

Human Behavior in Ad-hoc Teamwork

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@ ALA

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Ad Hoc Teamwork

“To create an autonomous agent that is able to efficiently and robustly **collaborate** with **previously unknown** teammates on tasks to which they are all individually capable of contributing as team members”.

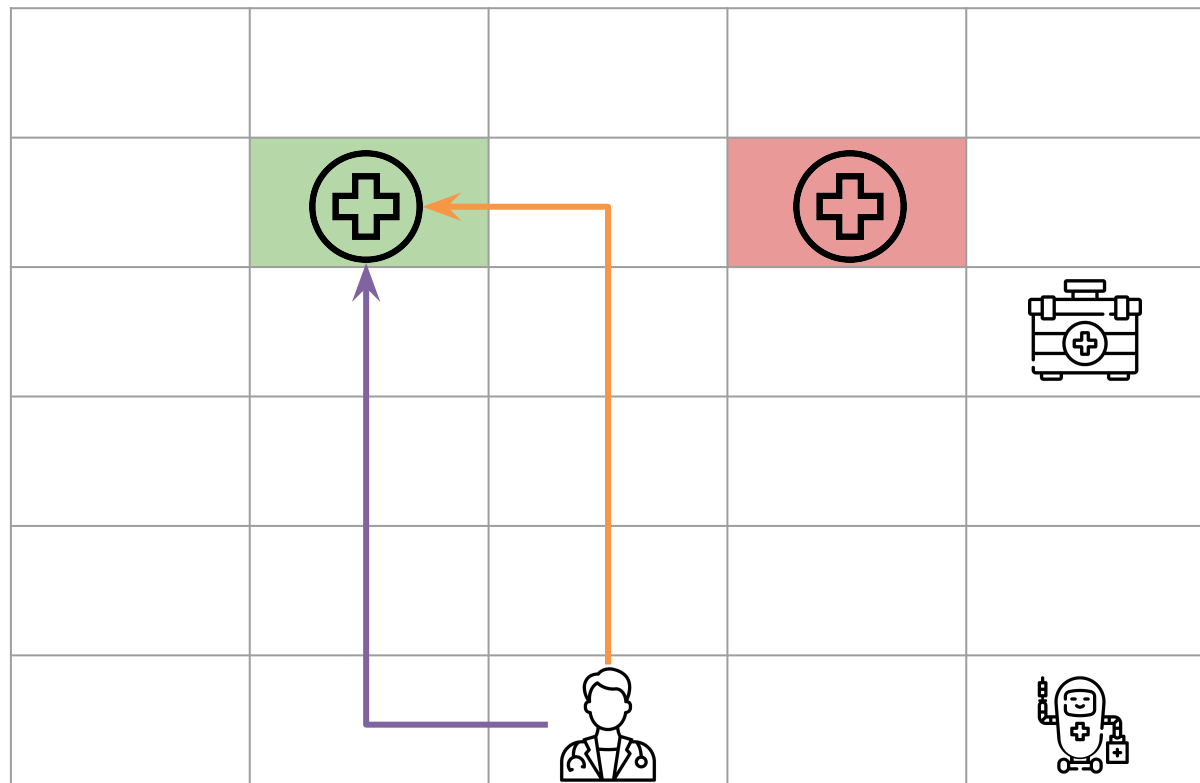
Stone, P., Kaminka, G. A., Kraus, S., & Rosenschein, J. S. (2010, July).

Ad Hoc Autonomous Agent Teams: Collaboration without Pre-Coordination. In AAAI Conference on Artificial Intelligence (p. 6).

Introduction

- How humans act under ad-hoc teamwork
- Three conditions
- Measured results based on optimality and legibility

Tool Fetching Domain



Optimal path:

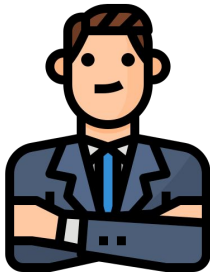
Path with minimum steps to goal

Legibility Timestep:

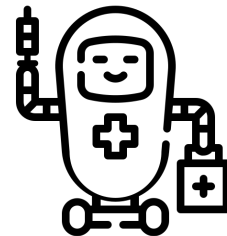
Number of steps greater than minimum steps for a legible path

Baseline Condition

- Simple instructions
- Mentioned worker's goal
- Did not mention fetcher's prediction



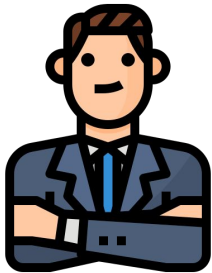
Go to Room R



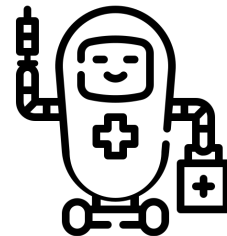
Incentive Condition

- Simple instructions
- With bonus
- With local instructions

Tobias Huber, Katharina Weitz, Elisabeth André, and Ofra Amir. 2020. **Local and global explanations of agent behavior: integrating strategy summaries with saliency maps.** *arXiv preprint arXiv:2005.08874* (2020)

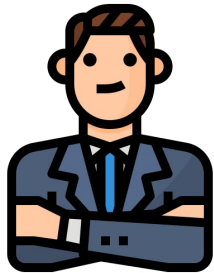


Go to Room R,
Nurse N will get
your tools, and you
will be rewarded for
good performance

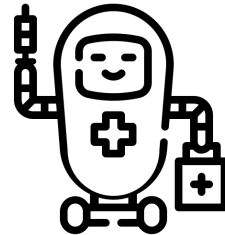


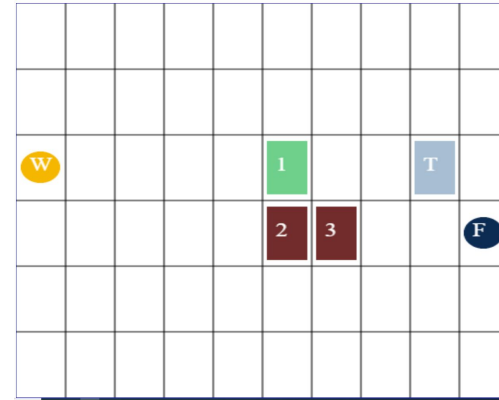
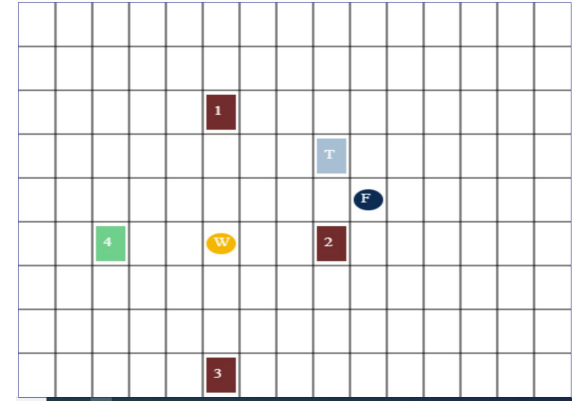
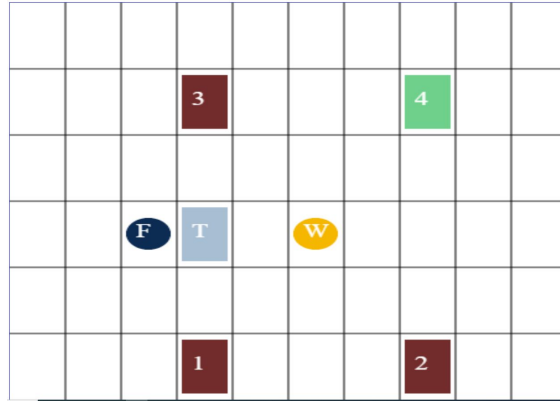
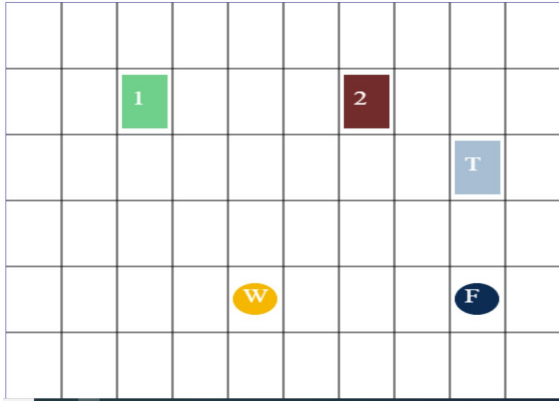
Instruction Condition

- Simple instructions (same as Baseline)
- Bonus, local information (same as Incentive)
- With global information

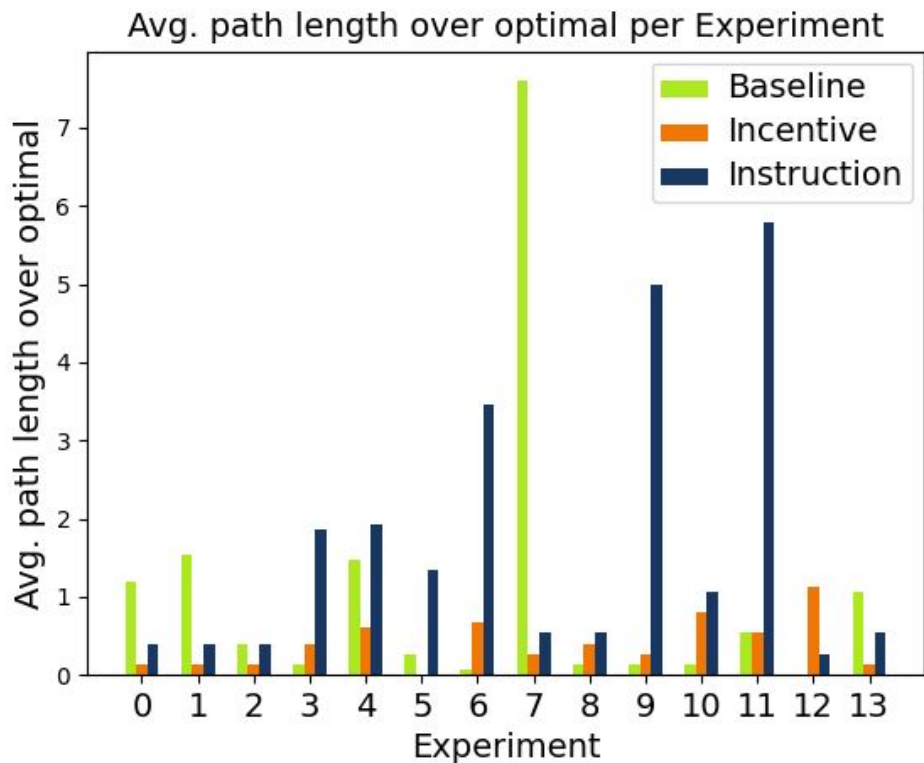


Go to Room R, Nurse N will get your tools, you will be rewarded for good performance, and **you must let Nurse N know where you are going without talking**

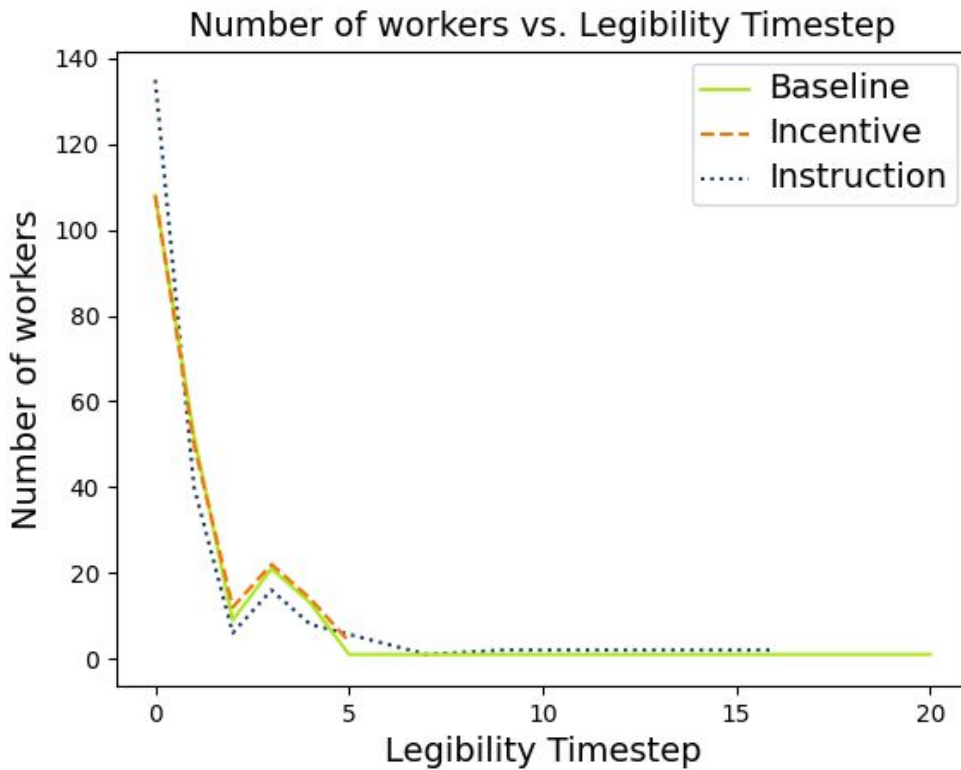




Optimality Results



Legibility Results

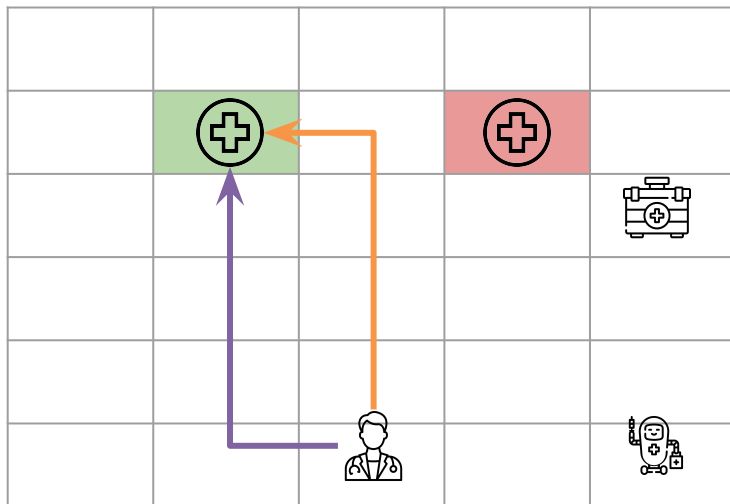


Summary

- We wanted to see **how humans behave** in ad-hoc teamwork settings
- We tested changes in behavior with 3 conditions
- We found humans are **not optimal**
- We found humans are **legible** given **explicit instructions**

Next Steps

- A **fetcher agent** that can better **predict human behavior**
- **Robot assistants** more **effectively helping** their human counterparts



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