THE POWER OF PEERS:
Rapport with and through Technology

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Relationship between Behavioral Cues, Linguistic Structure, Interactional Structure &... the World

- Gesture
- Eyebrow raise
- Eye gaze
- Head nod
- Posture shift

- Information structure (Emphasize new info)
- Conversation structure (Turn taking)
- Discourse structure (Topic structure)
- Grounding (Establish shared knowledge)

- Solidarity (sameness)
- Collaboration (Common goal)
- Familiarity (common topic)
- Learning Self-efficacy change

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Methodology

Study

Acquire data

Build formal models

Model

Design evaluation

Test

Realize gaps in data

Build

Implement on the basis of model

Rules
Posture Shifts mark the beginning of new discourse segments (Cassell et al., ‘01)

Low-SES children use more non-syntactic, and non-verbal strategies to indicate cohesion with peer stories (Ananny & Cassell, 2001)

3 distinct pairs of roles in collaborative storytelling can be distinguished through nonverbal signals (Wang & Cassell, 2003)

Small talk occurs before face-threatening discourse moves (Bickmore & Cassell, ‘02)
Embodied Conversational Agents
Embodied Conversational Agents
Relationship between Behavioral Cues & Linguistic Structure

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Grounding

Grounding (Clark & Shaefer)

- Ensures what’s been said is part of common ground
- One conversational participant initiates material. The other gives feedback, or acknowledgement.
  1. J: where is my talk?
  2. R: it’s in Cubberley
  3. : next to the Clock Tower
  4. J: oh okay
- Depending on the modality of communication, some of this acknowledgement may be implicit or conveyed by non-linguistic action, e.g. by gaze or facial expression.
Empirical Study

- 2 Conditions (10 Ss each)
- Face-to-face: Shared map + Face & Body
- Shared reference: Shared map only
Results

• Relationship between verbal and non-verbal acts in grounding.
  • Answer: mutual gaze during speaker’s response.
  • Info-request: speakers seek mutual gaze right after the question.
  • Assertion: listener attending to the shared referent is evidence of accepting the information.
  • Acknowledgement: speaker nod does not serve listener’s goals (it’s present in both conditions).
Implementation

- Pointing sensor
- Speech recognition
- Eye-tracker
- Understanding module
- Dialogue manager
- Generation module
- Text-to-speech
- Agent animation
- Highlight projection
- Highlight projection
- Agent animation
- Text-to-speech
- Speech recognition
- Eye-tracker
- Pointing sensor
- Map
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Story Listening Systems

Animal Blocks

TellTale

Sam

StoryMat

SAGE

Rosebud

DollTalk

One upon a time a little girl was sitting in front of her computer. She decided to tell a story. She wanted to tell about animals and dragons and witches and princes. She then went to her teacher and said, "I wanted to tell you about my story that I told today. I told it to my friends and they loved it." Her friends asked her to tell it again. So she told the story again and they loved it even more. She went back to her teacher and said, "I told it to my friends and they loved it." Her teacher said, "Why don't you write it down?" She wrote it down and then showed it to her teacher. Her teacher said, "That's a great story!" She wrote it down again and showed it to her teacher. Her teacher said, "That's a great story!" She wrote it down again and showed it to her teacher. Her teacher said, "That's a great story!" She wrote it down again and showed it to her teacher. Her teacher said, "That's a great story!" She wrote it down again and showed it to her teacher. 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Children’s Language Play
Literacy Learning with Peers

- Fantasy play with peers demonstrates more “distancing” and decontextualized language than with adults (Rogoff, 1990).
- Peers push one another to clarify communicative intentions (Goncu, 1993).
- Peers provide eye contact, facial expression, and other appropriate responses (Rooks, 1998).
- Peers model, invite, assist, direct, tutor, negotiate, affirm, and contradict each other (Stone & Christie, 1999).
Model of Story Listening Systems

1. Depend on children’s oral narrative skills to bootstrap literacy
2. Introduce peers as playmates in the technology or with the technology
3. Encourage children to construct their own personally meaningful stories.
4. Invite the kind of embodied play away from the desktop that is most comfortable for young children
5. Use embodiment to evoke social resonance – a bond of familiarity and solidarity that supports learning.
StoryMat

- Under-determined
- Reflective
- Listening

Results

Narrative Transformations

Incorporations

Narrative Voice

Character Voice
Narrator Voice
Stage-Director Voice

Incorporation from a peer
Incorporation from StoryMat

# of incorporations

Singles - Passive
Singles - StoryMat
Dyads - Passive
Dyads - StoryMat

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Story Listening Systems: Sam

Once upon a time, a little girl was sitting in front of her

SAGE

Rosebud

Animal Books

TellTale

DollTalk

SAGE

Sam

RENGA

The Expedition

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Collaborative Play
Sam as a learning partner

Increased use of quoted speech, and temporal and spatial information

- One child with Sam
- One child without Sam
- Dyad with Sam
- Dyad without Sam

Increased use of quoted speech, and temporal and spatial information over time

0.00
0.07

0
8

story1 story2 story3 story4
Short-term Effects

After 4 sessions over 3 weeks, a 5% increase in Test of Early Language Development (TELD) scores:

- Increase in Spoken Language Quotient between pre- and post-test ($p < .05$)
- Increase in Expressive Language sub-test between pre- and post-test ($p < .05$)
- Increase in Receptive Language sub-test between pre- and post-test ($p < .05$)

Relationship between Behavioral Cues, Linguistic Structure & Interactional Structure

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Rapport

Rapport = Attention + Positivity + Coordination + Recognition

Verbal
- Entrainment
- Social Deixis

Non-Verbal
- Attentiveness- spatial configurations and bodily postures that signal accessibility
- Positivity- smiling, head nodding
- Coordination- postural mirroring, interactional synchrony

(Tickle-Degnen, L. and R. Rosenthal, 1990)
Rapport

Rapport = Attention + Positivity + Coordination + Recognition

Intersubjectivity
- The other is like me

Theory of Mind:
- The other has a different mind

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- Entrainment
- Social Deixis

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(Tickle-Degnen, L. and R. Rosenthal, 1990)
Cultural Modeling & Rapport

• Storytelling practices differ according to cultural background (Champion, 1998; Heath, 1986; Labov, 1972; Smitherman, 1998)
• Children from non SAE cultural backgrounds feel ignored and may have trouble making a bridge from home to school language (Cazden, Michael, & Tabors, 1985; Gee, 1985; Guiterrez & Rogoff, 1995)
• Narrative structures from one’s own tradition can make children feel welcome and bridge to formal content (Pinkard, 1999)
• Children from lower socioeconomic status increase in their use of AAVE in comparison to their middle-class peers who decrease their use of AAVE (Wyatt, 1991; Wyatt, 2001)
K: I can do it myself. Go le- leave her, leave my, leave my fren alone brother.
D: I ain’t doin’. I ain’t fixin
D: [ momma.]
K: [Will you all]
K: keep it down there, some body is trying to sleep here.
D: Da::ng.
K: I hope you remember that you got a microphone on you.
D: K: Remember this on our shirts
D: So what, they, she can’t hear, hear or even know what we’re doin’.
K: but she can tape it duh, la;:::. What is this? You drinknin in the house?
D: Aw, aw, da-dang, you xx refrigerator.
K: Here you go. Gimme my chair.
D: You don’t even want the chair.
K: You don’t even want nothing [up in that room.]
D: [ I need my beer]
D: I need my beer, I need my beer. You ate all my Popsicles, I got 2 more beers now.
Axes of Rapport

- Phonological
- Syntactic
- Lexical
- Delivery
  - Verbal
  - Non-verbal
- Narrative style
  - Verbal
  - Non-verbal
Narrative Style: Attention

- Verbal
  - Repetition / echoic
  - Sing-song
  - Character > narrator
  - Meta-narrator / narrator / character back-and-forth
Narrative Styles: Coordination

- Non-verbal
  - Eye-roll
  - Disagreeing pout
  - Sass (Ironic head tilt)
  - Emphatic head nod
  - “suck-teeth”
Interactional Styles: Positivity

- Parataxis
- Interruption
- Simultaneous talk
Alex, African American Agent

- **Racial Assessment I**
  - 7 African American kids between ages 5 – 8
  - Participate in 3 sorting tasks
  - Shown a picture of Alex
  - Children's perception is Alex is not African American

- **Racial Assessment II**
  - 2 African American kids between ages 5 – 6
  - Participate in same 3 sorting tasks
  - Alex tells one story including syntactical features of AAVE
  - Children perceive Alex as being African American
Alex
Experiment

• 2 x 3
  • Af-Am vs. SAE speakers
  • Af-Am vs. SAE vs. code-switching agent

• Analysis
  • Entrainment
  • Rapport
  • Utterance-level Collaboration
  • Literacy (DELV measure)
  • Use of AAVE (DDM measure) & SAE
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