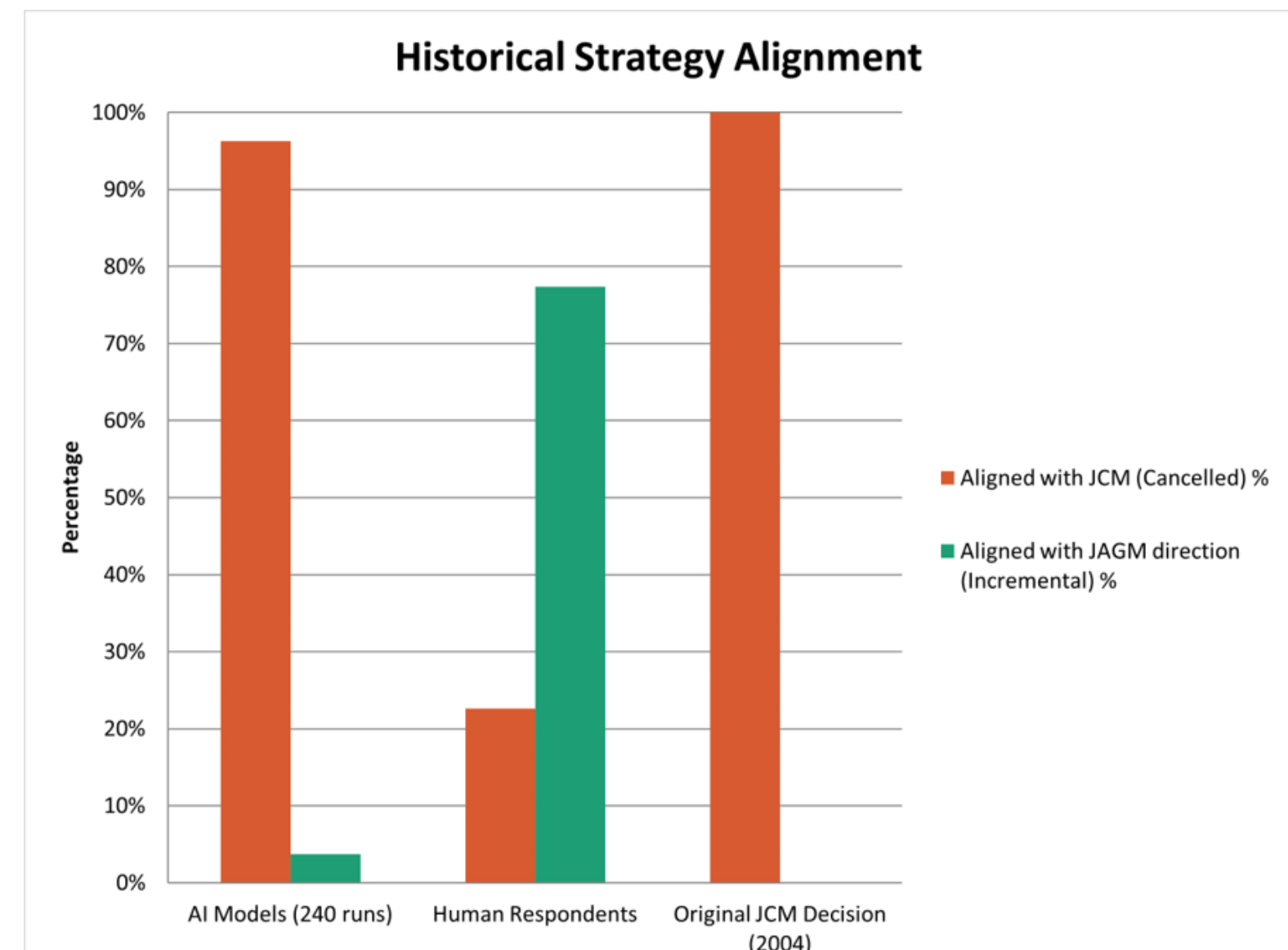
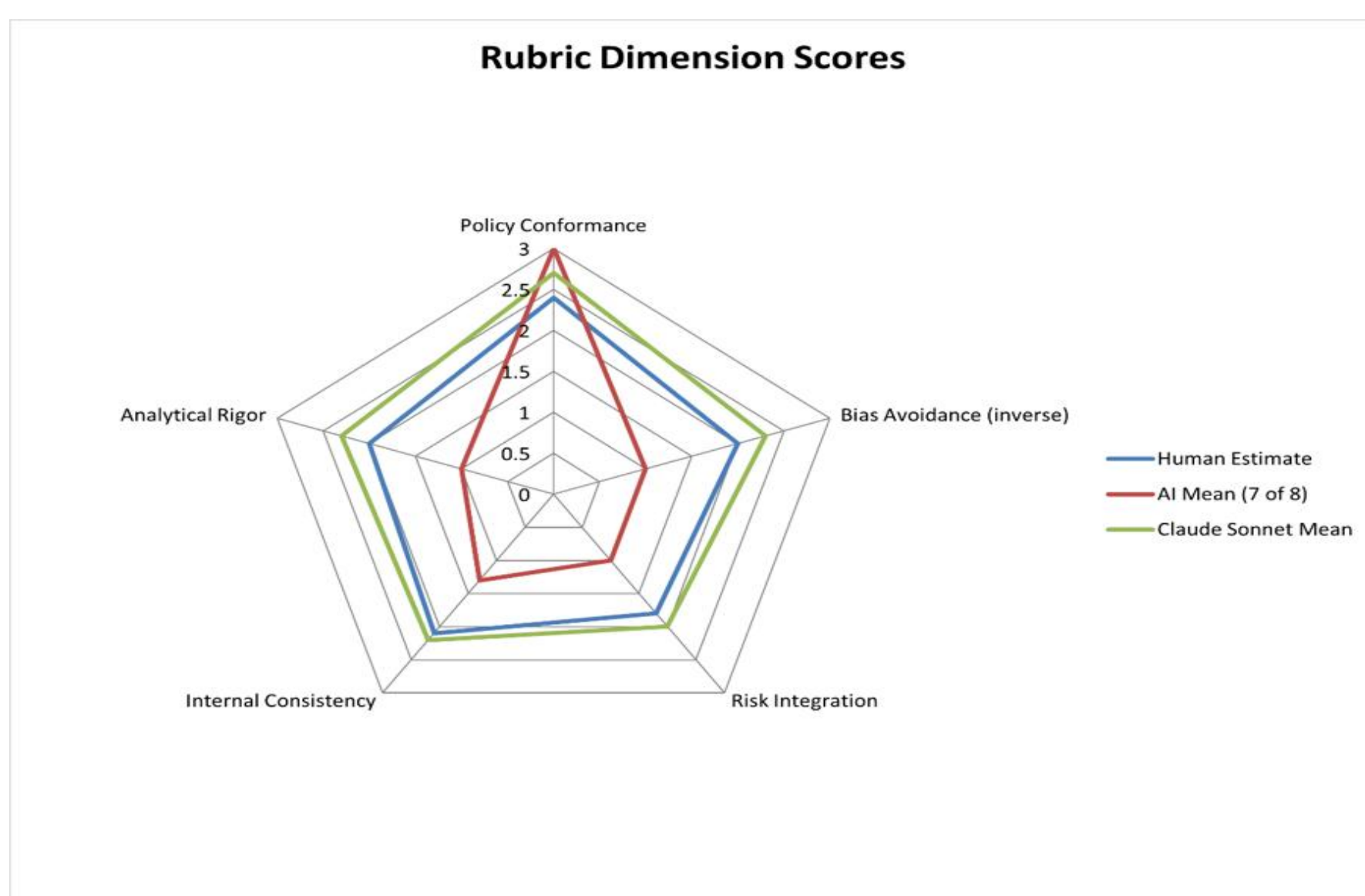
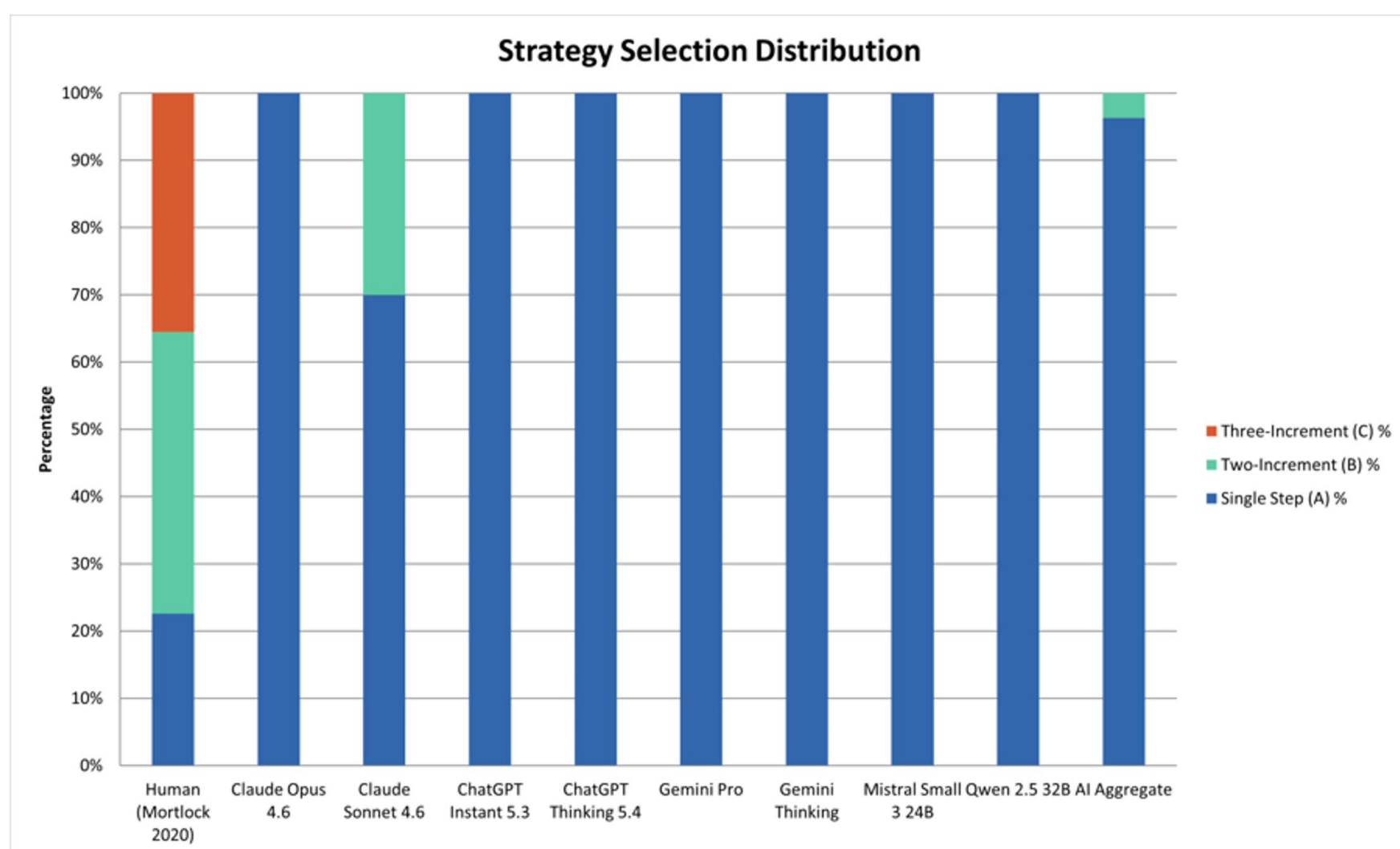


Abstract

- The U.S. Department of Defense acquisition system plans to invest nearly \$2.4 trillion in its most costly weapon systems, yet programs continue to experience cost growth, schedule delays, and performance shortfalls rooted in human cognitive biases during early planning (GAO, 2025). This research compares human acquisition planning outputs against AI-generated outputs using the Joint Common Missile (JCM) case study to determine whether AI can reduce cognitive bias in the development of Acquisition Strategies and Acquisition Program Baselines. Eight AI models (240 total runs) received the same case study data and survey instrument previously administered to 31 human acquisition professionals (Mortlock, 2020). Results show AI models overwhelmingly converged on a single-step, full-capability strategy (96.3%) aligned with the original JCM approach that was cancelled, while 77.4% of humans chose incremental strategies aligned with the successful follow-on JAGM program. AI models triggered cognitive bias indicators at rates significantly exceeding humans across all five constructs measured (all $p < .001$, Cohen's $h > 1.00$). Current AI systems are not ready as standalone acquisition planners but show potential as structured decision-support tools when designed to highlight estimate variance, force trade-off analysis, and appropriately weight independent cost estimates.

Methods

- Design:** Comparative case study with mixed methods
- Case:** Joint Common Missile (JCM), ACAT-1D at Milestone B
- Samples:** 31 human acquisition professionals (Mortlock, 2020) vs. 8 AI models x 30 runs = 240 AI responses
- AI Models:** Claude Opus 4.6, Claude Sonnet 4.6, ChatGPT Instant 5.3, ChatGPT Thinking 5.4, Gemini Pro, Gemini Thinking, Mistral Small 3 24B, Qwen 2.5 32B
- Inputs:** Identical prompt with standardized case study data (Draft APB, CAIG ICE, risk assessment, TRLs, CDD KPPs)
- Rubric:** 5-dimension evaluation (Policy Conformance, Analytical Rigor, Internal Consistency, Risk Integration, Cognitive Bias) scored 1-3 per dimension
- Statistics:** Chi-square, Fisher's Exact, Two-Proportion Z-tests, Shannon Entropy; effect sizes via Cramer's V and Cohen's h
- Bias Constructs:** Optimism Bias, Anchoring, Planning Fallacy, Trade-off Difficulty, Confirmation Bias, Legacy Preference



Results & Impact

- Strategy Selection:** 96.3% of AI runs chose the single-step strategy (cancelled JCM) vs. 22.6% of humans; $\chi^2(2)=151.44$, $p < .001$, Cramer's $V=0.748$. 7 of 8 AI models showed zero strategic diversity (Shannon $H=0$ bits) vs. human $H=1.54$ bits (97.2% of max).
- Anchoring & Bias:** 7 of 8 models selected APB schedule and cost in 100% of runs. All 5 bias constructs triggered at significantly higher rates in AI vs. humans (all $p < .001$, Cohen's $h > 1.00$). AI exhibited optimism bias (96.3%), anchoring (91.3%), planning fallacy (87.5%), trade-off difficulty (96.3%), and confirmation bias (87.5%).
- Rubric Scores:** Human composite 10.3/15 vs. AI-7 mean 7.3/15. Claude Sonnet 4.6 outlier at 11.5/15, the only model showing sensitivity to CAIG ICE independent estimates.
- Key Implication:** AI replicated the exact cancelled JCM strategy. Current AI does not reduce acquisition planning bias when given identical inputs to humans. AI exhibits structurally similar bias via data-weighting rather than cognitive heuristics, but these are potentially correctable through design.

Future Research

- 1) Repeat analysis across additional acquisition categories, pathways, and program types.
- 2) Test hybrid human-AI decision teams to determine if combined judgment outperforms either alone.
- 3) Explore prompt engineering variables (persona, tone, temperature) to elicit trade-off exploration absent in baseline responses.
- 4) Develop adversarial AI agents where one creates plans and another interrogates with ICEs and historical failures.
- 5) Study automation bias conditions under which humans accept, modify, or reject AI acquisition recommendations.
- 6) Design structured AI tools that force estimate variance highlighting, sensitivity analysis, and trade-off matrices for acquisition planners.