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Assessing AAC Interaction I: Effect of Task Type on Grounded Contributions & Multimodality

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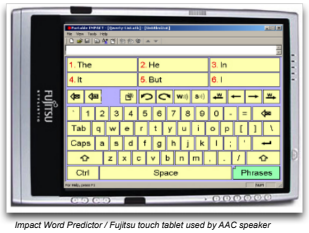
INTRODUCTION

Despite significant technological advances in AAC, many augmentative technologies are not designed to facilitate face-to-face social interaction[1,6,8]. The current study extends the work of Higginbotham, et al.[9] by examining the real-time interactions of non-disabled dyads in which one participant used an AAC device.

An underlying goal of any conversation is to achieve sufficient mutual understanding for the task at hand (e.g. telling a story, giving directions, solving a problem, etc.). The process by which participants arrive at a joint understanding of what the speaker has intended is called "grounding" or "achieving common ground". The basic unit of grounding, called a **Grounded Contribution** (GC) may be defined as a the collaborative process in which a signal (e.g. gesture, word, utterance) is successfully understood.

To produce a GC, The AAC speaker may present a series of individual letters, words, gestures, vocalizations, etc. In response, the addressees will typically indicate their acceptance of these utterance parts through sustained attention, repetition, word completion, relevant next turn, contingent query, request for repetition, etc., until a collaboratively grounded contribution is achieved[6].

This analysis focuses on the multimodal nature of GCs and its relationship to traditional measures of communication rate. Findings from this study have implications for designing devices for interactive communication, as well as pointing out the limitations of Automated Data Logging technologies (e.g., LAM) for assessing language use.



Impact Word Predictor / Fujitsu touch tablet used by AAC speaker

METHODS

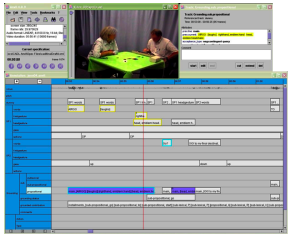
•Participants. 18 – 12 minute videos randomly sampled from 12 pairs of non-disabled adult dyads in the Higginbotham, et al.[9] study.
•Device. Enkidu Inpact word predictor (1,975 word dictionary) used by AAC user.

•3 experimental contexts
- Narrative – Unequal role relationship, referents not shared.
- Map – unequal role relationship, referents partially shared.
- Puzzle – equal role relationship, visually shared referents.

•ANVIL[11] used to transcribe and code interactions[5]:
- Utterances (speech, device, vocalizations)
- Meaningful gestures (limb, head/face, task actions)
- Index – pointing gestures
- Illustrator – descriptive gestures (e.g., make a circle)
- Emblems – culturally iconic gestures (e.g., thumbs up)
- Logfile user-device interactions
- Grounded contributions (GC) (*i.e., interactive utterances*). GCs analyzed in terms of frequency and composition (e.g., speech output, nonverbal behavior).

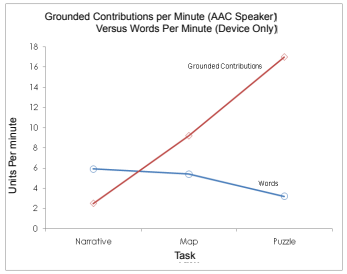
•ANOVA: Task (Narrative, Map, Puzzle) x Role (AAC, partner), paired comparison, tabular & survival analyses.

•Inter-rater Agreement: 3 transcribers, 15 hours training, transcription = 86%, coding 87%.

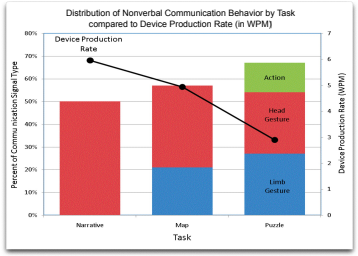


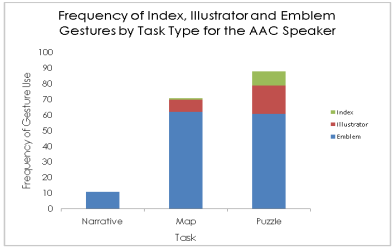
Example of annotation and coding using Anvil software

RESULTS



- (left) As tasks became more interactive, the rate of grounded contributions of AC Speaker increased.
- (left) In contrast the use of voice output decreased as tasks became more interactive.
- (lower left) The decline in Device Production Rate is negatively correlated with the increase in the proportion and type of gestures associated with the production of GCs.
- (lower left) Its important to note that the Action behaviors are task specific and associated with moving the puzzle pieces.
- (below) Analysis of limb gesture GCs also shows increasing diversity as the communication tasks become more overtly interactive. The index and illustrator gestures were used to tell the partner where to place and position the puzzle pieces.





CONCLUSIONS

- AAC Speaker performance is multimodal.
- Task specific differences multimodal communication related to:
  - temporal-interactive demands of the particular task.
  - the inability of the AAC system to accomplish the task-specific communication needs.
- Words per Minute (wpm) measure traditionally used to measure AAC rate fails to capture multimodal contributions, producing results which are at variance with performance. Measure of grounded contribution rate may be more representative of augmented interaction.
- Use of multimodal communication call into question unimodal / device output-only approaches to recording and analyzing interactive communication (e.g., automated data logging, LAM).
- Unimodal approaches may best be used to evaluate written and/or non-interactive forms of communication.

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