Student computers: Six-year-olds believe that computers can learn

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Introduction

Learning-by-teaching research often tries to substitute an artificial agent for a human (e.g. Wagster et al., 2007). Given this, it is important to ask whether children feel more or less compelled to ensure that the agent has a complete, and correct set of knowledge. We tested whether children correct errors more for a human or for a computer. In addition, we wanted to explore what *kind* of information children transmit to the agent. Do they focus more on essentials for the human and think that they should provide a more literal demonstration for a computer? Thus, children should overimitate irrelevant actions (Lyons et al., 2007) for a computer but not a person.

Research question

Do children approach teaching a person and a computer differently? Are differences based on the capabilities that children attribute to each agent?

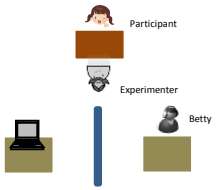
Study 1

Participants: 14 6-year-olds (M= 6;7, 8 male)

Procedure

I. Agents introduced

Computer: a laptop with a blank display and a camera, which gets "pictures of what we do but no sound."
Person: named Betty or Bob, wore headphones so that they could "see but not hear."



Room layout

This material is based upon work supported by the National Science Foundation under Grant No. 0433653 to DTL and MMS.

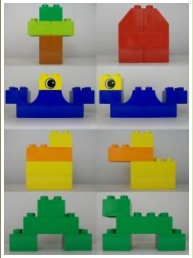
II. Agent demonstrations

The experimenter built an airplane for each agent and had them demonstrate that they had learned it by building it themselves.

III. Framing questions

Participants were asked questions to highlight the differences between people and computers:

"You know that when your friend smiles she is happy. Would the computer/Betty know this?"



IV. Build trials

In 5 build trials the experimenter showed participants how to build an object and then asked them to teach the building to the computer and person.

Correction trials: In three trials, after the child returned from building for both agents, the experimenter discovered a mistake in her initial build and asked participants to correct it for just on agent.

Overimitation trials: In two trials the experimenter performed a series of unnecessary actions on the Lego blocks as she built the structure

Results

- Participants corrected mistakes for the computer in 2.07 out of 3 trials ($t(13) = 2.33$, $p = .04$)
- 11 out of 14 participants corrected for the computer on the first trial.
- 5 out of the 14 participants overimitated the unnecessary actions for both agents.

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Study 2 (no framing questions)

Participants: 14 6-year-olds (M = 6;4, 6 male)
Procedure: same as Study 1 but without framing questions and more salient overimitation actions.

- Participants corrected the mistake for the computer in 1.79 of the 3 correction trials ($t(13) = 1.10$, $p = .29$)
- 8 (of 14) corrected for the computer on the first trial
- Children were more likely to overimitate unnecessary actions for the computer (M = 1.14 of 2 trials) than the person (M = .64) ($t(13) = 2.46$, $p = .03$)

Study 3 (new framing questions)

Did the questions in Study 1 highlight areas were the computer lacks insight? Would questions that just highlight differences between agents have the same effect?

Summary

- All children demonstrated the building of structures to the computer and person.
- Differences between teaching a person and a computer:
  - In Study 1, where differences between the agents were highlighted, children were more likely to correct mistakes for the computer.
  - In study 2, children provided more concrete demonstrations for the computer, imitating even unnecessary actions.
- A third study will explore the attributions affecting how children interact with a student computer.