Exploiting embodiment for human-machine interaction

SS16 - (Embodied) Language Comprehension

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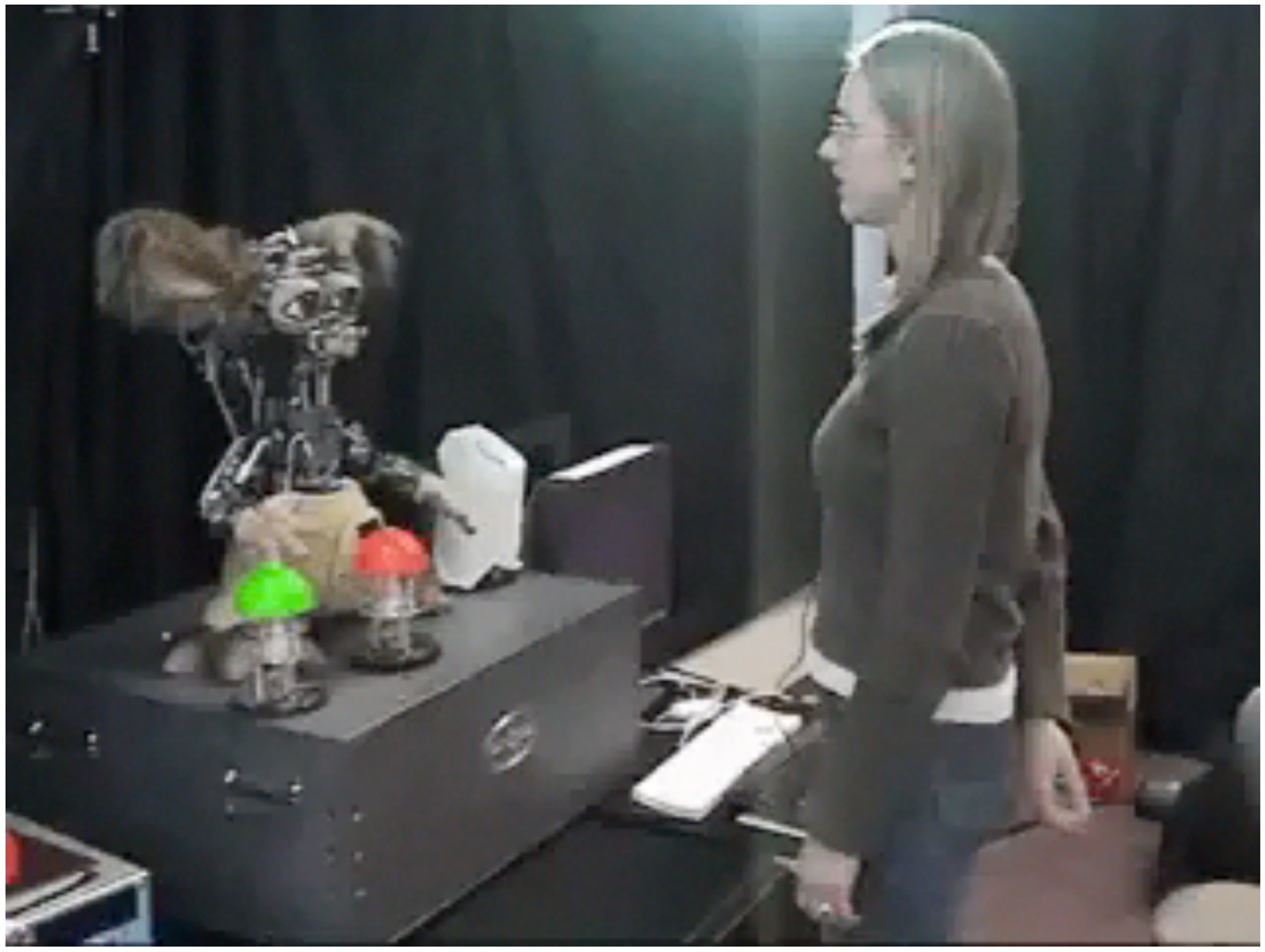
Robots

- Embodied machines, more human-like
- Technical complexity vs. additional possibilities
  - Actuators, motion, lip movement for speech
  - Detecting and recognising the “world”
  - ✦ Sharing environment
  - ✦ Expressing non-verbally

Robots

- Purposes
- Advantages
- Weaknesses

Leonardo, MIT



more from MIT

- https://www.youtube.com/watch?v=ounRBQzI85s

- Children learning from robots: http://robotic.media.mit.edu/portfolio/cyberlearning/

Bert, Urbana-Champaign

- Robot learning action & language: http://www.isle.illinois.edu/acquisition/videos.html

Geminoid, Osaka

- https://www.youtube.com/watch?v=_NTj88EdPtM&list=PLG7sRAdtlqAlkwFmOR26occCJzbFNrymM&index=6

- https://www.youtube.com/watch?v=78ZdTri0Jps

Beyond robots

- Virtual systems
  - More “world” knowledge
  - Less technical effort
  - Applications e.g. for training, playing
- Or both: Augmented Reality

Instructions in AugR

- https://www.youtube.com/watch?v=UjVL7txfI7E

- But, where's language?

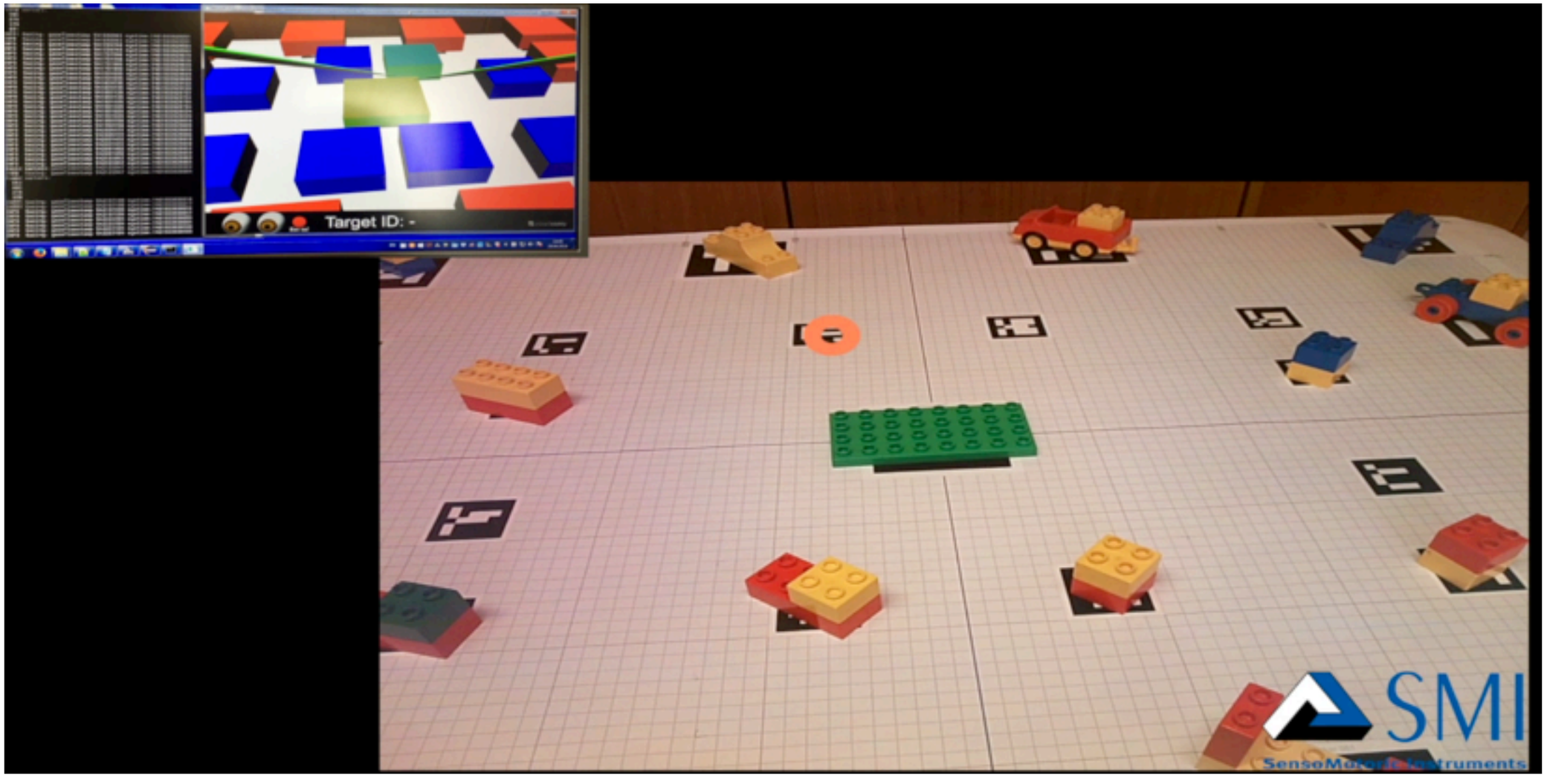
Instruction Applications

- Language can be produced…
- But how to check whether human user understood?
- Comprehending language still problematic
  - Visual highlighting instead, low temporal resolution
- Our approach: gaze-based interaction!

Interactive NLG

- Produce instruction, check for (target) gaze, produce feedback/instruction
- Differing optimal strategies for human instructors and NLG systems!?
  - Human: Full, redundant instruction, feedback at the end
  - NLG: Slower & shorter instruction, benefit from gaze-based feedback

Compare



References

- Personal robots, MIT: https://www.media.mit.edu/research/groups/personal-robots

- Language acquisition and robotics, Urbana-Champaign: http://www.isle.illinois.edu/acquisition/robots.html

- ATR: http://www.geminoid.jp/en/index.html