Automatic Measurement of Teachers' Talk: Indicators of Location and Quality in Science Activities

Jay Buzhardt, Dwight Irvin, John Hansen, Prasanna Kothalkar, Kyle Consolver, Ying Luo, Beth Rous

Juniper Gardens Children's Project

Introduction

- A key goal of *Next Generation Science Standards* is to promote interest and exploration of natural phenomena
- In preschool settings, teachers prompt exploration by asking questions, encouraging informal exploration and experimentation
- To date, live or offline video observation has been the sole way to capture the quality of teacher question asking in the pre-k classroom (e.g., Sanders et al., 2016)
- To date, Automatic Speech Recognition (ASR) has not been used to measure the **content/quality** of teacher talk
- Here, we used ASR to quantify preschool teachers' use of keywords that promote student exploration and inquiry

Method

- 2 PreK classrooms (14 children w/ and without disabilities, 7 teachers)
- Ubisense (indoor mapping tool) was used to locate children & teachers in activity areas during the day
- Preschool audio recorded Language ENvironment Analysis (LENA) devices
- ASR algorithms used to identify teacher use of "What", "Where", "Why", "Who" and "How" words

We used speech and location sensing tools to measure teachers' talk in the preschool classroom

Speech algorithms more accurately detected teacher questions in science activity areas

For additional information or questions, contact:
jaybuz@ku.edu;
dwirvin@ku.edu

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- Complete poster
- Paper describing language and location measurement in preschool setting

Results

- 599 adult utterances processed across **all preschool activities**
  - 348 (58.1%) identified by ASR algorithm as containing WH words/phrases
- Accuracy across all activity areas
  - 58.6% when accepting one or less false positives (detected a WH word that was not spoken)
  - 44.5% with no false positives

- 85 utterances within **science activity areas only**
  - 54 (63.5%) identified with WH words/phrases
- Accuracy within science activity areas only
  - 79.6% when accepting one or less false positives
  - 59.3% with no false positives

Discussion

- First attempt to automatically measure frequency, location, **and** content of teacher-student interactions
- Slightly higher proportion of questions in science activities areas than across all activity areas
- Algorithms more accurate in science areas
- Continuing improvement of algorithm accuracy

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