

Intelligent Agents for Distance Learning

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MITRE Sponsored Research

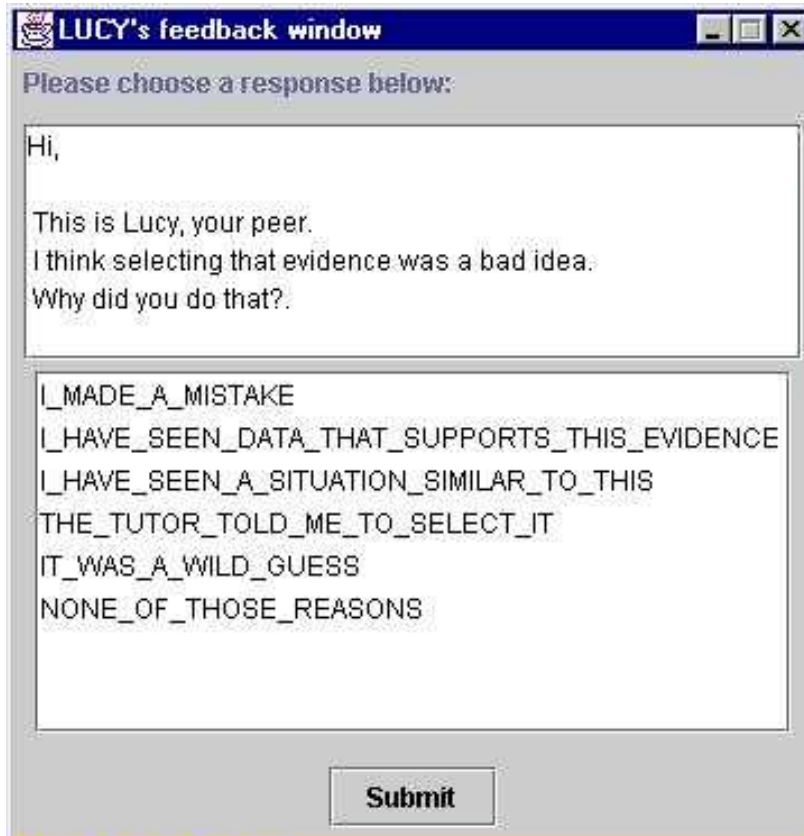
The logo for the MITRE Technology Program, featuring a stylized graphic of stacked blocks in yellow, orange, and blue to the left of the text.

MITRE
Technology
Program

Problem

- **The changing military environment, where threats, procedures, and equipment are not consistent, is forcing modification in existing military training programs that train only for specific tasks rather than competencies.**
- **Classroom learning improves significantly when students participate in structured learning activities in small groups of peers. As the U.S. military moves from schoolhouse instruction to Web-based distance learning, students risk losing this important contact with other students.**

Background



The screenshot shows a window titled "LUCY's feedback window". The text inside the window reads: "Please choose a response below:", "Hi,", "This is Lucy, your peer.", "I think selecting that evidence was a bad idea.", "Why did you do that?". Below this text is a list of six options: "I_MADE_A_MISTAKE", "I_HAVE_SEEN_DATA_THAT_SUPPORTS_THIS_EVIDENCE", "I_HAVE_SEEN_A_SITUATION_SIMILAR_TO_THIS", "THE_TUTOR_TOLD_ME_TO_SELECT_IT", "IT_WAS_A_WILD_GUESS", and "NONE_OF_THOSE_REASONS". At the bottom of the window is a "Submit" button.

An intelligent agent acting as a peer can take charge by assuming a more inquisitive and directive role.

- ...
- **LuCy: Hi! This is LuCy, your peer. I think selecting that evidence was a bad idea. Why did you do that?**
- **Sarah: I have seen data that supports this evidence.**
- **LuCy: What data do you think is related, Brad?**
- **Brad: IMINT Report that helicopters are flight-ready.**
- **LuCy: I agree.**
- **Sarah: Okay.**

Objective

- To develop and incorporate *a simulated peer* into *a rich, multi-person collaborative distance-learning environment* to facilitate both group and individual learning
- To infuse and assess *instructional roles in the simulated peer* to promote effective learning

Activities

- Investigate dialogue-understanding techniques to capture the essence of student-to-student communication (FY01)
 - ✓ Group learning experiment (30 subjects)
 - ✓ Dialogue role prediction model (80.3% accuracy)
- Develop a simulated peer whose behavior is governed by multi-agent planning (FY02)
 - ✓ Joint NSF proposal with Univ. of Pittsburgh on spoken collaborative learning dialogue
 - ⇒ Reasoning engine using Protégé knowledge representation system and JESS expert system
- Explore detection and repair of ineffective collaborative distance-learning (FY03)

Highlight

Are group members learning effectively?

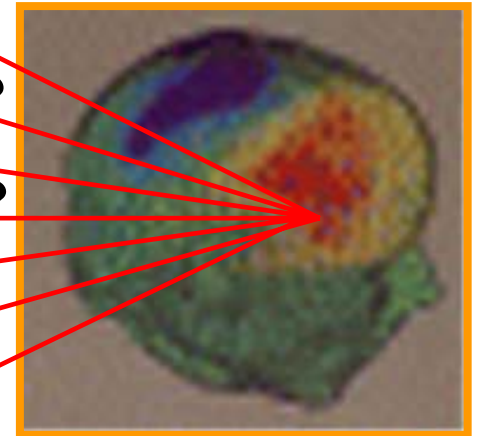
What underlying communication is occurring?

What group dynamic interactions are observed?

What roles are being played by participants?

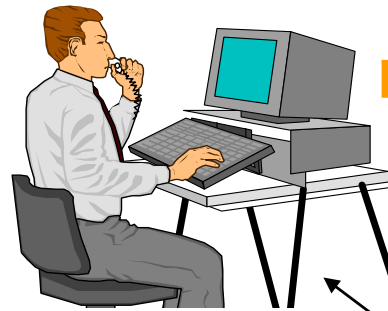
What pedagogical interventions make sense?

What role should I assume?



Peer Agent
Planner

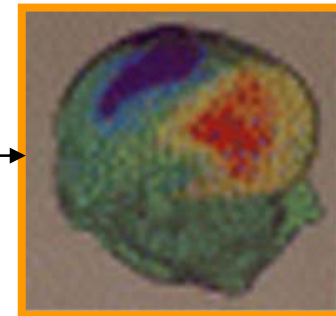
Demonstration



Human Learner

White Board

Peer Agent



Human Learner



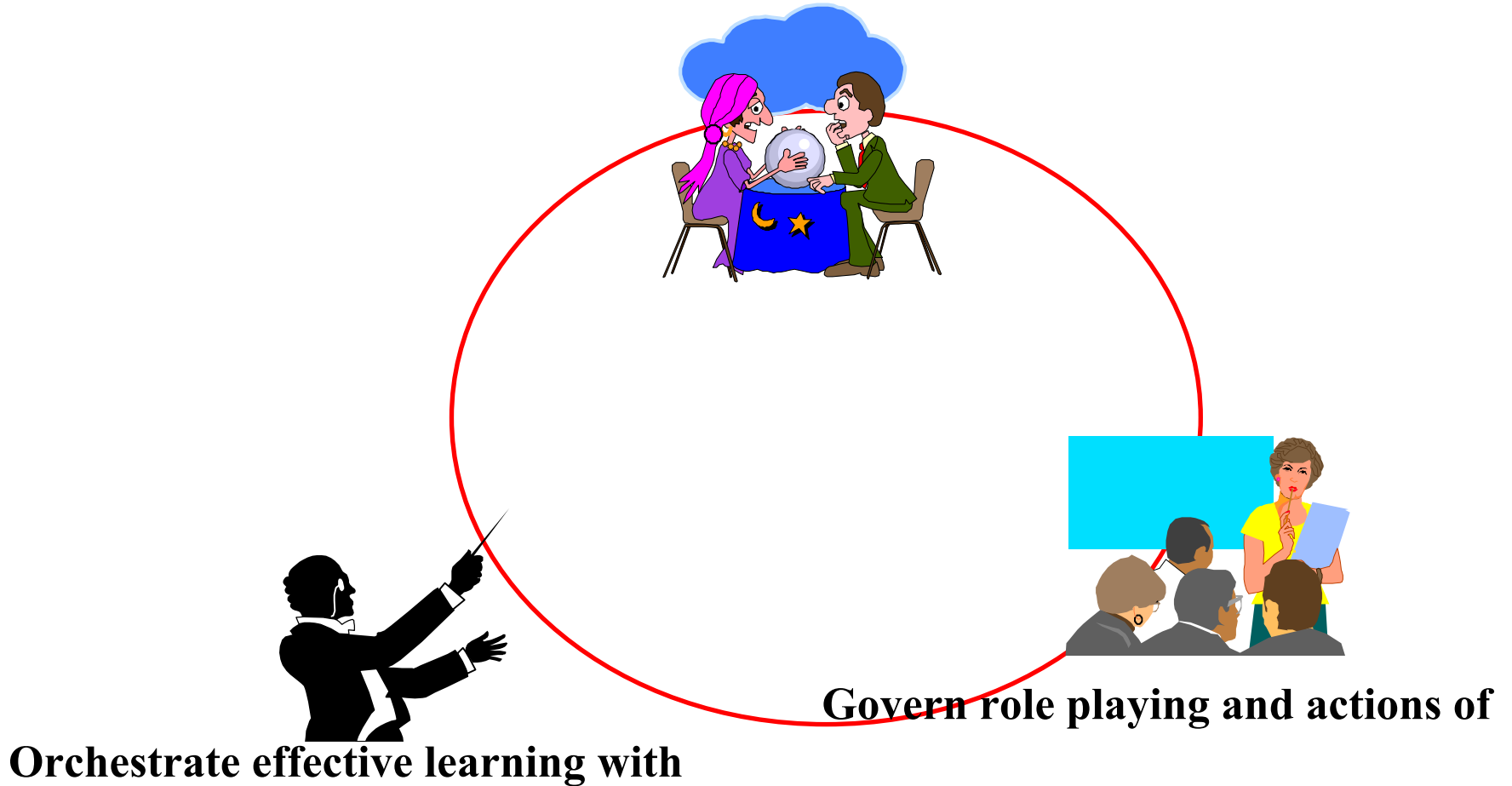
Watch a Peer Agent promote effective collaborative learning.

Impacts

- **New Army Intelligence School program on companion-based learning based on this MSR research**
- **Collaborative learning communication interface**
- **Refereed publications (2 conference papers, FY01)**
- **Related prior year MSR journal paper now 16th most cited in the International Journal of AI in Education (<http://www.cbl.leeds.ac.uk/ijaied/top100.html>)**
- **Public release of our collaborative software (<http://www.openchannelsoftware.com/projects/SAILE>)**

Future Plans

Predict collaborative learning effectiveness



Backup Slides

Predicting Effectiveness



- Comprehend what is taking place in the collaborative learning environment to drive simulated peer
- Capture essence of student-to-student interaction
 - Communicative acts as indicators

Person	Dialogue	Learning Skill	Subskill	Role
W1	No, a corporation's made up of companies.	Acknowledge	Reject	T-eval
M3	One on me there. A company has departments	Inform	Assert	T-infog
W1	We have to draw a picture, right?	Task	Coordinate group process	T-coord

Peer Agent Architecture

