

NRI: INT: Designing Effective Dialogue, Gaze, and Gesture Behaviors in a Social Robot that Supports Collaborative Learning in Middle School Mathematics

Erin Walker^{1,2}, Diane Litman^{1,2}, Adriana Kovashka¹, Timothy Nokes-Malach²

¹School of Computing and Information

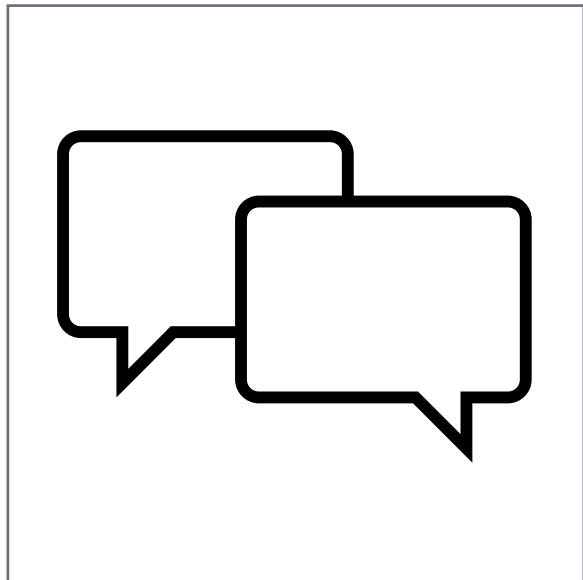
²Learning Research and Development Center

University of Pittsburgh

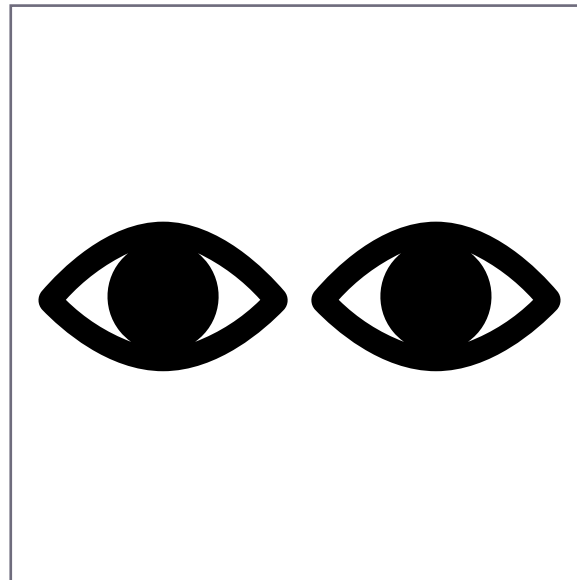
eawalker@pitt.edu

Key Challenge

How can robots be used to support the dyadic collaborations of middle school mathematics students?



Dialogue



Gaze



Gesture

Preliminary Work

Currently collecting pilot data using a prototype. Two students teach the robot, “Emma”, about mathematics problems.



Preliminary Work

Currently collecting pilot data using a prototype. Two students teach the robot, “Emma”, about mathematics problems.



Research Plan

Train a reinforcement learning model using

- Simulations grounded in learning theory
- Undergraduates interacting with the Nao robot
- Middle schoolers interacting with the Nao robot

Evaluate the model against non-adaptive policies, expert policies, virtual agent.



Thank you!

Interdisciplinary Work.

Human-computer interaction,
natural language processing,
machine learning,
cognitive psychology.

CS Contribution.

Apply reinforcement learning to
human-robot interactions to
demonstrate that social actions
can be automatically acquired.

Learning Sciences Contribution.

Understand how robot gaze,
gesture, and dialogue influence
balance of participation, domain
entrainment, and learning.



This work was funded by NSF
#IIS-2024645

PI: Erin Walker, eawalker@pitt.edu



NSF #IIS-2024645
Award date: Fall 2020