The Future Workforce: Human-AI-Robot Teaming

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Draw from Social Science Principles of Human Teaming

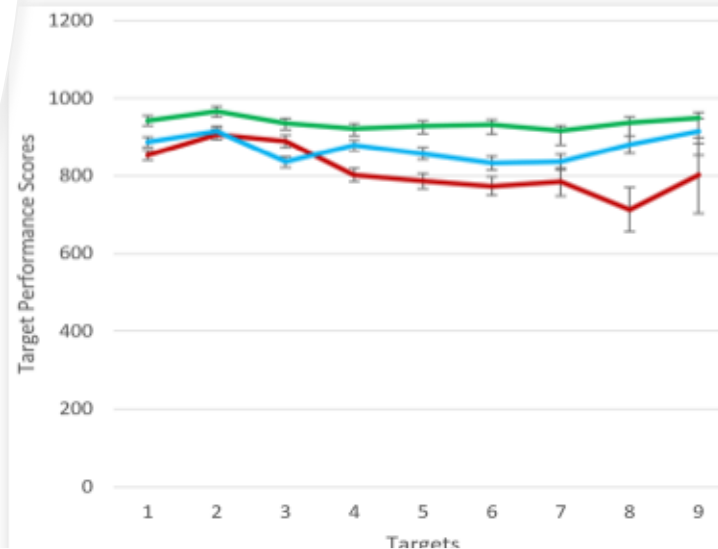# 1. *Team members have <u>different roles and responsibilities</u>*

Don't Replicate Ourselves

2. Effective teams understand that each team member has different roles and responsibilities and <u>avoid role confusion, but back each other up as necessary</u>

Technology Needs to Understand the Bigger Team Task

- **Synthetic teammate**
  - Performance
  - Coordination

- **Control teammate**

- **Experimenter teammate**

3. With team practice, *effective teams <u>share knowledge</u> about the team goals and the current situation and this facilitates coordination and implicit communication*

Humans and Technology Need to Train Together

4. *Effective teams have team members who are interdependent and thus need to <u>interact/communicate</u> even when direct communication is impossible*
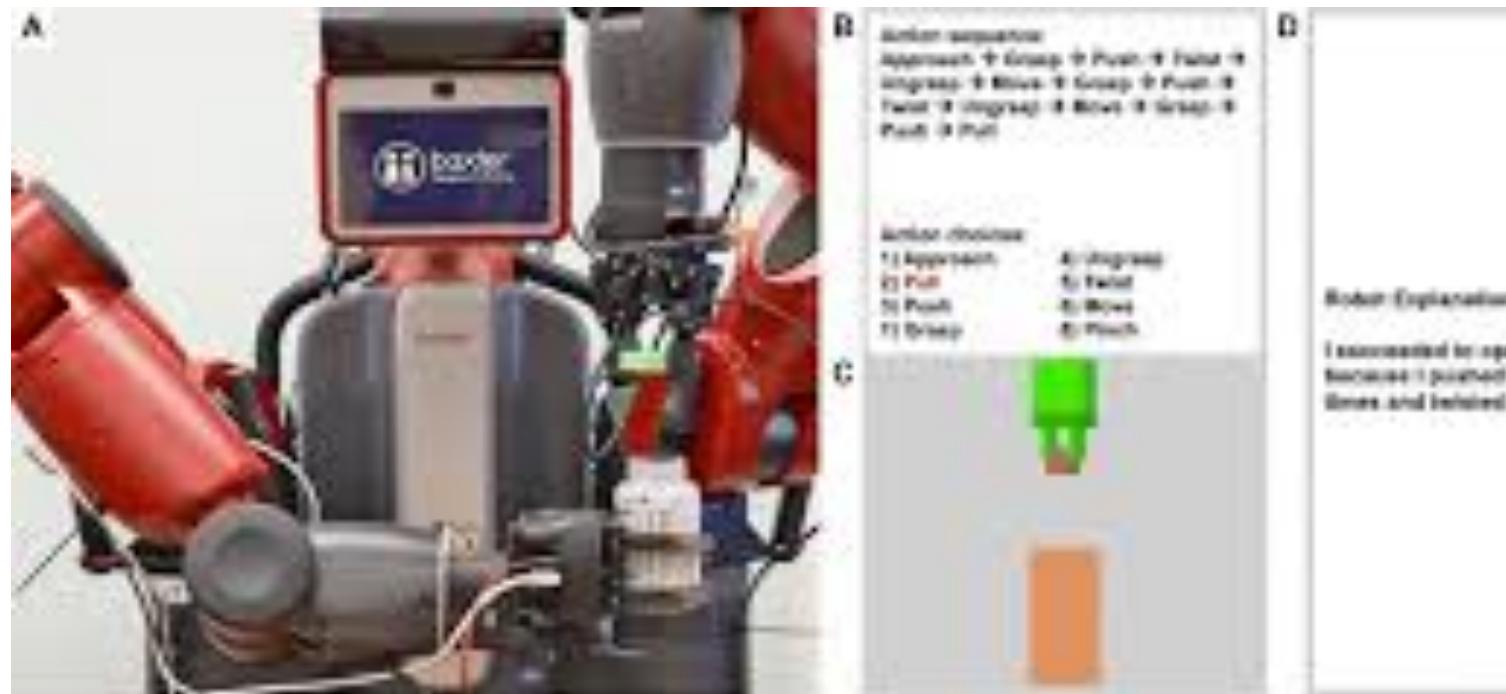
Interaction is Important But Natural Language Communication May Be Unnecessary

5. Interpersonal trust is important to human teams

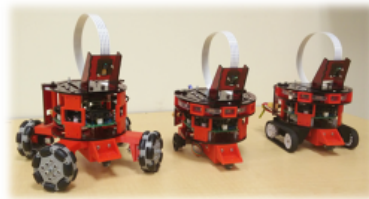# Transparency and Explanation are Important

Social Science Research for Informing Human-AI-Robot Teaming
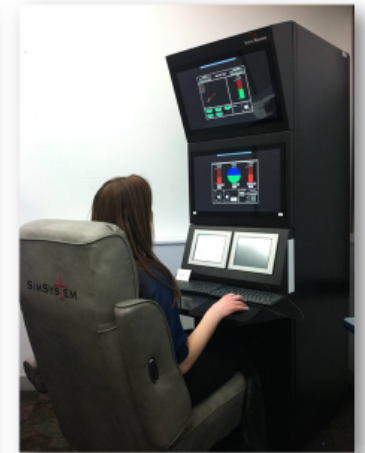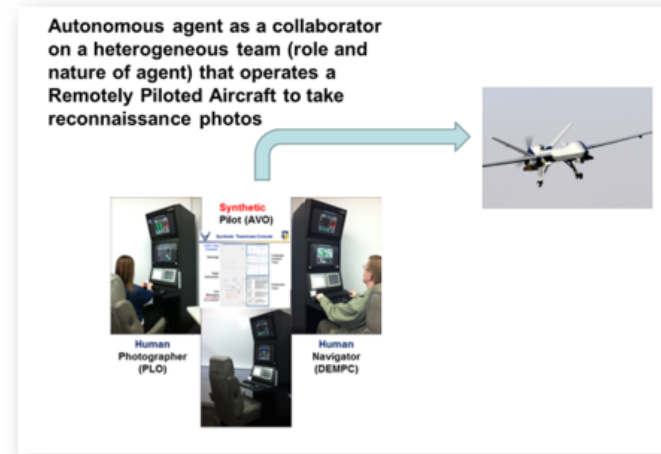
Synthetic Task Environments

Testbed

Concept Image

- Some vehicles will be autonomous and some remotely driven
- Human-driven cars will have to interact with the driverless cars
- Will be situated in a model urban setting

Autonomous agent as a collaborator on a heterogeneous team (role and nature of agent) that operates a Remotely Piloted Aircraft to take reconnaissance photos

Synthetic Pilot (AVO)

Human Photographer (PLO)

Human Navigator (DEMPC)

Testbed

- Extend ACT-R cognitive modeling
- Better understand essentials of team coordination
- Use synthetic teammates for team training

Wizard of OZ

Testbed
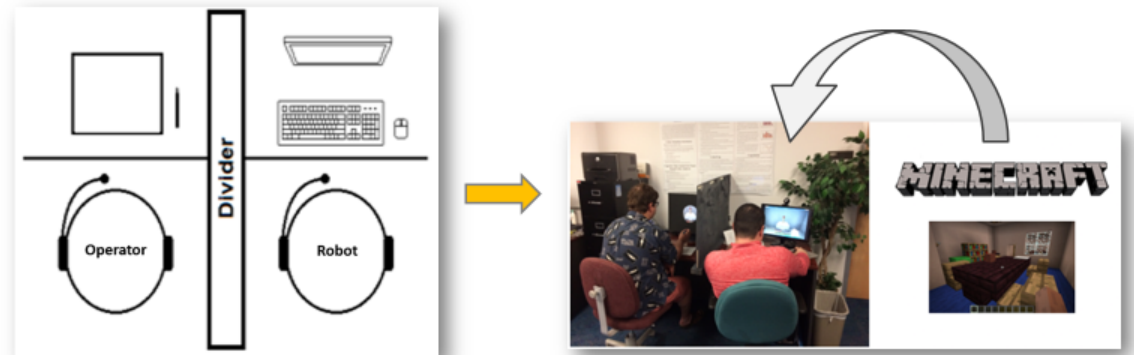
- A simulated USAR task environment (Minecraft)
- Human Operator and Robot work together to complete the USAR task and identify victim locations
- A human playing the role of the robot in a Wizard-of-Oz paradigm
- Operator has restricted view of the environment and has map before building collapse that is inconsistent with current structure

Conclusions

- **Principles from the social science of teams have implications for human-AI-robot teaming**

- **Testbeds and the Wizard of Oz method can provide human subjects data on interactions with robots/AI ahead of robot/AI development**