

Interoperability for Human-AI Teaming and Decision-Making in Extreme Contexts

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Introduction

- Emergency response agencies are consistently challenged with communication breakdowns that limit coordination, where these interoperability failures contributed to the tragic loss of lives [11, 13].
- Human-AI teaming encompasses complexities, including shared knowledge, trust, interdependence, and effective communication that are essential for improvement of performance & decision-making, while poor integration of AI can create overreliance that hinders coordination [4, 7, 9, 10, 14].
- The current study aims to investigate how AI reliability & explainability affect decision accuracy and perceived team interoperability, while questioning how trust in AI can impact an individual's decision.

Method

The survey gathered (N = 87) general demographics and consisted of predictors, mediators, and exposure to scenarios requiring a decision-making task.

- **Predictors:** Perceived Interoperability & Trust in AI acting as predictors that influences the decisions that the participants make.
- **Mediators:** Mental Workload & Perceived Stress to mediate the scenarios are eliciting appropriate stress and cognitive load that is comparable to realistic emergency response scenarios.
- **Scenarios:** Multiple decisions (Human Suggestion, AI Suggestion, & Alternative Suggestion). Each participant is exposed to differing conditions of AI reliability (high or low) and AI explainability (explainable or ambiguous).

Fisher's Exact Test Pairwise Comparisons

Scenario	Comparison	OR	p
Scenario 1	vs Low Reliability + No Rationale	4.80	.025
	vs All Other Conditions (pooled)	3.08	.049
	vs Low Reliability + No Rationale	4.43	.031
Scenario 2	vs All Other Conditions (pooled)	3.82	.013
	vs High Reliability + No Rationale	4.65	.029
	vs Low Reliability + Rationale	14.65	.005
Scenario 3	vs Low Reliability + No Rationale	7.42	.017
	vs All Other Conditions (pooled)	6.99	< .001

References

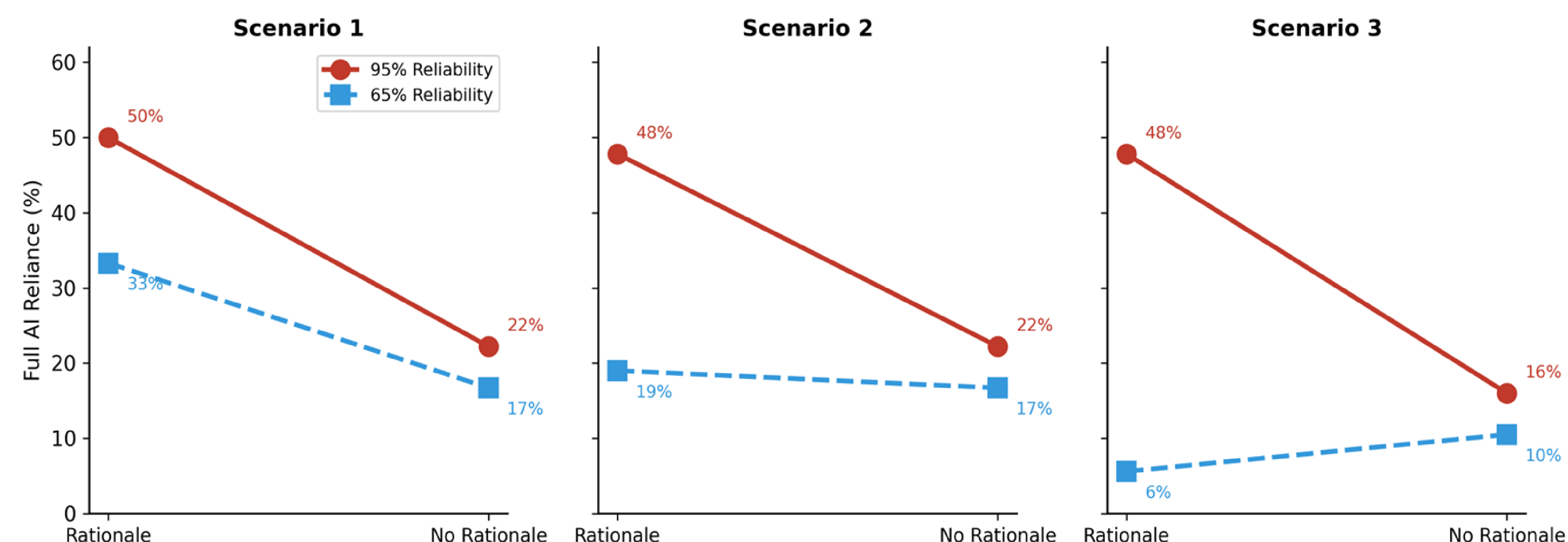


Results

Trust is associated full AI reliance.

- Higher trust in AI was significantly associated with more full AI decisions, $r_s = .32$, $p = .003$.
- Participants who chose full AI reported higher trust ($M = 3.00$) than those who never did ($M = 2.50$), $t(66.3) = 2.53$, $p = .014$, $d = 0.58$.
- At the observation level, participants who chose full AI had significantly higher trust ($M = 3.16$) than those who chose Modified AI+Human ($M = 2.65$) or Human Only ($M = 2.62$), $F(2, 248) = 9.15$, $p < .001$

XAI × Rationale Interaction on Full AI Reliance by Scenario



Discussion

- Those who had higher trust in AI were more likely to choose the AI decision regardless of their condition, consistent with research on automation bias, which shows increased trust can cause automatic acceptance of outputs without critical evaluations, even in situations where the content is incorrect [2, 12].
- Individuals in the High Reliability with rationale condition were more likely to choose the less optimal decision, with approximately half selecting full AI reliance across all three scenarios. This pattern was consistent regardless of scenario context, demonstrating what current research suggests: individuals are prone to overreliance on AI tools when the system provides both detailed explanations and a justification for its recommendation [3].
- Individuals in the Low Reliability group with no rationale presented for the decision were the least likely to accept the AI decision output, instead defaulting to human judgment or a modified approach. This aligns with current research that showed when reliability cues fall below a particular threshold, individuals are less susceptible to automation bias and more likely to rely on their own judgment, reducing inappropriate AI reliance [15].