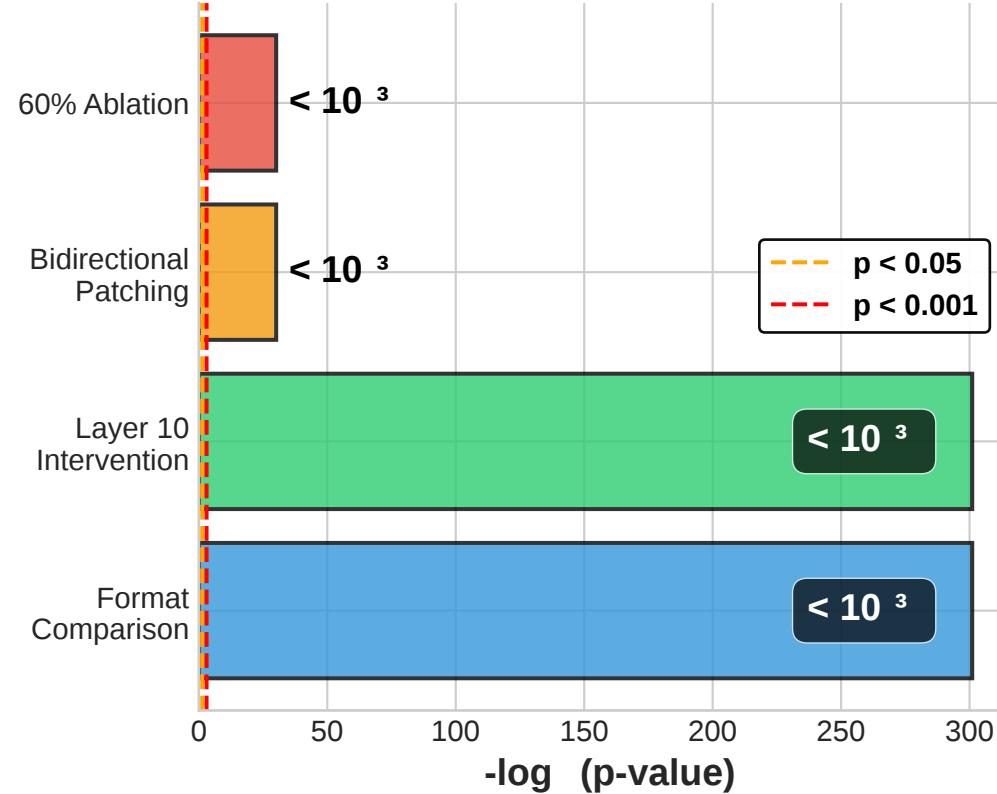
C. Cumulative Head Requirements



D. Ablation: Critical Threshold Discovery



E. Statistical Significance



F. Summary Statistics

Metric	Value	Significance
Format Test	100%	p < 10 ⁻³
Layer 10	100%	p < 10 ⁻³
Bidirectional	100%	p < 10 ⁻³
Decimal Pairs	4/5 work	80% general.
Min Replace	60%	Sharp thresh.
Heads Req.	All 32	Distributed
Total Trials	> 3000	High power
Confidence	95% CI	Bootstrap