Collaborative Construction of Multimodal Utterances

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Embodied Interaction

Language and Body in the Material World

LEARNING IN DOING:
Social, Cognitive,
& Computational
Perspectives

CAMBRIDGE

Field trips

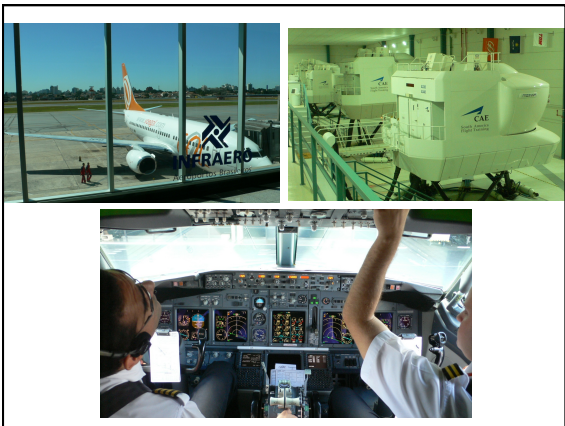|		Revenue Flights		FFS Training	
		# of flights	#of pilots observed	Hours observed	# of pilots
Japan	Aug 2005	22 legs	22 pilots	15 hours	7 pilots
	May 2007	------	------	8	4
N. America	Oct 2005	------	------	37	3
New Zealand	Nov 2005	21	14	4	2
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Brazil	Aug 2007	16	16	10	6

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Field Notes

Utterance Types in the Wild

- Multimodal utterances
- Collaboratively constructed utterances
  - Verbal Continuations
- Collaboratively constructed multimodal utterances

Relations between Gesture and Speech

		Temporal Relation		
		Concurrent	Offset	Unrelated
Semantic Relation	Congruent		Lexical Affiliate	
	Complementary	Co-expressive Speech	???	
	Unrelated			???

#1: FLAPS 5
20° Bank
- Start: Flaps 5. **FLAPS 5 speed**
- N1 45% (approx 1 knot/sec decel)
- Establish 20° bank (PF check VSI, ALT, PLI)
- Stick shaker
  - Smoothly apply MAX Power (PM adjust to GA)
  - Level wings, do not change config, retract SB
  - Power comes up, apply nose down trim
  - Airspeed increases, lower pitch to 5 - 6°
  - Approaching **Flaps 5 speed** - 65%
- Finish: **FLAPS 5 speed**

Let's see a movie

I: Level the wings ↑,
          [*models airplane roll attitude with right hand palm down*]
PF: Hmmm
I: right,
I: don't change your flap or landing gear configuration↑,
                              [*raises fingers of right hand and wags to right*]
PF: Hmmm, hmmm
I: right↑?
      [*drops hand to table. Pilots nod*]
   Retract speedbrake.
              [*right hand models pushing speedbrake lever forward and down*]
   Hopefully that's not (0.1), not gonna be a problem. (1)
              [*raises right hand wags to right, then drops to table*]
                  [*PF shakes his head side to side*]

I: (reading) PM verifies thrust is set,
          monitors altitude and airspeed,
          [*PM raises his left hand and spreads his fingers and thumb*]
          calls out any trends towards terrain.

		Temporal Relation		
		Concurrent	Offset	Unrelated
Semantic Relation	Congruent		Lexical Affiliate	
	Complementary	Co-expressive Speech		
	Unrelated			

I: For us, if we start out flaps five (1) sp..
  [*looks to computer monitor and right index point to it*]
Let's go to flaps five,
  [*raises right arm and opens right and left palms to make "five"*]
flaps five speed
  [*PF positions his hands as if to hold a yoke and pushes forward*]
that's what we are gonna go to, okay?
  [*shakes right and left hands rhythmically*]
    [*scratches left elbow with right hand*]

Semantic Relation		Temporal Relation		
		Concurrent	Offset	Unrelated
	Congruent		Lexical Affiliate	
	Complementary	Co-expressive Speech		
	Unrelated			

PM: Yes, I know difference between
  Boeing and (Company X)'s procedure.
  Our procedure just trim out at flap five speed (0.2)
I: and then
  [*makes two fists to represent holding yoke and pulls toward his chest*]
PM: keep back pressure only,
  [*I continues holding his two fists near his chest*]
  not applying any more trim.

Semantic Relation		Temporal Relation		
		Concurrent	Offset	Unrelated
	Congruent		Lexical Affiliate	
	Complementary	Co-expressive Speech		
	Unrelated			

PM: But a, it's realistic the Boeing way. (0.5)
  Because, ah
  [*I makes trim gesture*]
PF: Hmmm.
PM: We always manage to keep our trim…
  [*I nods continuously*]
I: Uh, huh.
  [*nods continuously*]
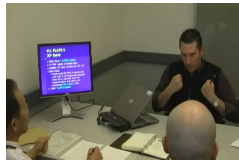PM: ( ) you know, forward out of habit.
  [*I nods continuously*]

Semantic Relation		Temporal Relation		
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PM: It's very really difficult
  [*models pushing the yoke*]
    [*I stops modeling nose up trim*]
  to get Ah, (0.5) back to normal (0.2)
  [*right hand offer shape*]
  nose down
  [*models pushing the yoke*]
PF: To ah:::: to recover from
  [*looks toward and flicks right fist toward PM*]
PM: because [ ] you have to push
  [*models pushing the yoke again*]
    [I *nods and points at PM with his right index finger*]

Semantic Relation		Temporal Relation		
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I: once those engines,
  [*cupped hands at side below shoulders*]
  they are under slung engines,
  [*two beats with cupped hands at side below shoulders*]
  right?
  The engines, these.
  [*arms extended out above previous engine gesture location*]
PF: (*unintelligible*)
  [*fingertips of both hands rotate up quickly*]
I: So, it's gonna .
  [*bends forward bringing wing gesture down*]
PF: tend to, yeah
  [*flicks fingertips up again*]
  [I: *entire body and arms come up*]
I: hhh.
  It's gonna tend to (0.3)
  [*bends at waist and lowers arms*]
  sling this airplane up.
  [*entire body and arms come up again*]

Semantic Relation		Temporal Relation		
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Coherence of gesture

- Gestures presuppose the fine details of the imagined situation

Conceptual Anticipation

- Gesture provides evidence that imagination can run ahead of talk
- One consequence of repeating the "push" gesture is that it keeps the main point active while the verbal preamble is delivered
- Participants anticipate each other's conceptual projects

Mutual elaboration of talk and gesture.

- Gesture, talk, printed words and objects all have different representational affordances.
- Gestures may enter into relations of mutual elaboration with a variety of other semiotic resources in the activity system.
  - As co-expressive speech and/or as lexical affiliates.
  - And across participants.
- Very complex semiotic fields emerge from interaction.

Collaborative construction

- The production of multi-author multimodal utterances with precise temporal and conceptual alignment indicates that the participants inhabit jointly imagined worlds.
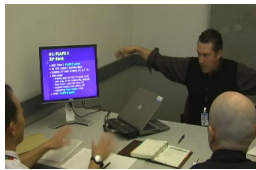
How a paper is born and grows to publication