The Interacting Roles of Attention Allocation and Trust in Highly Automated AAM Environments

Yusuke Yamani

OLD DOMINION UNIVERSITY®

Who I am

- M.S. in Human Factors (Institute of Aviation) and Ph.D. in Psychology (Visual Cognition and Human Performance) from the University of Illinois at Urbana-Champaign
- Post-doc in Industrial Engineering (Surface Transportation Human Factors) at the University of Massachusetts at Amherst and Liberty Mutual Research Institute of Safety
- Associate Professor in the Department of Psychology and the Department of Civil and Environmental Engineering at ODU
- Collaborating with NASA LaRC since 2021

Program of Research

Mechanisms of attentive visual processing

- Attention control
- Visual search
- Eye movement
- Aging and Individual differences

Limits of human performance in applied environment

- Complex displays
- Machine operation
- Surface transportation
- Advanced air mobility
- Nuclear operation

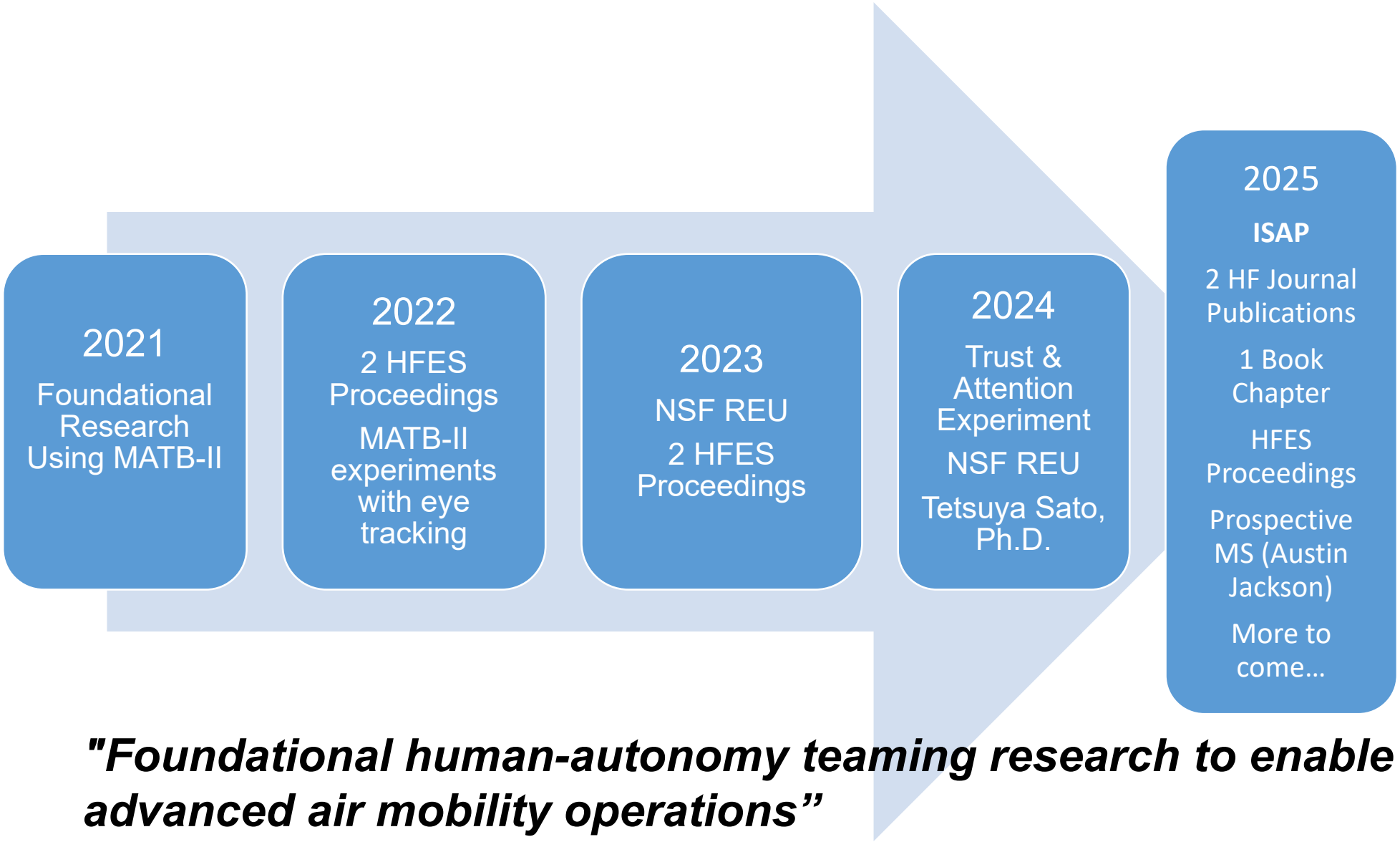
Methods to ameliorate human cognitive performance

- Human-Machine Interface
- Human-Autonomy/AI Teaming
- Human-Systems Integration
- Training

Basic *Applied*

Theory-Inspired Applied Research

History of ODU-NASA LaRC Collaboration

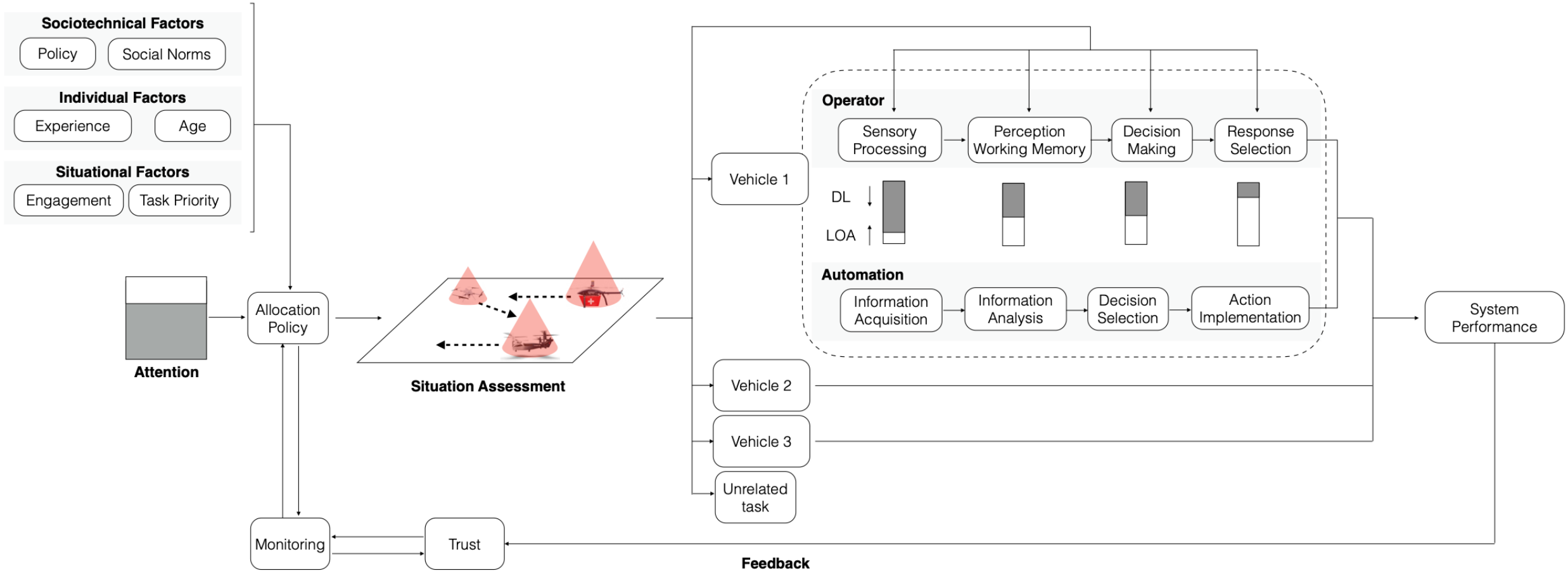


"Foundational human-autonomy teaming research to enable advanced air mobility operations"

Overview of Advanced Air Mobility (AAM)

- AAM allows logistics of goods and passengers within and between rural and urban areas (National Academics of Sciences, Engineering, and Medicine, 2020)
- Future AAM operation will require increasingly autonomous systems (Chancey et al., 2021; Pritchett et al., 2018)

Human-Technology Interaction in AAM



Yamani et al. (2024)

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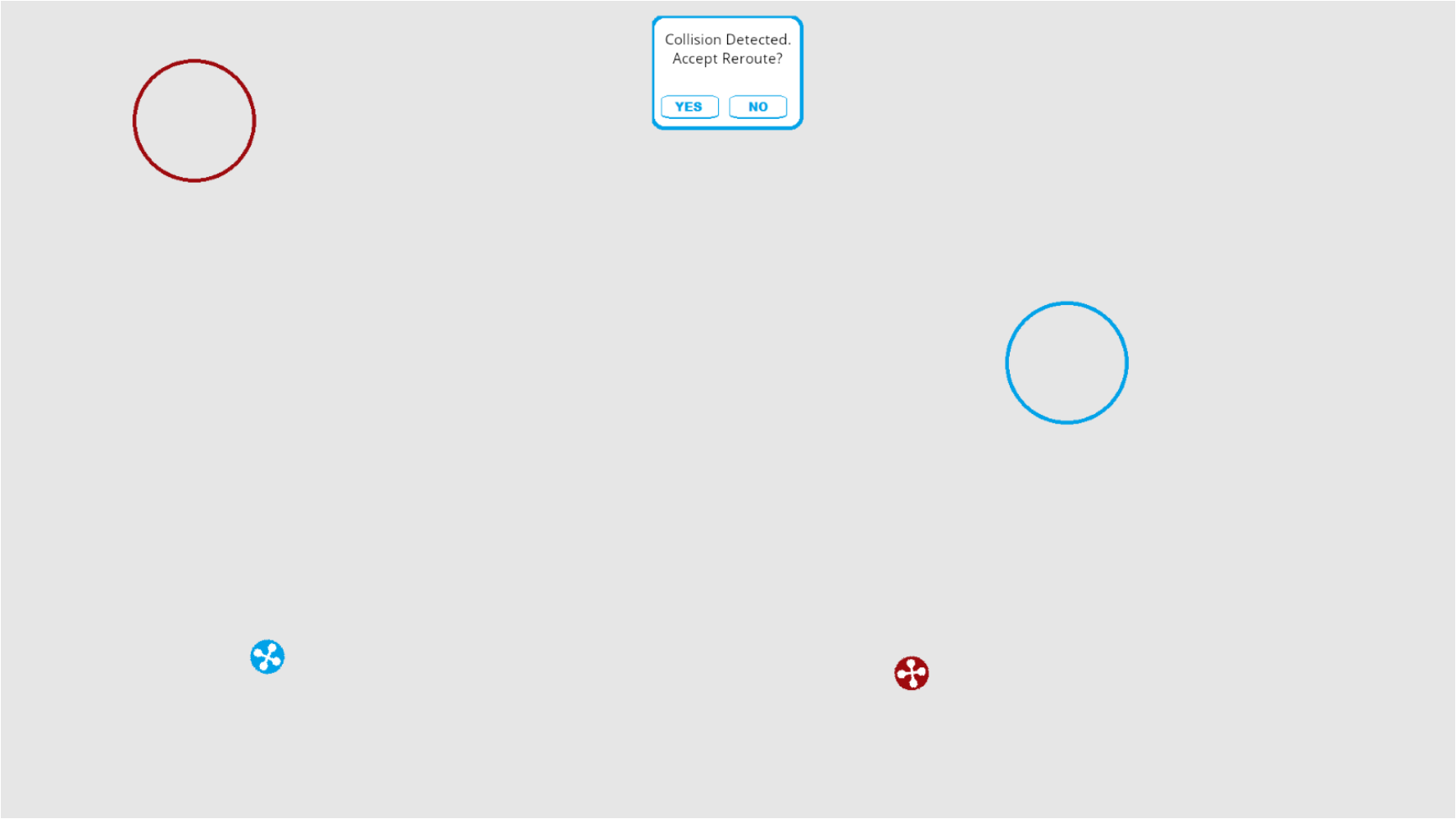
Multi-Action Planning Task



Jackson et al. (under review)

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Experimental Design

- IV
  - Reliability
    - 100, 70, 70FA, 70MS
- DV
  - Performance
  - Trust (Jian et al., 2000; Chancey et al., 2017)
  - Dependency
    - Compliance: Operator's agreement with automation when there is a signal
    - Reliance: Operator's agreement with automation when there is no signal

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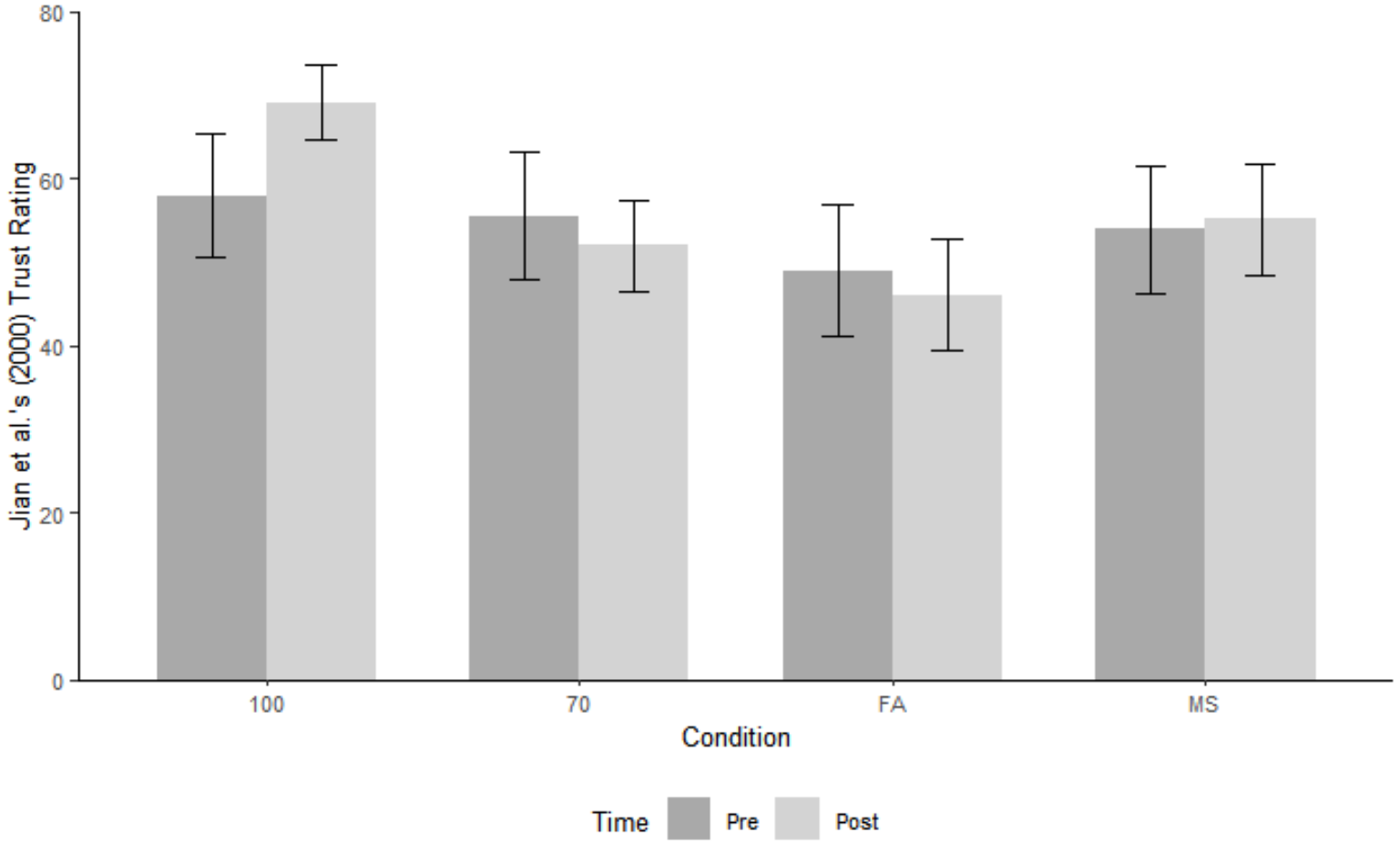
Results: Jian et al. (2000) Trust



Jackson et al. (under review)

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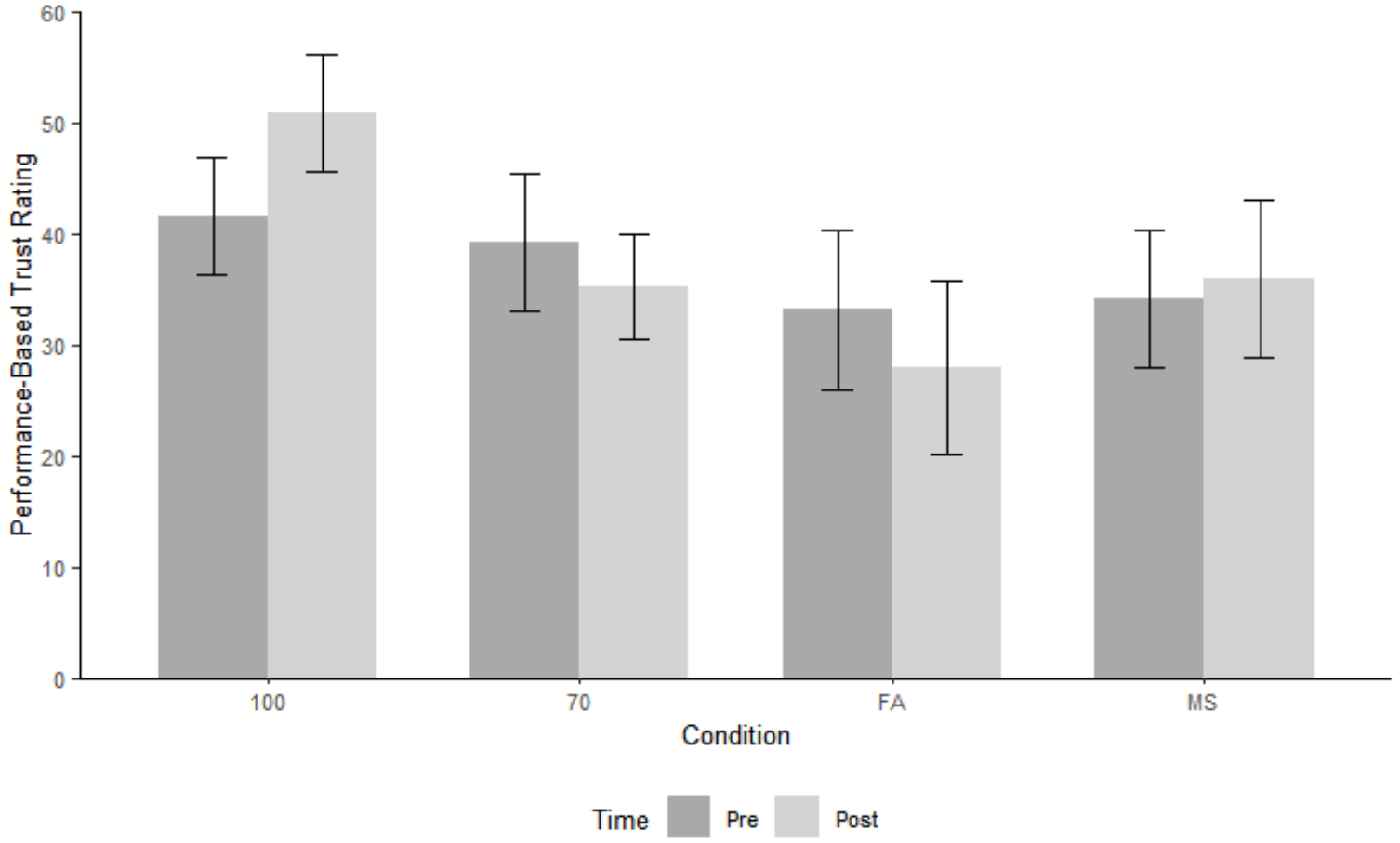
Results: Chancey et al. (2000) Trust



Jackson et al. (under review)

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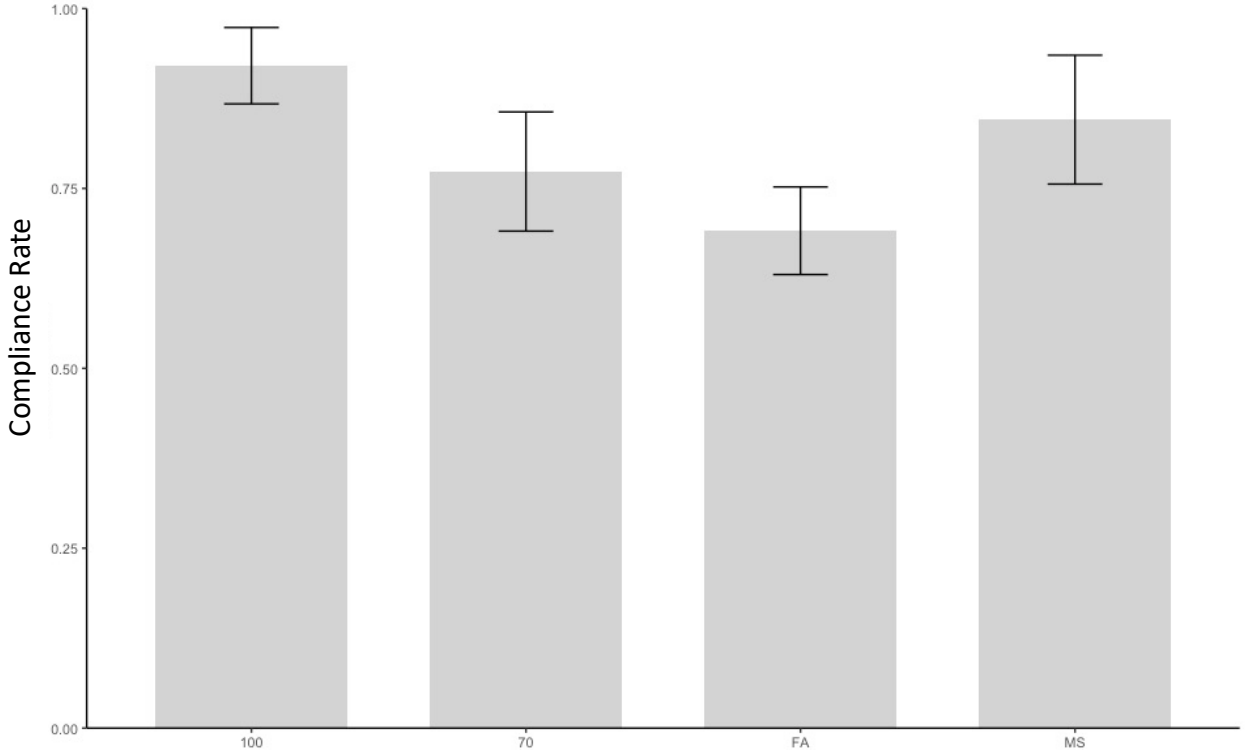
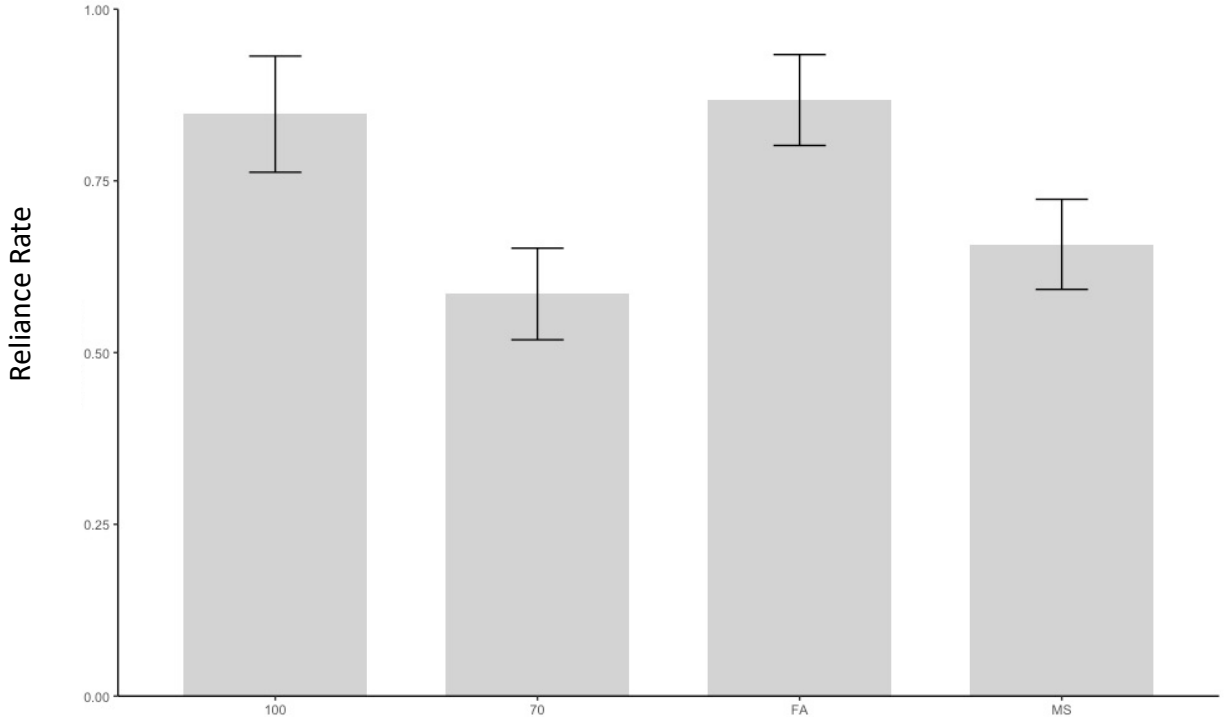
Results: Dependency Behavior





Jackson et al. (under review)

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Discussion

- Automation aids with 70% reliability, regardless of error bias, led to lower levels of trust than 100% reliable automation
- False alarms and misses influenced trust similarly across different dimensions
- The experiment replicated asymmetrical effects of automation errors types on compliance and reliance (Chancey et al., 2017)
- Automation designers should consider that error bias can systematically modulate dependency behavior, and work to create transparent systems that properly calibrate operator trust to the automated system

Jackson et al. (under review)

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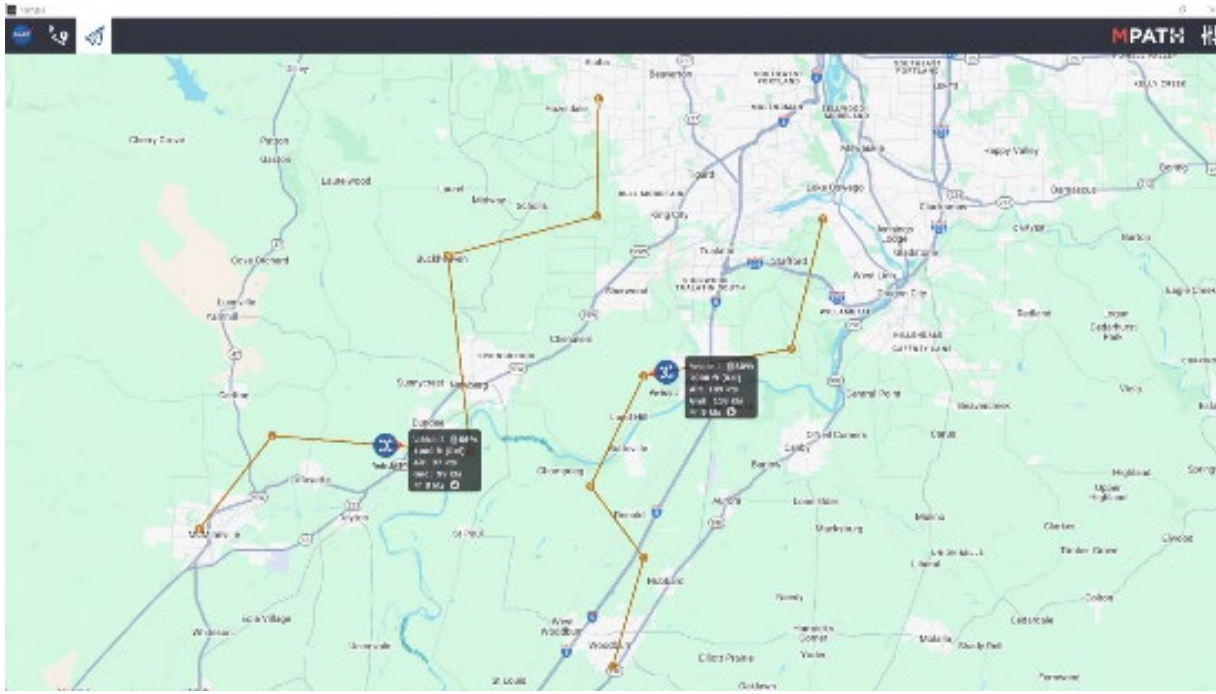
Current Experiment

- Previous experiments featured unrealistically high error rates (~30%)
- Can we measure changes in operator workload and readiness to intervene highly automated and reliable AAM in a monitoring task?
- Scenarios in MPATH
- Data entry task + DRT (Stojmenova & Sodnik, 2018)



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