SYMBOLIC SYSTEMS 100

May 12, 2005: Conversation

IP Notice: Some slides from Julia Hirschberg and info from Cruse and the readings

Outline

- **Conversation: a core phenomenon in high-level cognition**
- **We've seen its role in computer science.**
- **Today: Linguistics, Psychology, Philosophy**

Turns and Utterances

- **Conversation is characterized by turn-taking:**
  - Speaker A talks, then speaker B, and so on.
- **How do speakers know:**
  - Who should talk next
  - When they should talk
- **Evidence that language is structured to make this problem solvable: 'split-second timing'**
  - On overage, not much speaker overlap (~ 5% in English)
  - But little silence between turns either (less than 200 ms)
  - It takes at least this long to plan an utterance
  - So language must be set up in such a way that speakers can easily tell who should talk and when.

Turn Taking

- ## How do we know when a speaker is

  - Giving up or taking a turn?

  - Holding the floor?

  - Interruptable?

- ## How do I know when

  - Its my turn obligatorily

  - Optionally?

Simple Turn-Taking Rules

- At each transition-relevance place (TRP) of each turn:

  - If current speaker has selected A as next speaker, then A must speak next

  - If current speaker does not select next speaker, any other speaker may take next turn

  - If no one else takes next turn, the current speaker may take next turn

- TRPs are where the structure of the language allows speaker shifts to occur

Implications of the Turn-Taking Rules

- **Adjacency pairs** set up next speaker expectations
  - GREETING/GREETING
  - QUESTION/ANSWER
  - COMPLIMENT/DOWNPLAYER
  - REQUEST/GRANT

Adjacency pairs: what to say?

- **Julia Hirschberg example:**

- **Conversational partners expect certain patterns of behavior in normal conversation:**

  - Julia: You got an A? That's great!

  - Diane1: Yeah, I'm really smart you know.

  - Diane2: Well, I was just lucky I happened to read the chapter right before the test. Otherwise I never would have squeaked through.

Adjacency pairs: expected behavior

- **COMPLIMENTS are expected to be followed by DOWNPLAYERS.**

- **It doesn't have to happen**

- **But deviation is significant.**

More on deviation from expectations

- **Silence is different when it follows the first part of an adjacency pair**

- **Significant silence is dispreferred**

  A: Is there something bothering you or not? (1.0s)

  A: Yes or no? (1.5s)

  A: Eh?

  B: No.

Even more on deviation

- **We call a response that is not conversational appropriate or expected a "dispreferred" response.**

- **Things like denying a request or saying no in general are dispreferred.**
  - 'no' to a simple request without explanation
  - Changing the topic abruptly without transition

- **Indicators:**
  - "well", "um", silence

Grounding and Contributions

- Dialogue is a collective act performed by speaker and hearer

- Common ground: set of things mutually believed by both speaker and hearer

- Need to achieve common ground, so hearer must ground or acknowledge speakers utterance.

- Clark (1996):
  - *Principle of closure.* Agents performing an action require evidence, sufficient for current purposes, that they have succeeded in performing it

- (Interestingly, Clark points out that this idea draws from Norman (1988) work on non-linguistic acts)

- Need to know whether an action succeeded *or failed*

How is Closure Achieved?

- **Clark and Schaefer**

- **Each joint linguistic act is a "contribution"**

- **Two parts:**
  - Presentation
  - acceptance

Adjacency pair	Example
Part 1. Summons	A. (rings)
Part 2. Response	B. *Benjamin Holloway*
Part 1. Assertion	A. *this is Professor Dwight's secretary, from Polymania College*
Part 2. Assent	B. *ooh yes –*
Part 1. Assertion	A. *uhm . about the lexicology *seminar**
	B. **yes**
	A. *actually Professor Dwight says in fact they've only got two more m . uhm sessions to go, because I didn't realize it it . finishes at Easter*
Part 2. Assent	B. *I see, yes*
Part 1. Assertion	A. *so it . wouldn't really be .*
	B. *much point,*
Part 2. Assent	B. *. no*
Part 1. Thanks	B. *thanks very much*
Part 2. Response	A. *OK .*
Part 1. Good-bye	A. **bye**
Part 2. Good-bye	B. **bye**

Clark and Schaefer: Grounding

- **Continued attention**: B continues attending to A

- **Relevant next contribution**: B starts in on next relevant contribution

- **Acknowledgement**: B nods or says continuer like *uh-huh, yeah,* assessment (*great!*)

- **Demonstration**: B demonstrates understanding A by paraphrasing or reformulating A's contribution, or by collaboratively completing A's utterance

- **Display**: B displays verbatim all or part of A's presentation

A human-human conversation

C_1: . . . I need to travel in May.

A_1: And, what day in May did you want to travel?

C_2: OK uh I need to be there for a meeting that's from the 12th to the 15th.

A_2: And you're flying into what city?

C_3: Seattle.

A_3: And what time would you like to leave Pittsburgh?

C_4: Uh hmm I don't think there's many options for non-stop.

A_4: Right. There's three non-stops today.

C_5: What are they?

A_5: The first one departs PGH at 10:00am arrives Seattle at 12:05 their time. The second flight departs PGH at 5:55pm, arrives Seattle at 8pm. And the last flight departs PGH at 8:15pm arrives Seattle at 10:28pm.

C_6: OK I'll take the 5ish flight on the night before on the 11th.

A_6: On the 11th? OK. Departing at 5:55pm arrives Seattle at 8pm, U.S. Air flight 115.

C_7: OK.

Grounding examples

- ## Display:
  - C: I need to travel in May
  - A: And, what day in May did you want to travel?

- ## Acknowledgement
  - C: He wants to fly from Boston
  - A: mm-hmm
  - C: to Baltimore Washington International
  - [Mm-hmm (usually transcribed "uh-huh") is a backchannel, continuer, or acknowledgement token]

Grounding Examples (2)

- **Next relevant contribution:**

- **A: And you're flying into what city?**

- **Q: Seattle**

- **The second pair part of an adjacency pair grounds the first pair**

Grounding Examples (3)

- **Acknowledgement + next relevant contribution**
  - *And*, what day in May did you want to travel?
  - *And* you're flying into what city?
  - *And* what time would you like to leave?

- **The *and* indicates to the client that agent has successfully understood answer to the last question.**

Admin break

- ***** Symbolic Systems Forum *****

- **Mind Out of Matter: A History of the Quest for a Conscious Machine**

- **Jessica Riskin, History Department**
- **http://www.stanford.edu/dept/HPS/riskin.html**

- **Thursday, May 12th at 4:15pm**
- **Room 380-380C**
- **Stanford University**

Admin break: Riskin Abstract

The talk will describe my book-in-progress, which is about the genesis and early history of artificial life. The book will examine attempts to simulate the behaviors and bodily functions of living creatures from the first appearance of these attempts as thought-experiments in the mid-seventeenth century, through their transformation into actual experiments in the early eighteenth century, and ending with the widespread rejection, in the early nineteenth century, of the possibility of simulating life in mechanism. My central interest in telling this story is in the continual re-definition of life and mind, on the one hand, and of machinery, on the other, resulting from these measurements of each against the other. The terms in which nineteenth-century philosophers and engineers rejected the possibility of mechanical simulations of life implied a new understanding of life's (and machinery's) defining features. Some key elements of this new understanding would later, I believe, inform the return of artificial life in cybernetics.

Admin Break: Homework

- **Original policy: late homework not accepted**
- **You guys have asked to accept late homework with penalty**
- http://www.stanford.edu/class/symbsys100/
- **OK, seems reasonable. New policy:**
  - Late homework will be accepted for 24 hours after due date
  - Remember that due date is 10:00am.
  - Not 11:30am.
  - But late homework will have a 40% penalty.

Conversation structure & expectations depend on task

- **Telephone Openings**
  - Pat: Hell?
  - Chris: Hi, Pat. It's Chris.
  - Pat: Hi!

- **Telephone closings (6-turn)**
  - Chris: Well, I just wanted to see how you were doing
  - Pat: Thanks for calling. We'll have to have lunch sometime
  - Chris. I'd like to
  - Pat: OK
  - Chris: OK
  - Pat: See you
  - Chris: Yeah, see you

From Julia Hirschberg

Conversation structure & expectations depend on task

- **Service Encounters**
  - Clerk: Good morning. Is there something I can help you with?
  - Pat: Hi. Yeah. I wonder if you could show me
- **Meetings**
  - Boss: Today I want to focus on next year's goal statements Chris, could you report please…
  - Chris:…
  - Boss: Pat, now let's hear from yhou..
  - Pat:…
- **What about?**
  - IM?
  - Email?

From Julia Hirschberg

Presequences

Type of Pre-sequence	Example
Pre-question Response	A. oh there's one thing I wanted to ask you B. mhm
Pre-announcement Response	A. well d'you know what they got B. what –
Pre-invitation Response	A. Are you doing anything tonight? B. No.
Pre-request Response	A. Do you have hot chocolate B. Yes, we do.
Summons Response	A. Hey, Molly B. Yes?
Summons by telephone Response	A. (rings telephone) B. Benjamin Holloway
Pre-closing statement Response	A. Well okay B. Okay
Pre-narrative Response	A. I acquired an absolutely magnificent sewing machine, by foul means, did I tell you about that? B. no

Pre-requests

- A: Hi. Do you have uh size C flashlight batteries [pre-request]

- B: Yes sir [go ahead]

- A: I'll have four please [request]

- B: ((turns to get)) [response]

Why presequences

- **Avoid telling someone something they know already**

- **Put an announcement in a focused position**

- **Avoid a dispreferred response**

Disfluencies

the . [exhale] . . . [inhale] . . [uh] does American airlines . offer any . one way flights . [uh] one way fares, for one hundred and sixty one dollars

[mm] i'd like to leave i guess between [um] . [smack] . five o'clock no, five o'clock and [uh], seven o'clock . P M

around, four, P M

all right, [throat_clear] . . i'd like to know the . give me the flight . times . in the morning . for September twentieth . nineteen ninety one
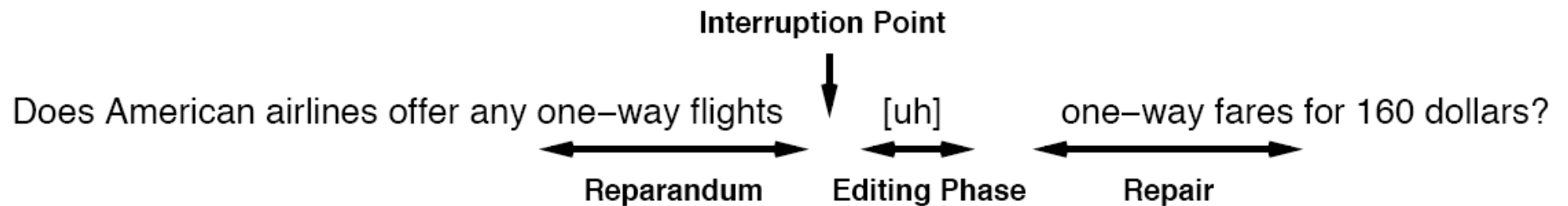
[uh] one way

[uh] seven fifteen, please

on United airlines . . give me, the . . time . . from New York . [smack] . to Boise-, to . I'm sorry . on United airlines . [uh] give me the flight, numbers, the flight times from . [uh] Boston . to Dallas

Figure 9.5   Some sample spoken utterances from users interacting with the ATIS system.

Disfluencies:
standard terminology (Levelt)

Interruption Point

Does American airlines offer any one-way flights [uh] one-way fares for 160 dollars?

← Reparandum → ← Editing Phase → ← Repair →

- **Reparandum**: thing repaired
- **Interruption point (IP):** where speaker breaks off
- **Editing phase** (edit terms): uh, I mean, you know
- **Repair**: fluent continuation

Kinds of disfluencies

- **Fillers (uh, um)**
- **Edit terms (I mean, you know)**
- **Repetitions**
- **Pauses**

Counts
(from Shriberg, Heeman)

- **Sentence disfluency rate**
  - Levelt human dialogs: 34% of sentences disfluent
  - Switchboard telephone convesrations: ~50% of multiword sentences disfluent

- **Word disfluency rate**
  - Switchboard telephone chats: 6%
  - Booking air travel: 13%

Disfluencies

- **Clark and Fox Tree**

- **Looked at "um" and "uh"**
  - "uh" includes "er" ("er" is just British non-rhotic dialect spelling for "uh")

- **Different meanings**
  - Uh: used to announce minor delays
    - Preceded and followed by shorter pauses
  - Um: used to announce major delays
    - Preceded and followed by longer pauses

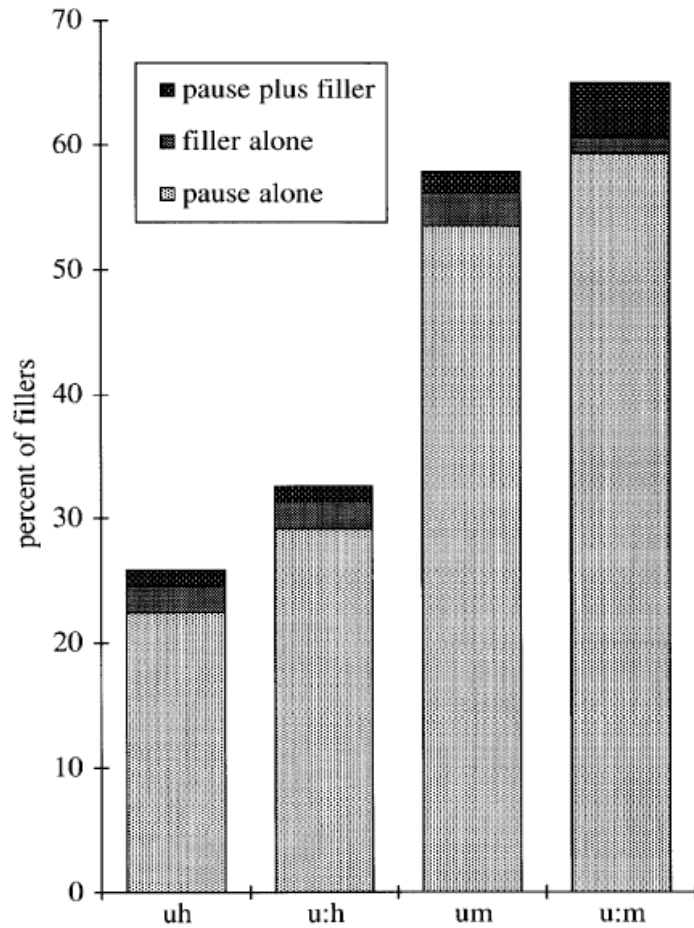# Um versus uh: delays
(Clark and Fox Tree)

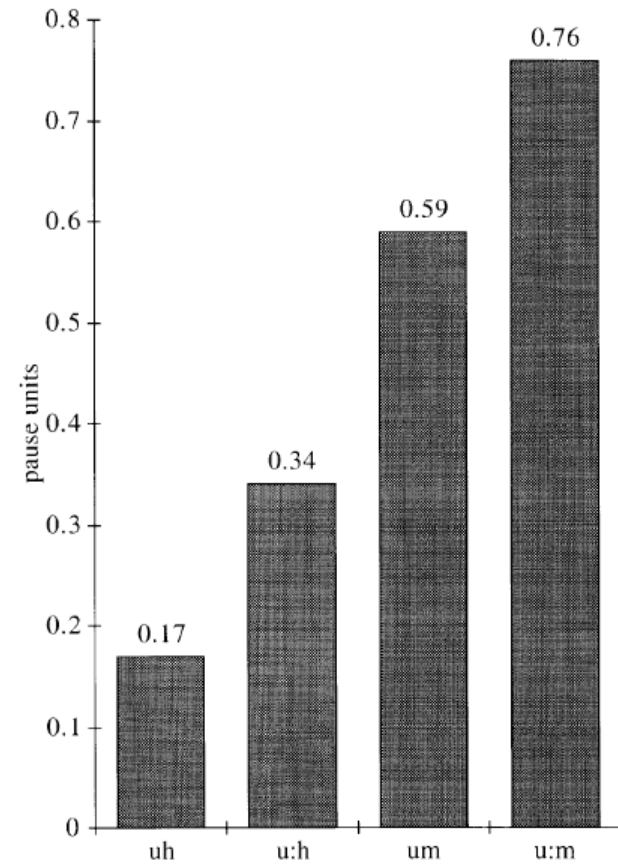Fig. 1. Percent of fillers followed by delays (LL corpus).

Fig. 2. Mean length of pauses after fillers (LL corpus).

Utterance Planning

- The more difficulty speakers have in planning, the more delays

- Consider 3 locations:
  - I: before intonation phrase: hardest
  - II: after first word of intonation phrase: easier
  - III: later: easiest

- And then uh somebody said, . [I] but um -- [II] don't you think there's evidence of this, in the twelfth - [III] and thirteenth centuries?
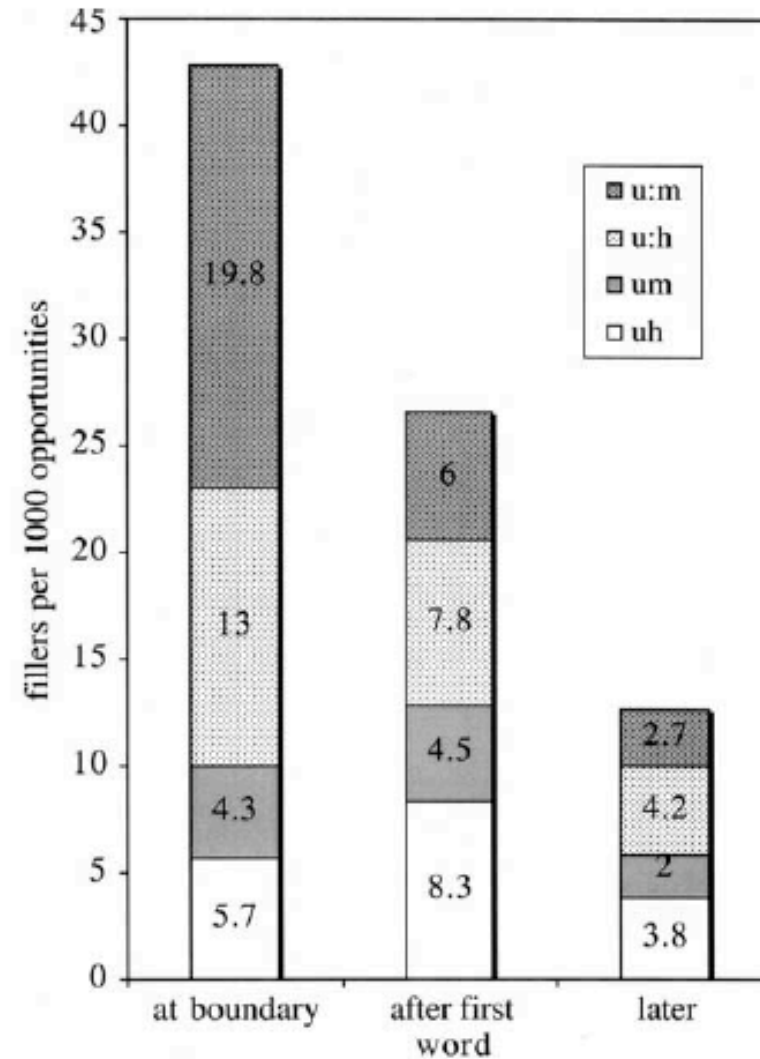
Delays at different points in phrase

Fig. 5. Rates of *uh* and *um* at three position in tone units (LL corpus).

Backchannels

- **Uh-huh**

- **Yeah**

- **What are the differences between these?**

Conversational Implicature

- **A:** And, what day in May did you want to travel?
- **C:** OK, uh, I need to be there for a meeting that's from the 12th to the 15th.
- **Note that client did not answer question.**
- **Meaning of client's sentence:**
  - **Meeting**
    - **Start-of-meeting: 12th**
    - **End-of-meeting: 15th**
  - **Doesn't say anything about flying!!!!!**
- **What is it that licenses agent to infer that client is mentioning this meeting so as to inform the agent of the travel dates?**

Conversational Implicature (2)

- A: … there's 3 non-stops today.
- **This would still be true if 7 non-stops today.**
- **But no, the agent means: 3 and only 3.**
- **How can client infer that agent means:**
  - *only 3*

Grice: conversational implicature

- **Implicature means a particular class of licensed inferences.**

- **Grice (1975) proposed that what enables hearers to draw correct inferences is:**

- **Cooperative Principle**

  - **This is a tacit agreement by speakers and listeners to cooperate in communication**

4 Gricean Maxims

- **Relevance: Be relevant**

- **Quantity: Do not make your contribution less (1) or more (2) informative than required**

- **Quality: try to make your contribution one that is true (don't say things that are false or for which you lack adequate evidence)**

- **Manner: Avoid ambiguity and obscurity; be brief and orderly**

Relevance

- **A:** Is Regina here?
- **B:** Her car is outside.
- **Implication:** yes
  - **Hearer thinks:** why would he mention the car? It must be relevant. How could it be relevant? It could since if her car is here she is probably here.
- **Client:** I need to be there for a meeting that's from the 12th to the 15th
  - **Hearer thinks:** Speaker is following maxims, would only have mentioned meeting if it was relevant. How could meeting be relevant? If client meant me to understand that he had to depart in time for the mtg.

Quantity

- A:How much money do you have on you?

- B: I have 5 dollars

  - Implication: not 6 dollars

- Similarly, 3 non stops can't mean 7 non-stops (hearer thinks:

  - if speaker meant 7 non-stops she would have said 7 non-stops

- A: Did you do the reading for today's class?

- B: I intended to

  - Implication: No

  - B's answer would be true if B intended to do the reading AND did the reading, but would then violate maxim

Quantity

- **What did you have for lunch today?**
  - Baked beans on toast
  - Food
    - Violates quantity 1
  - 87 warmed-up baked beans served on a slice of toast 12.7x10.3cm, which had been unevenly toasted
    - Violates quantity 2

Manner

- Avoid obscurity, ambiguity, unnecessary prolixity and be orderly.

- Miss X produced a series of sounds that corresponded closely with the score of "Home Sweet Home"

What can you do with Maxims

- **Obey them**

- **Violate them (I.e. deceive)**

- **Face a conflict (I'd like to tell you more, but I don't have the information)**

- **Exploit them: I.e. intentionally violate them to signal a hidden meaning:**

- http/www.xent.com/FoRK-archive/august97/0376.html

How to deceive without lying

- **Mom: Where are you going?**
- **Little George: I'm going to the candy store.**

- **If little George is also going to the pool hall, his sentence is true.**
- **But what it implicates is false**
- **This implicates (via QUANTITY) something that is false, I.e. that I am ONLY going to the candy store**

What is said versus implicatures

- **What is said + what is implicated = overall meaning**

- **"What is said" = proposition**

- **Propositions can be challenged or agreed with:**
  - A: It's raining
  - B: That's not true

  - A: The correct answer is '7'
  - B: I agree

Text from web from lecture on Cruse

What is said vs. implicatures

- **Implicatures (symbolized with +>) cannot be directly challenged or agreed with:**
- **A: Theo is an excellent typist and has a sunny disposition**
- **+> Theo is not a very good cognitive scientist.**
- **B: "That's not true./I agree"**
- **Not: B denies/agrees that Theo is not a very good linguist**

Conclusions

- **Conversation**
  - **A really key phenomenon of high-level cognition**
  - **Studied in linguistics, philosophy, psychology, computer science**
  - **Study is still only in its infancy!**
  - **I hope some of you will be inspired to look into conversation!**