THE POWER OF PEERS:

Rapport with and through Technology

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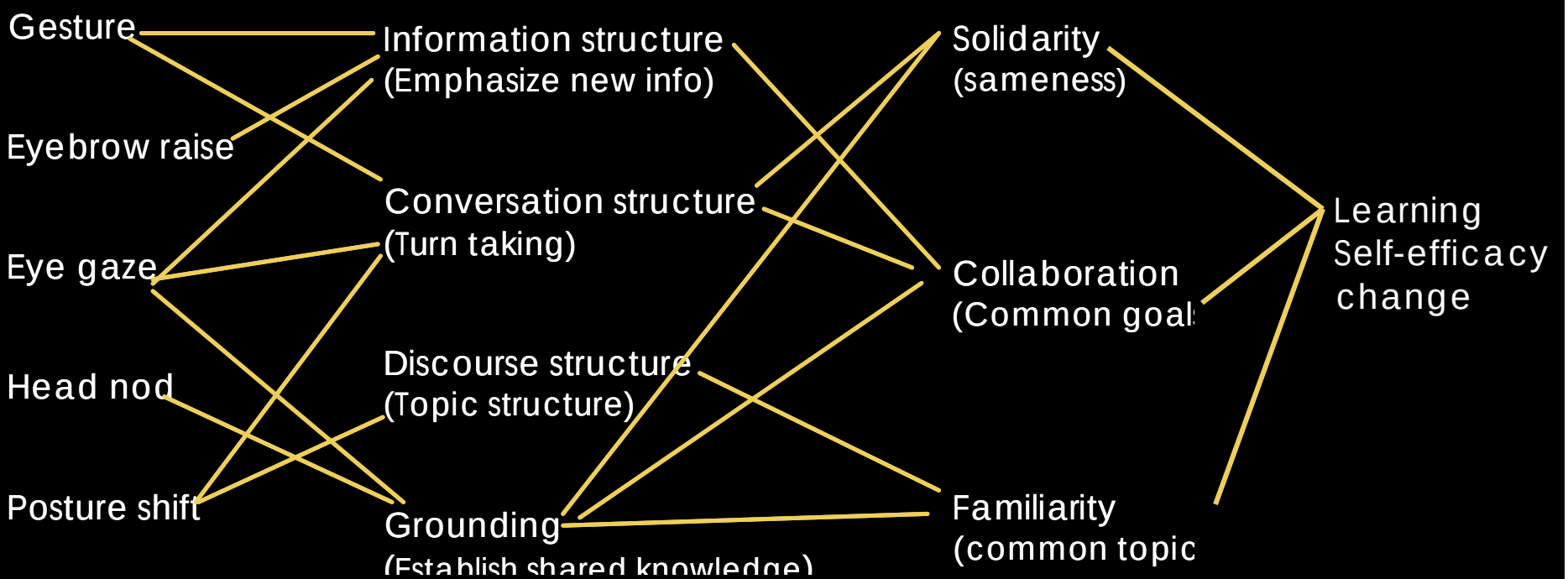
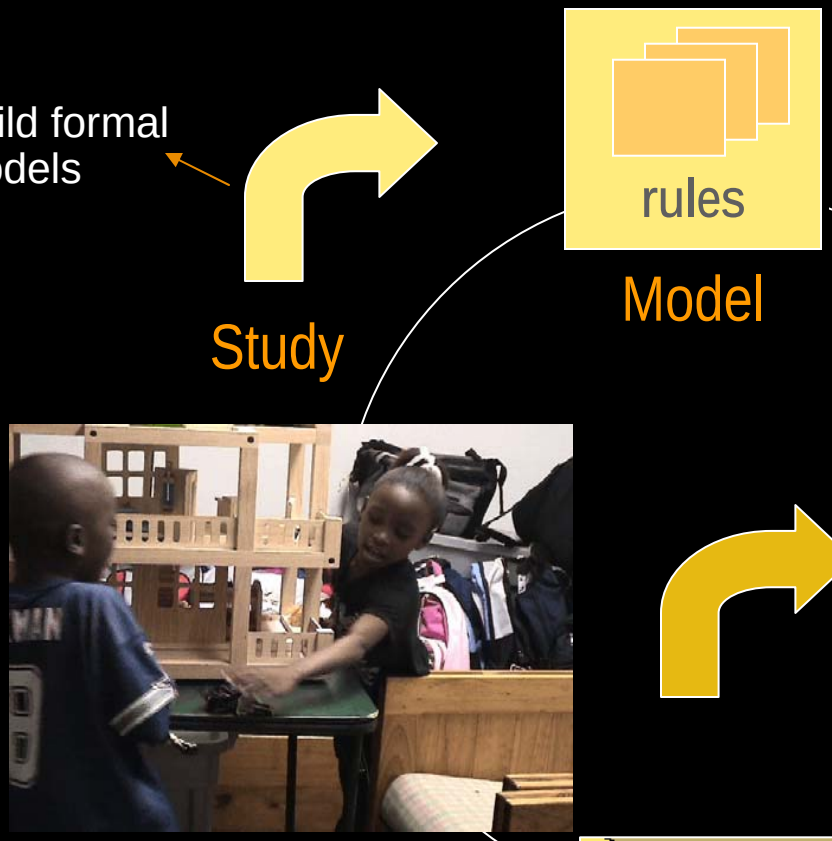
Relationship between Behavioral Cues, Linguistic Structure, Interactional Structure & . . the World



Methodology



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

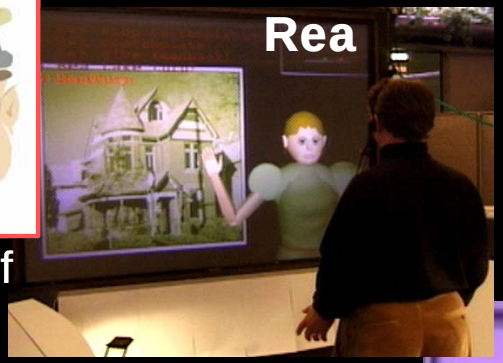
Low-SES children use more non-syntactic, and non-verbal strategies to indicate cohesion with peer stories (Ananny & Cassell, 2001)

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)

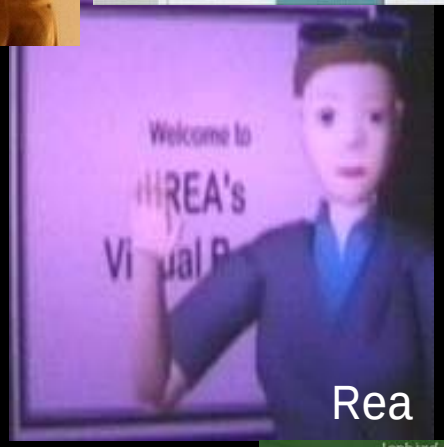
Embodied Conversational Agents

Gandalf

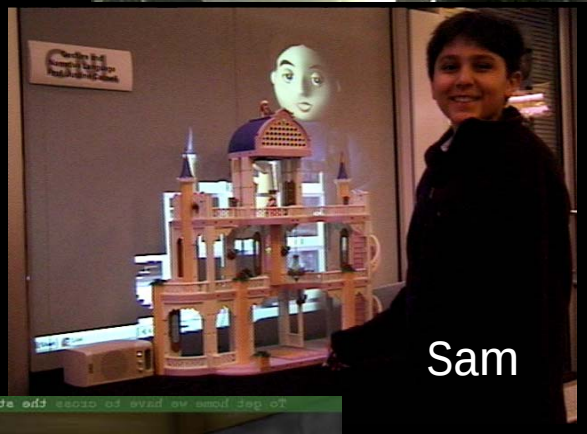


Rea

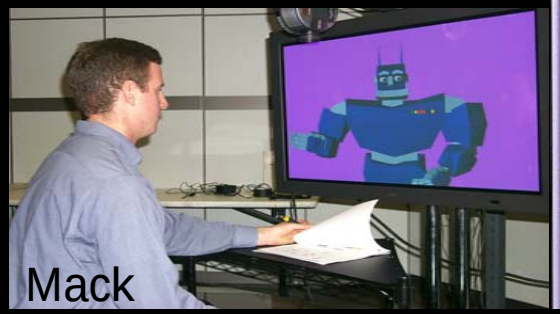
Grandchair



Rea



Sam

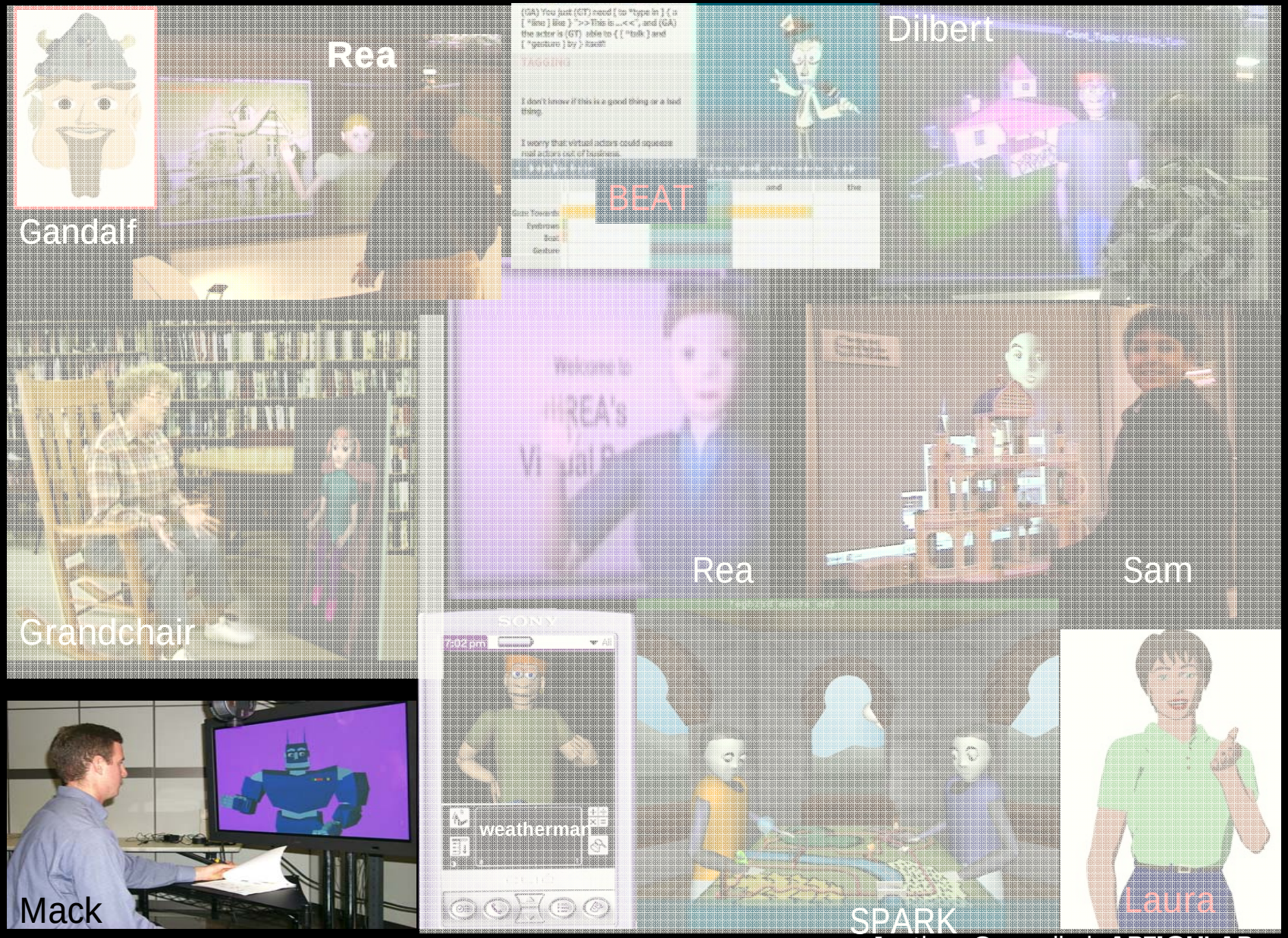


Mack

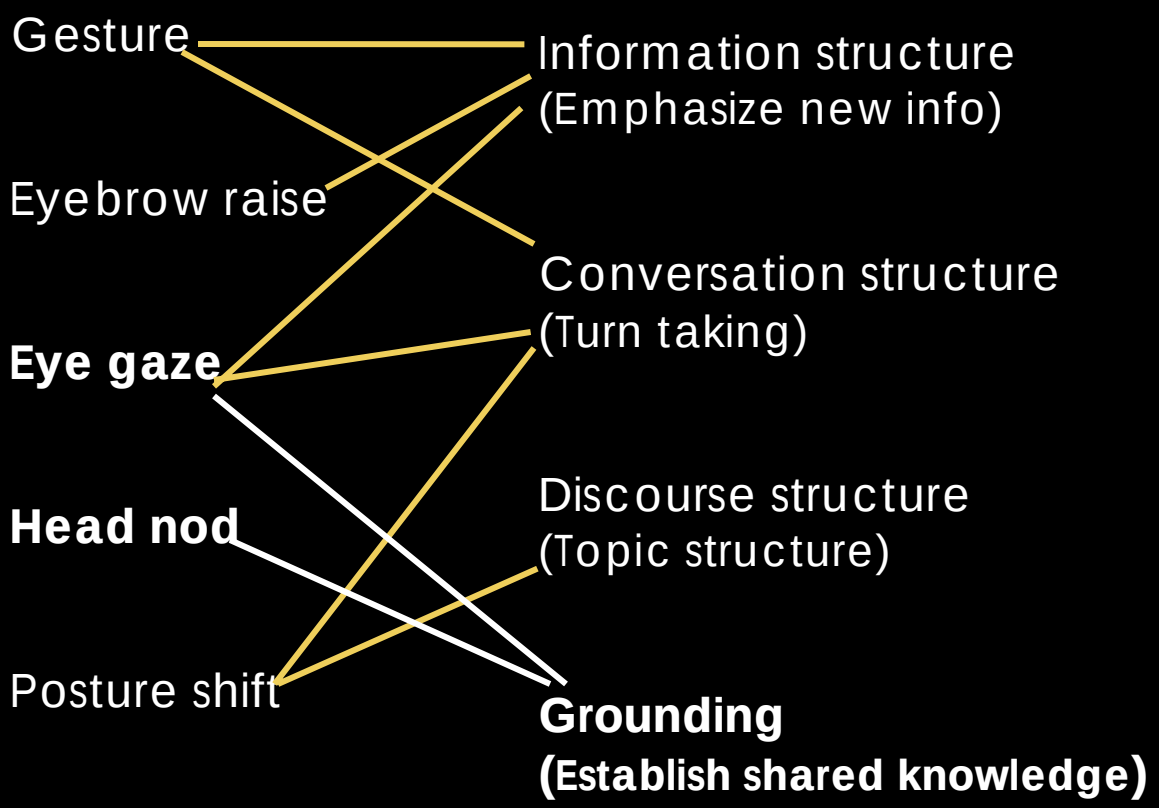
SPARK

Laura

Embodied Conversational Agents



Relationship between Behavioral Cues & Linguistic Structure



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?

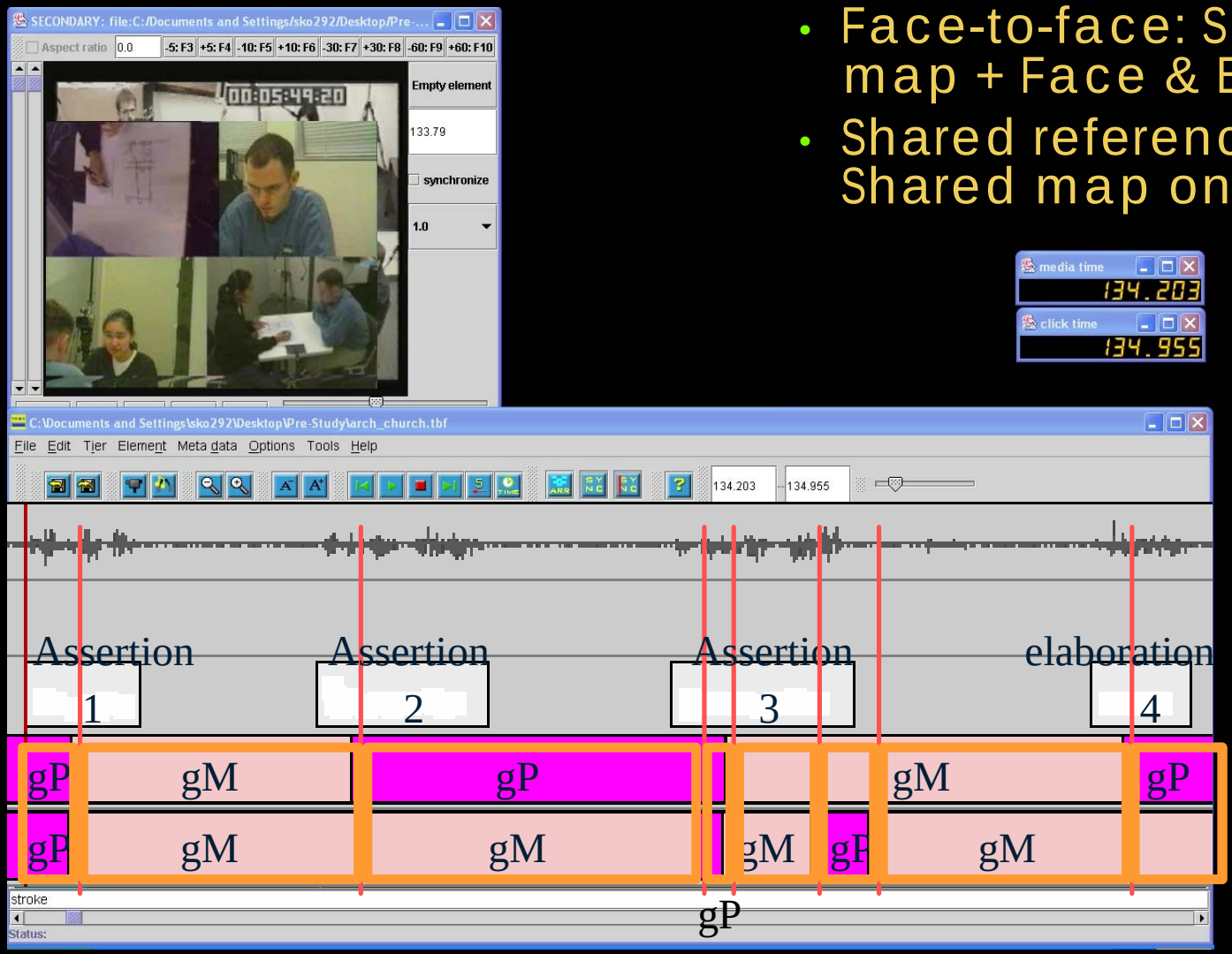
    (2) R: it's in Cubberley

    (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

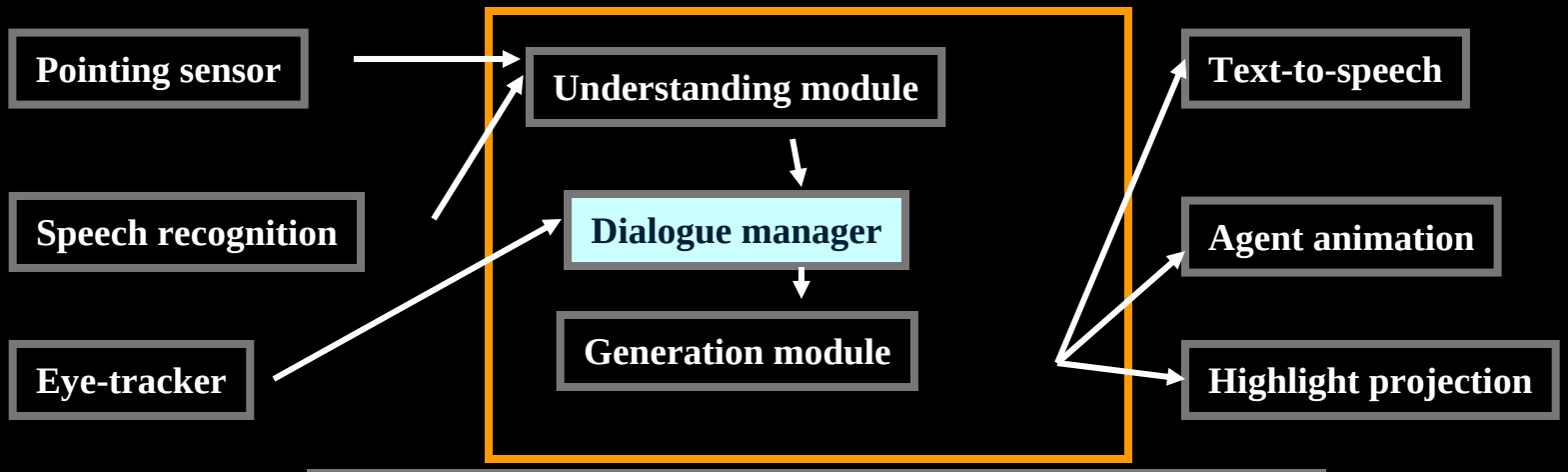
- 2 Conditions (10 Ss each)
  - Face-to-face: Shared map + Face & Body
  - Shared reference: Shared map only

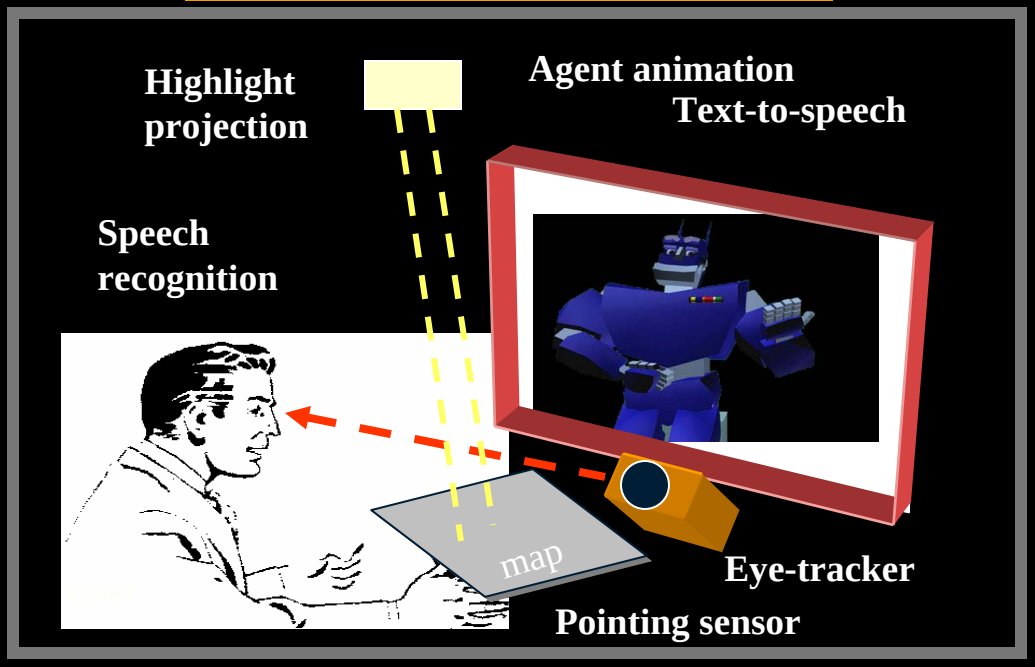


Results

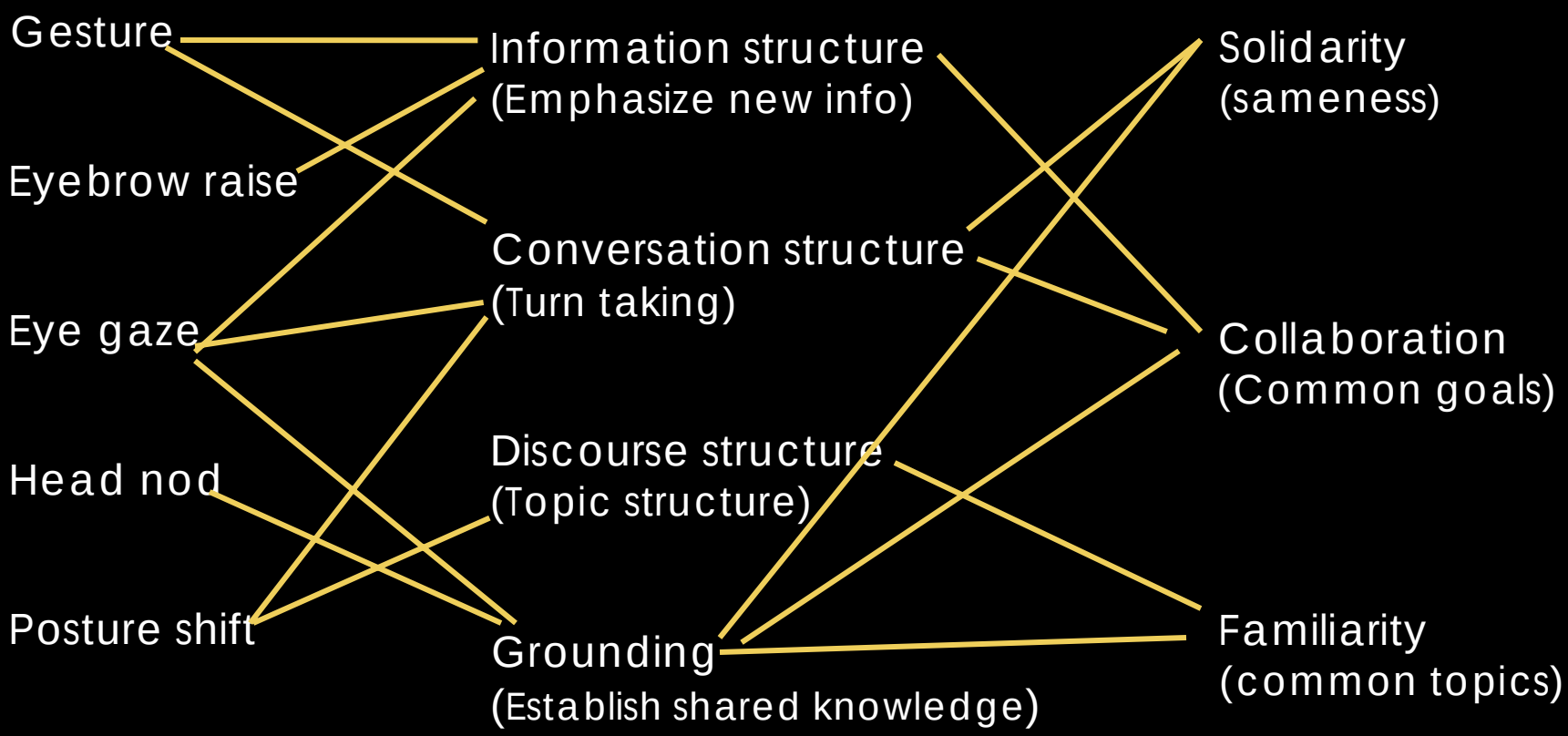
- Relationship between verbal and non-verbal acts in grounding.
  - Answer: mutual gaze during speaker's response.
  - Info-request: speakers seek mutual gaze right after the question.
  - Assertion: listener attending to the shared referent is evidence of accepting the information.
  - Acknowledgement: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

Implementation

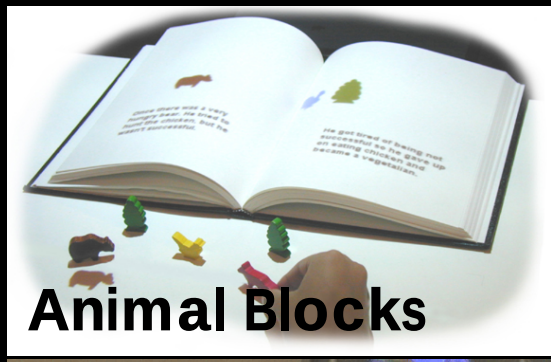


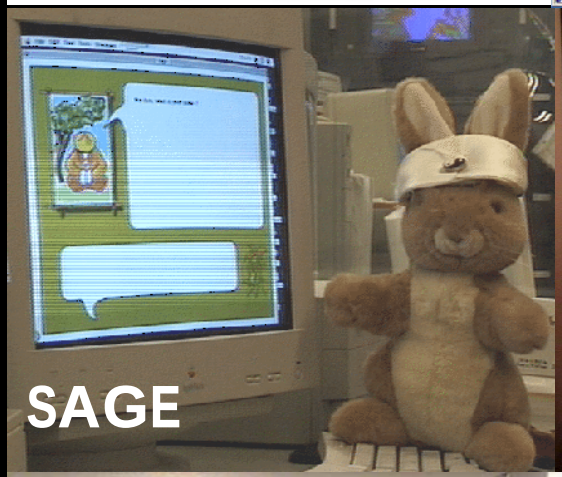


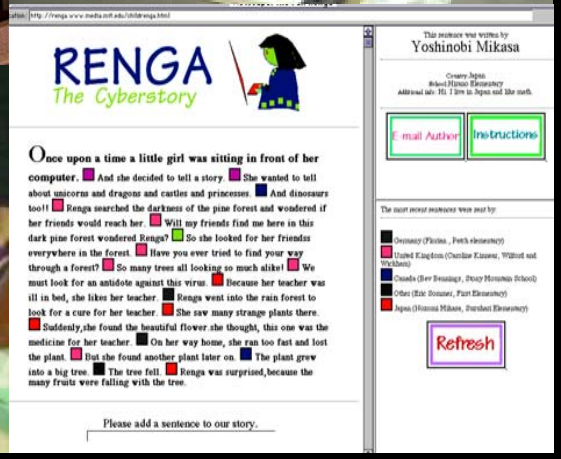
Relationship between Behavioral Cues, Linguistic Structure & Interactional Structure



Story Listening Systems







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.

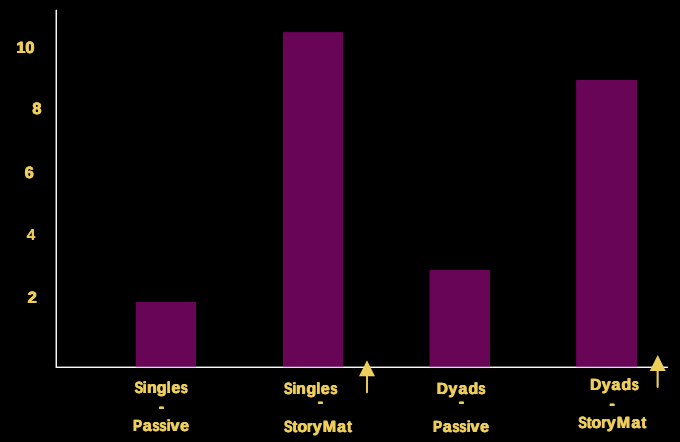
StoryMat

- Under-determined
- Reflective
- Listening

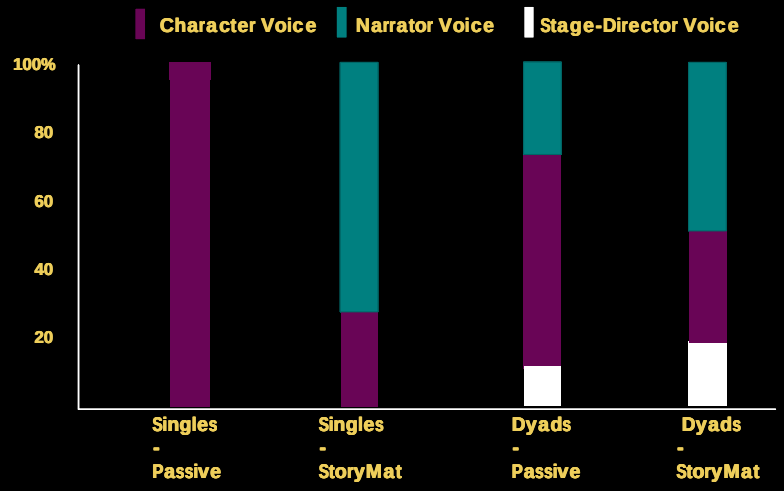
Cassell, J. and K. Ryokai (2001). "Making Space for Voice: Technologies to Support Children's Fantasy and Storytelling." Personal Technologies **5**(3): 203-224.

Results

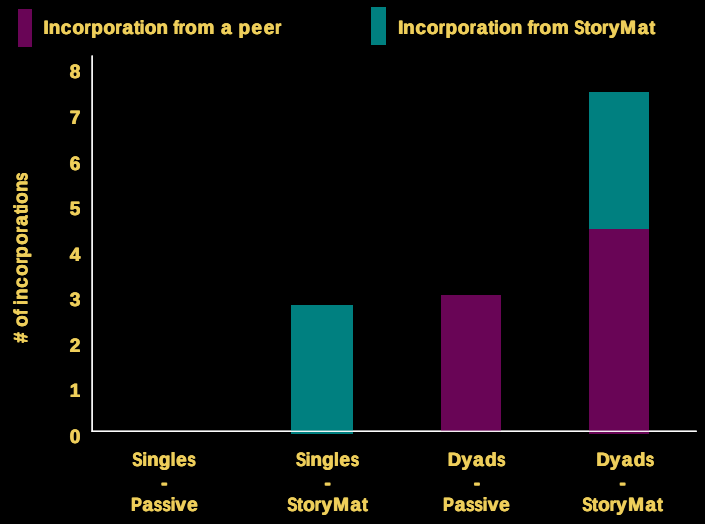
Narrative Transformations



Narrative Voice



Incorporations



Story Listening Systems: Sam

Justine Cassell | ARTICULAB

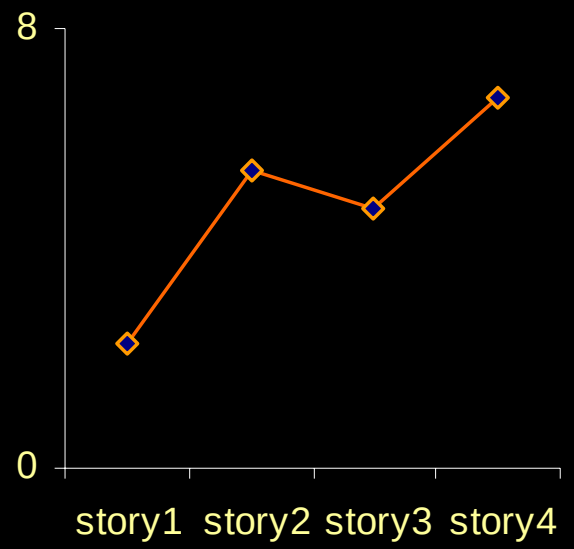
MAR 14 '01
PM 12:15

Collaborative Play

Sam as a learning partner

Increased use of *quoted speech*, and *temporal* and *spatial* information

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



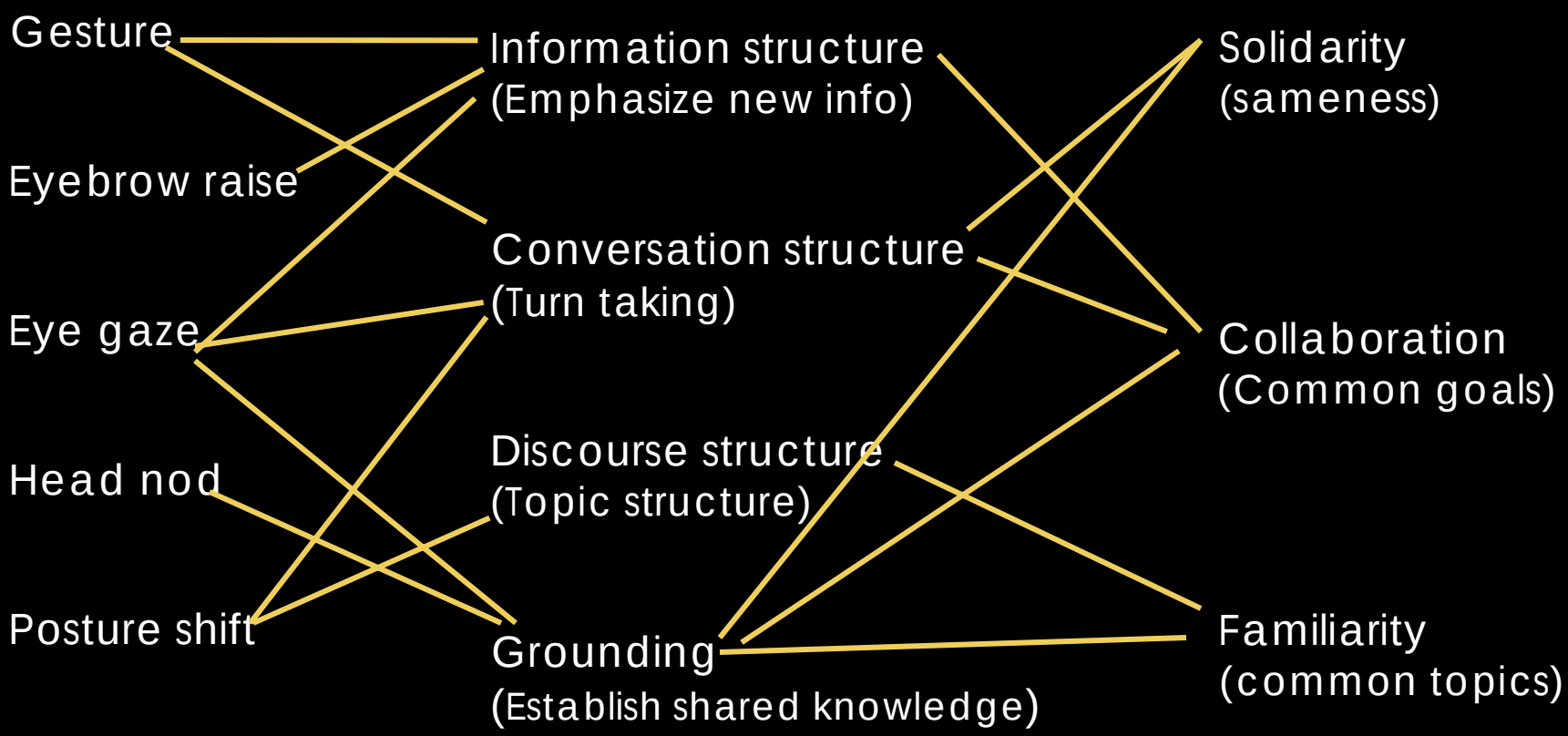
Short-term Effects

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)

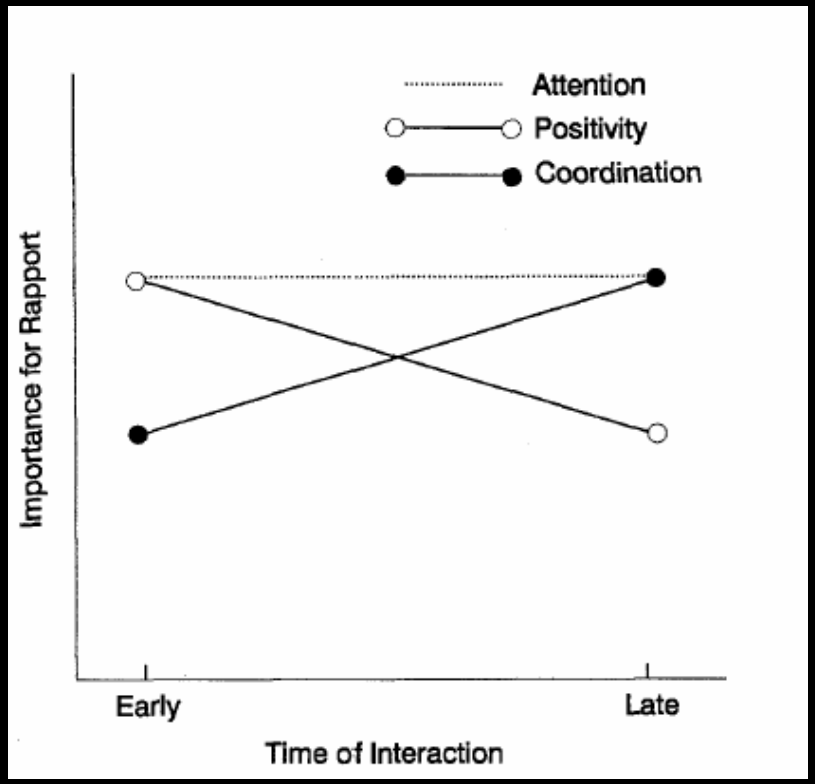
Cassell, J. (2004). Towards a Model of Technology & Literacy Development. *Journal of Applied Developmental Psychology.*

Relationship between Behavioral Cues, Linguistic Structure & Interactional Structure



Rapport

Rapport = Attention + Positivity + Coordination + Recognition



Verbal

- Entrainment
- Social Deixis

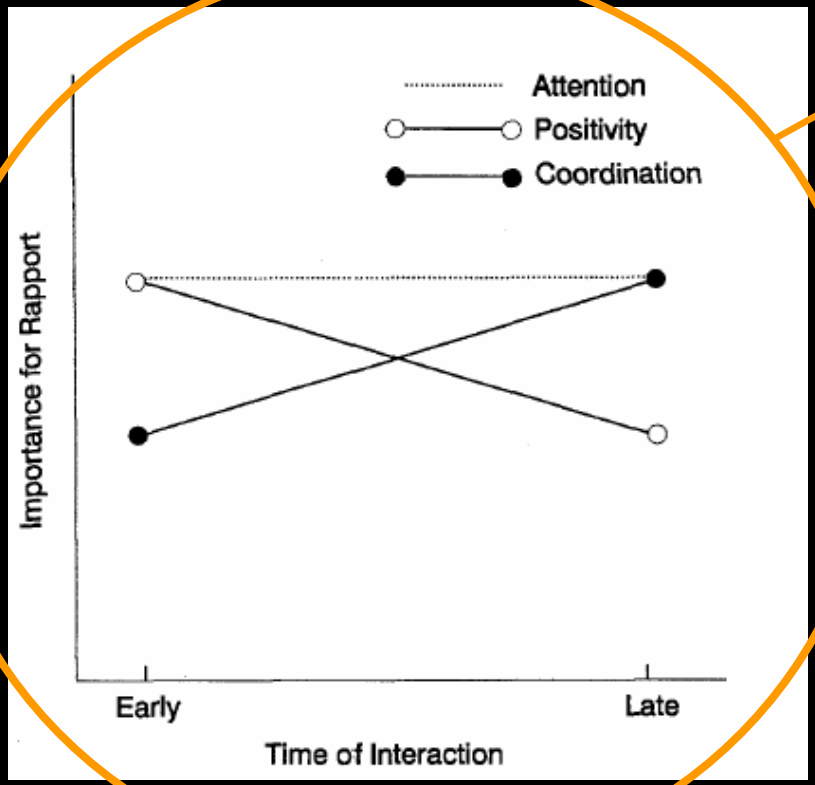
Non-Verbal

- 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

Verbal

- Entrainment
- Social Deixis

Non-Verbal

- Attentiveness- spatial configurations and bodily postures that signal accessibility
- Positivity- smiling, head nodding
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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 the 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

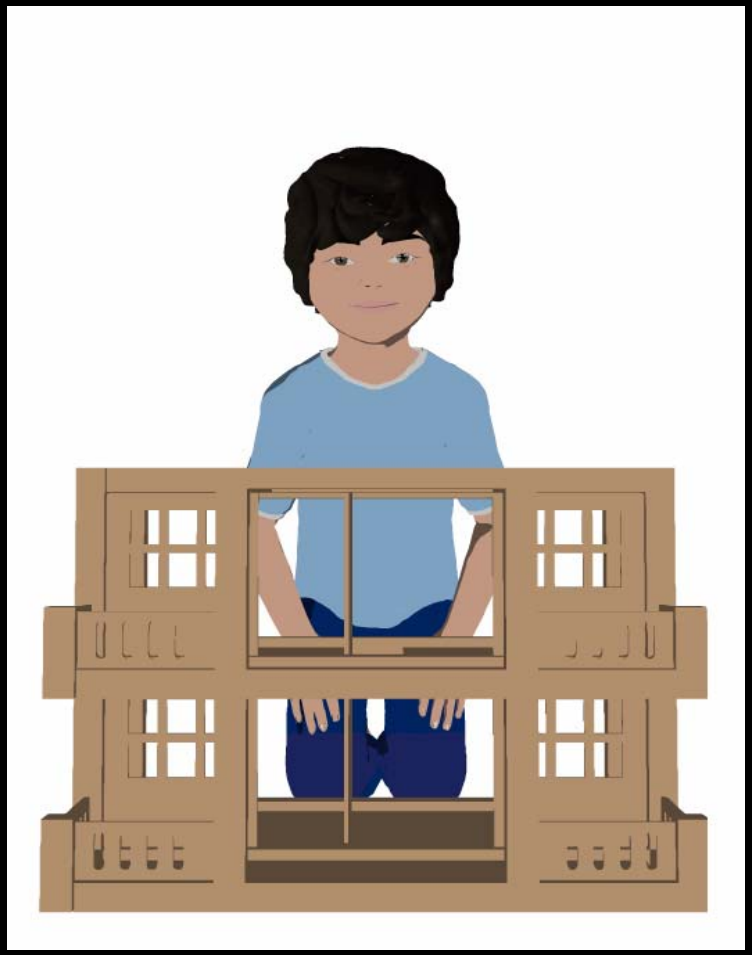
Narrative Styles: Coordination

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

Interactional Styles: Positivity

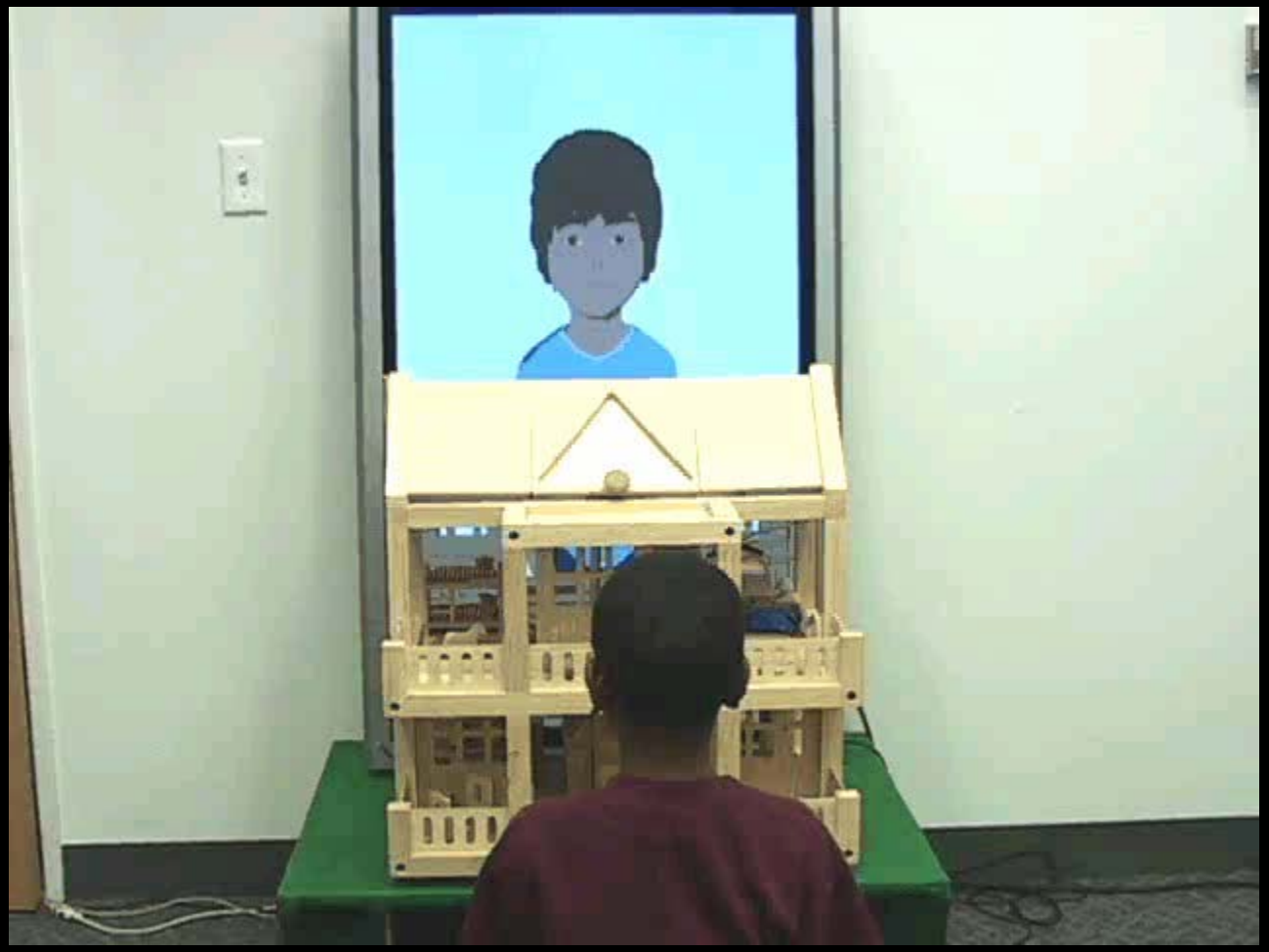
- Parataxis
- Interruption
- Simultaneous talk

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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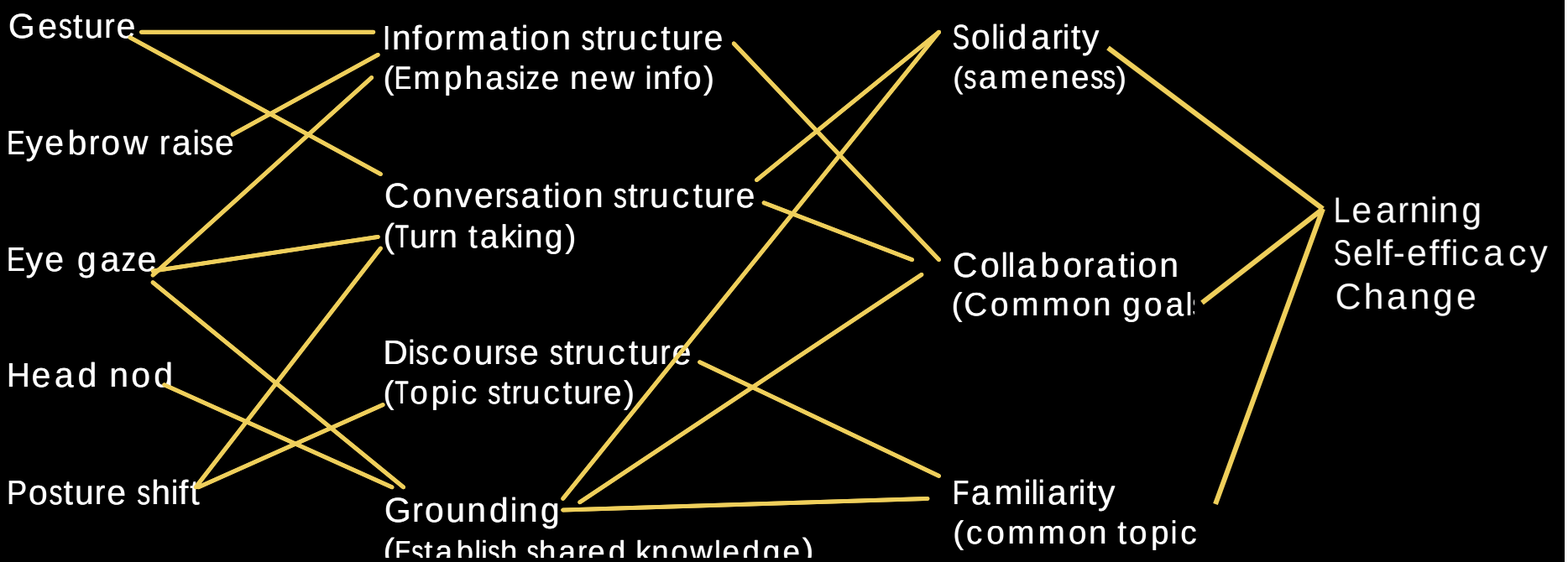

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