

Interaction and Communication (1)

Simon Garrod

Overview

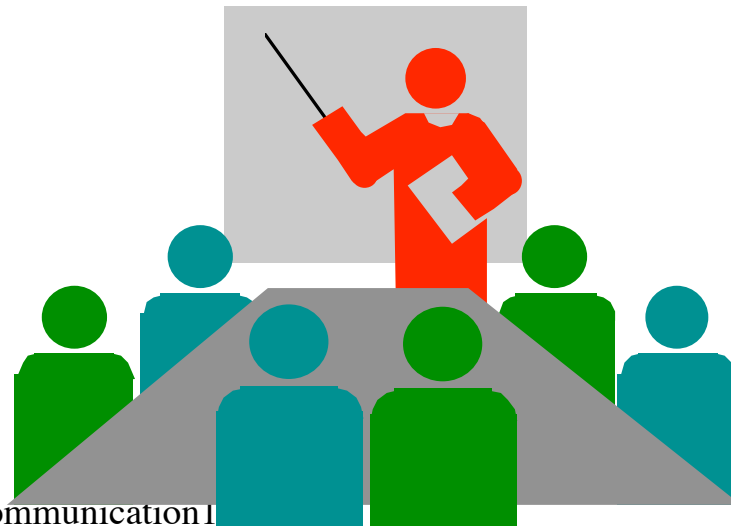
- What is communication?
- Interactive *vs* non-interactive communication
- Interactive linguistic & graphical communication
- Group communication
- Communication & complex problem solving

Lecture 1

- Outline different theories of communication
- Argue for the priority of dialogue over monologue
- Discuss psychological approaches to dialogue
- Discuss the problem of coordinated action
- Contrast communication via monologue and dialogue

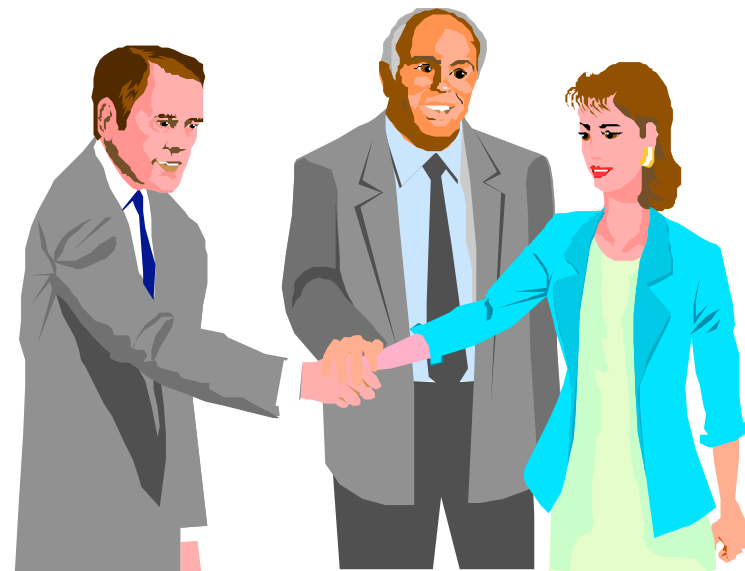
Communication 1

- Standard Theory (Cherry, 1956)
 - information transfer
 - sender → information → receiver
 - autonomous activity



Communication 2

- dialogue account
 - information alignment
 - conv1 ↔ information ↔ conv2
 - joint action



Contrasting Communication 1&2

- Information Transfer
 - engineering origins
 - meaning in the code
 - decoupled processing
 - monologue account
- Information alignment
 - bio/social origins
 - meaning in consensus
 - tightly coupled processing
 - dialogue account

Dialogue is the basic setting for language use

- Universal among language users
 - Producing or understanding monologue requires special skills (or education)
- Essential for language acquisition
 - Coupling between production and comprehension
- Predates reading and writing (monologue) by thousands of years?

Psychology & Dialogue

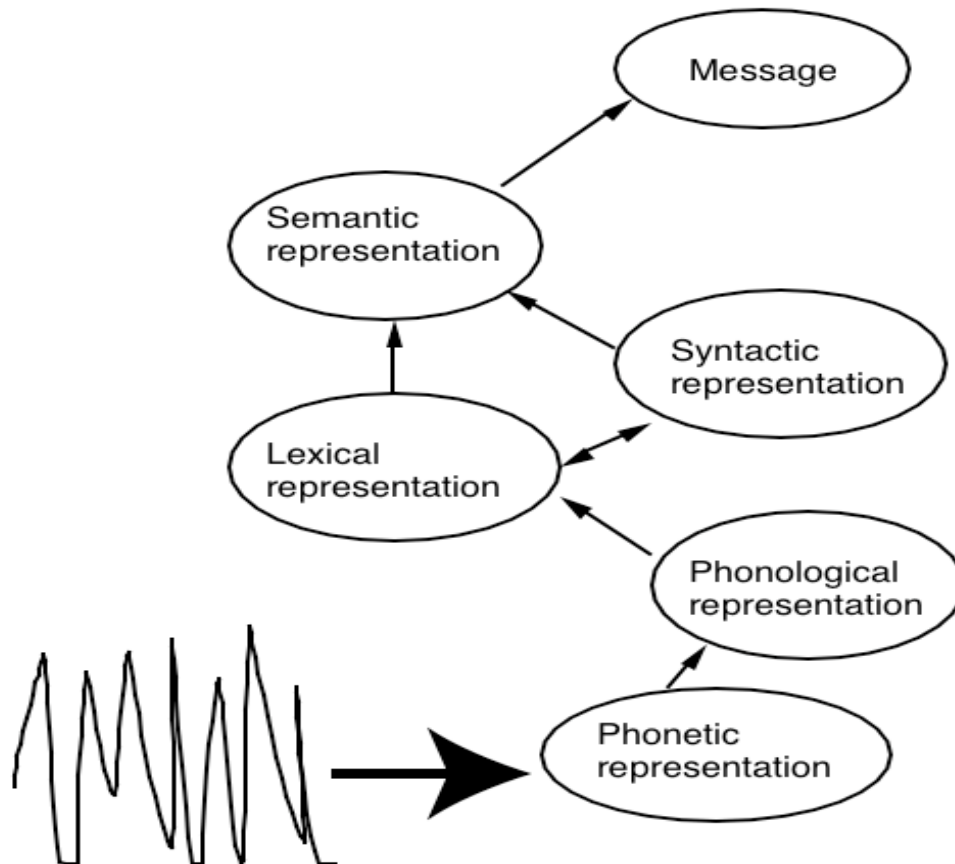
(Clark, '95)

- “language as product” approach
 - Mechanisms for computing levels of linguistic representation
 - Based on monologue (production and comprehension)
- “language as action” approach
 - Action-based account in terms of intentions
 - Based on interactive communication (dialogue)

Language as product

- Combines cognitive psychological account with generative linguistic account
- Treats language processing as translation
 - comprehension -- translating from sound to meaning
 - Production -- translating from message to sound
- Uses psychological experiments to test accounts of each of these translation processes

Example of levels of representation for comprehension



Mechanistic theory of dialogue?

- Dialogue is basic
- Mechanistic theory should:
 - Reflect different processing context of dialogue and monologue (i.e., minimally 2 interacting agents)
 - Explain why dialogue is so easy for humans and why monologue is so difficult
 - Explain how different levels of representation are processed in a dialogue context

What does this mean?

- Minimal monologue system

Individual - as speaker

Individual - as listener

- Minimal dialogue system

Interlocutor1 ↔ Interlocutor2

Standard theory of communication(monologue)

Information Transfer (Cherry,1956)

sender → signal(information) → receiver

- sender encodes-- receiver decodes
- *Autonomous* processes

Example monologue

Some routines are no doubt stored long-term; for example, repetitive conversational patterns such as *how do you do?* and *thank you very much*. Although there are clearly difficult issues deciding what is a routine, some corpus studies suggest that routines account for as much as 30% of dialogues, so they are extremely common. However, in addition to these routines, we argue that routines are set up during the current dialogue. In other words, if an interlocutor uses an expression in a particular way, it can then be accessed as a routine by the other interlocutor in the next utterance (and also, presumably, in comprehension). We call this process *routinization*. It is due to coordination at different linguistic levels.

Example maze dialogue

1-----**B:** Tell me where you are?

2-----**A:** Ehm : Oh God (*laughs*)

3-----**B:** (*laughs*)

4-----**A:** Right : two along from the bottom one up:

5-----**B:** Two along from the bottom, which side?

6-----**A:** The left : going from left to right in the second box.

7-----**B:** You're in the second box.

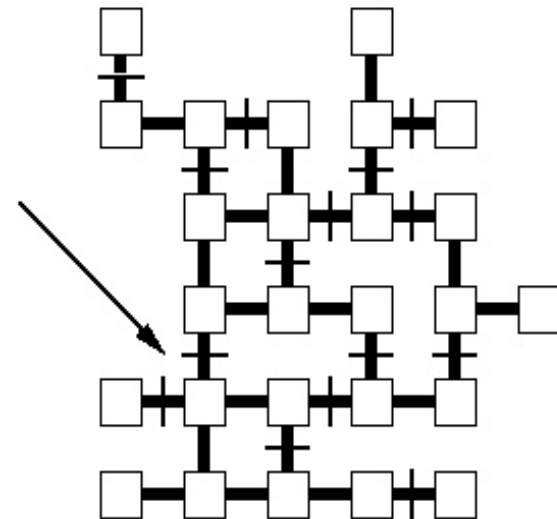
8-----**A:** One up (*1 sec.*) I take it we've got identical mazes?

9-----**B:** Yeah well : right, starting from the left, you're one along:

10-----**A:** Uh-huh:

11-----**B:** and one up?

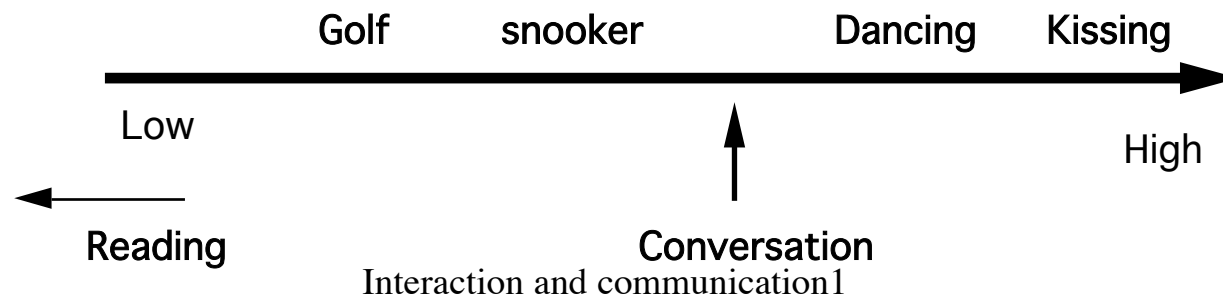
12-----**A:** Yeah, and I'm trying to get to ...



Dialogue as joint action(Clark, '95)

- Joint actions
 - *coupled* actions (e.g., ballroom dancing)
 - require *coordination*

Joint Action - degrees of coupling



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Dialogue as joint action

Joint contributions

- Adjacency pairs (Schegloff et al. '73)
 - Question-Answer
 - Greeting-Acknowledgement
 - Statement-Affirmation
- Joint reference (Clark, '96)

Adjacency pairs or dialogue moves

- 1----**B:** Tell me where you are? ←
- 2----**A:** Ehm : Oh God (*laughs*)
- 3----**B:** (*laughs*)
- 4----**A:** Right : **two along from the bottom one up:** ←
- 5----**B:** Two along from the bottom, which side?
- 6----**A:** The left : going from left to right in the second box.
- 7----**B:** You're in the second box.
- 8----**A:** One up :(*1 sec.*) I take it we've got identical mazes?
- 9----**B:** Yeah well : right, starting from the left, **you're one along:** ←
- 10----**A:** Uh-huh: ←
- 11----**B:** **and one up?**
- 12----**A:** Yeah, and I'm trying to get to*etc.*
- Question1

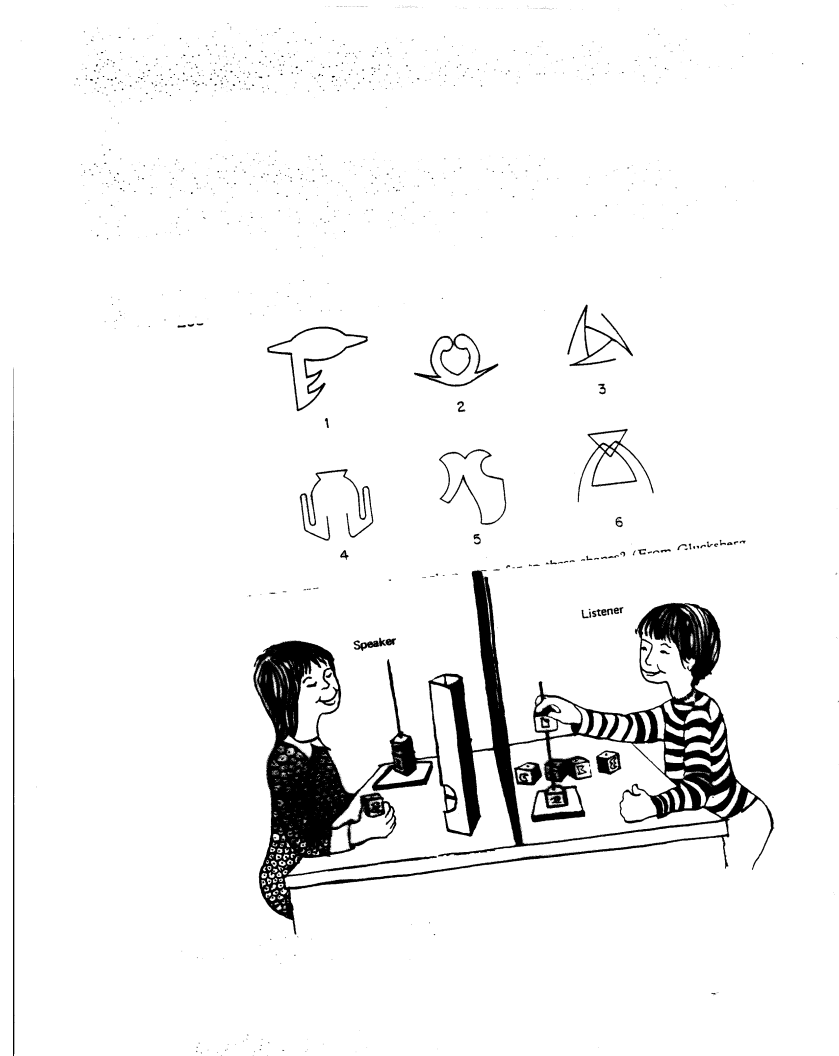
Answer1
- Statement1

Affirmation 1

Collaborative reference

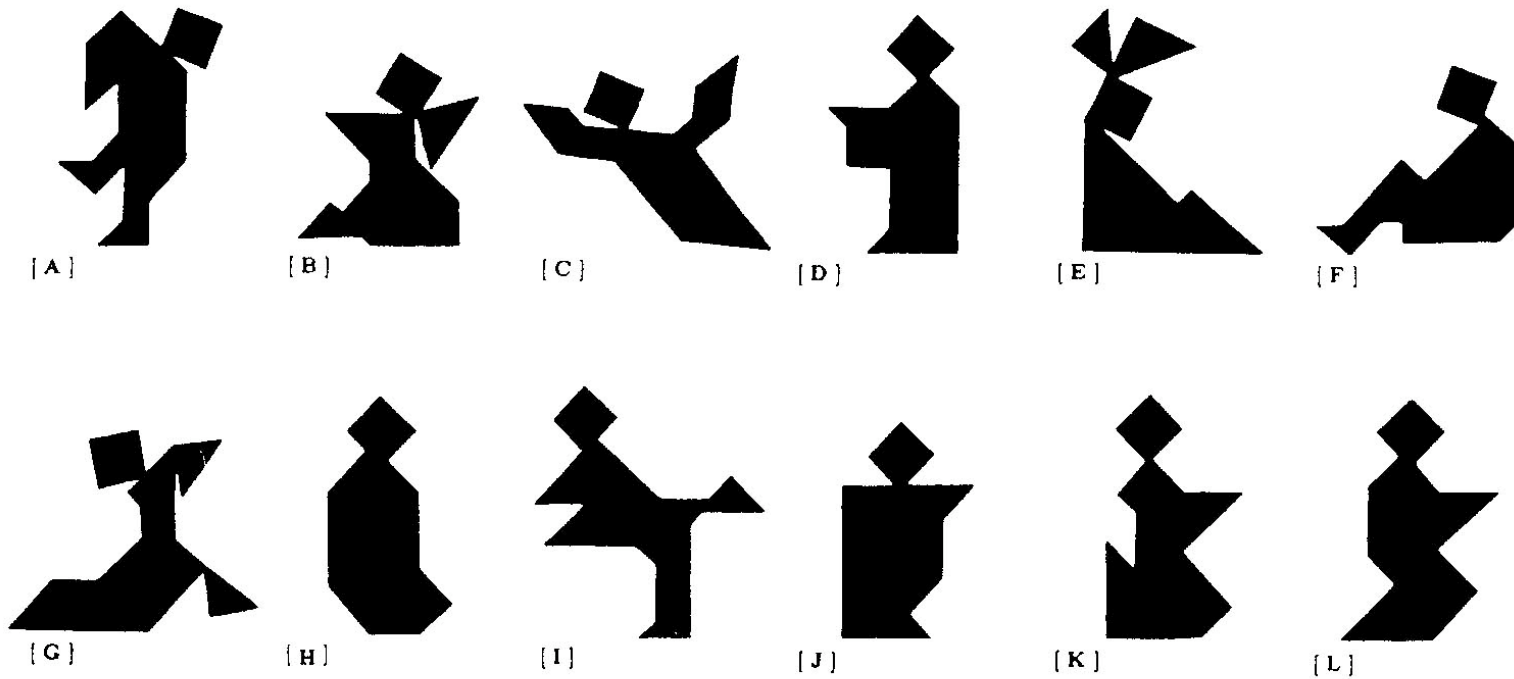
- Krauss et al. 1960s
 - Referential communication paradigm
- Clark et al. 1980-90
 - Tangram task
- Schober & Clark (1989)
 - Effects of participant status on reference

Referential communication task (Krauss et al.)

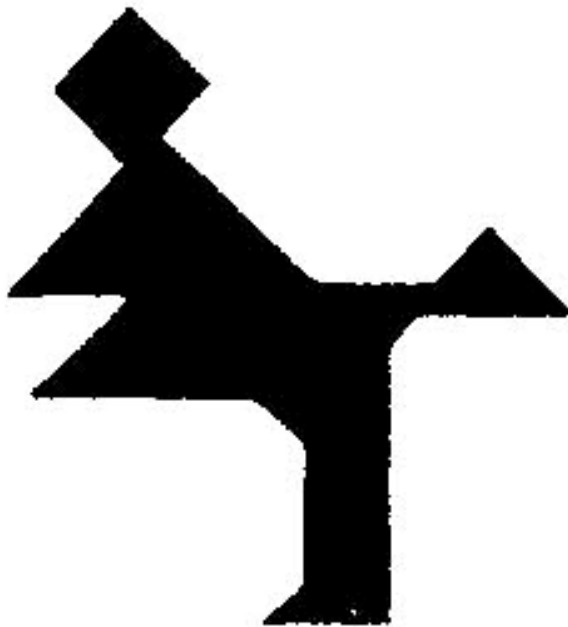


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Chinese Tanagram figures used by Clark and Wilkes-Gibbs (1986)



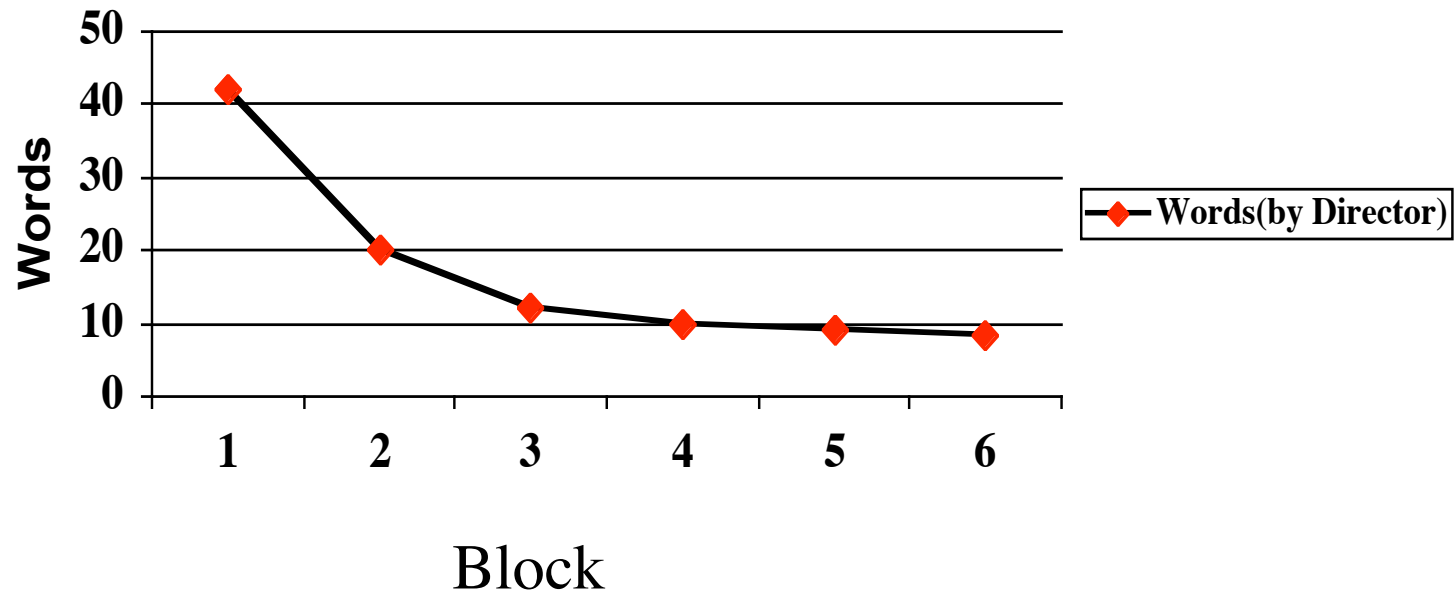
Joint reference



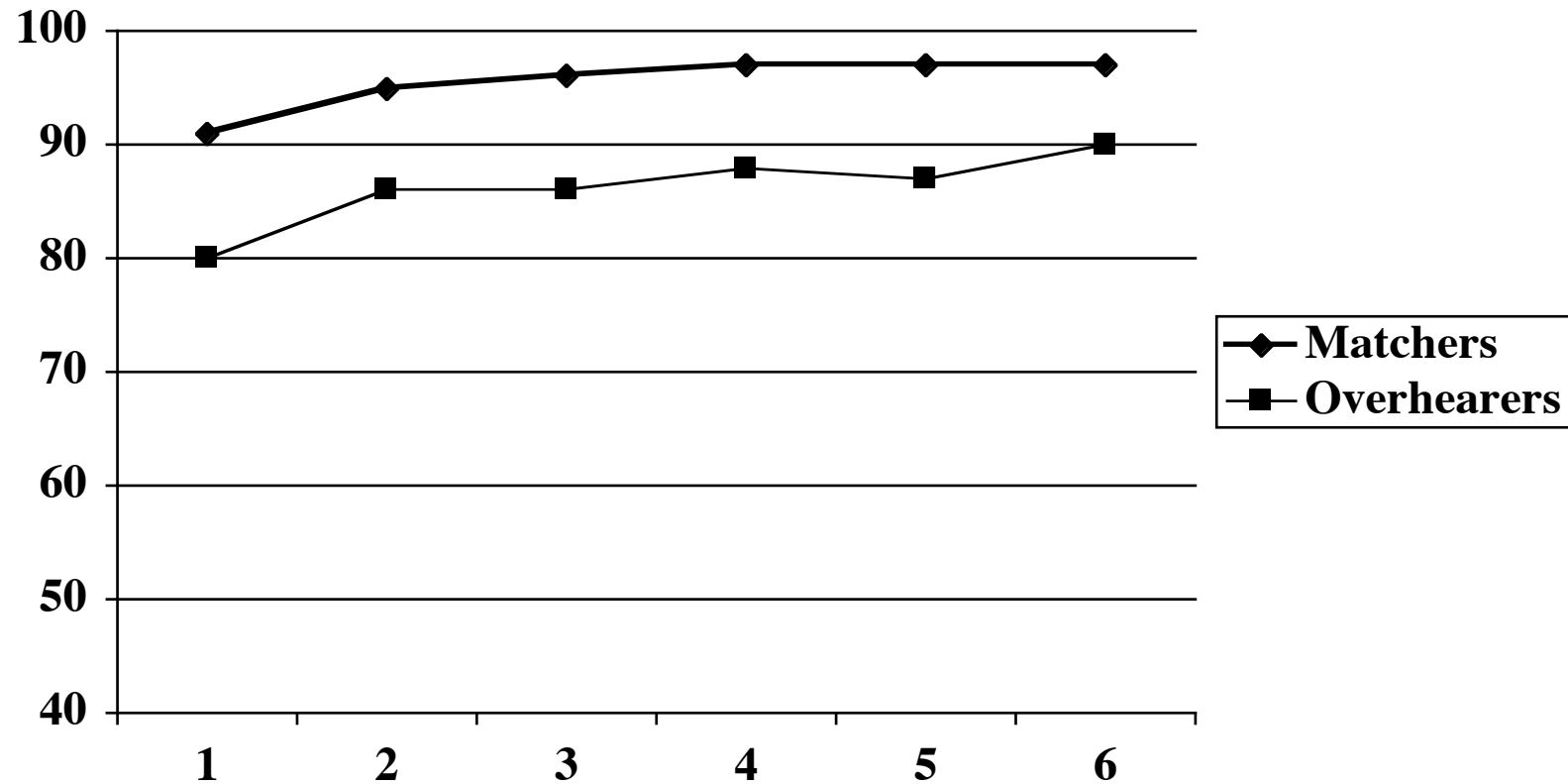
[1]

- 1 All right the next one looks like a person who's ice skating, except they're sticking two arms out in front
- 2 Um, the next one's the person ice skating that has two arms
- 3 The third one is the person ice skating, with two arms
- 4 The next one's the ice skater
- 5 The fourth one's the ice skater
- 6 The ice skater

Referential reduction



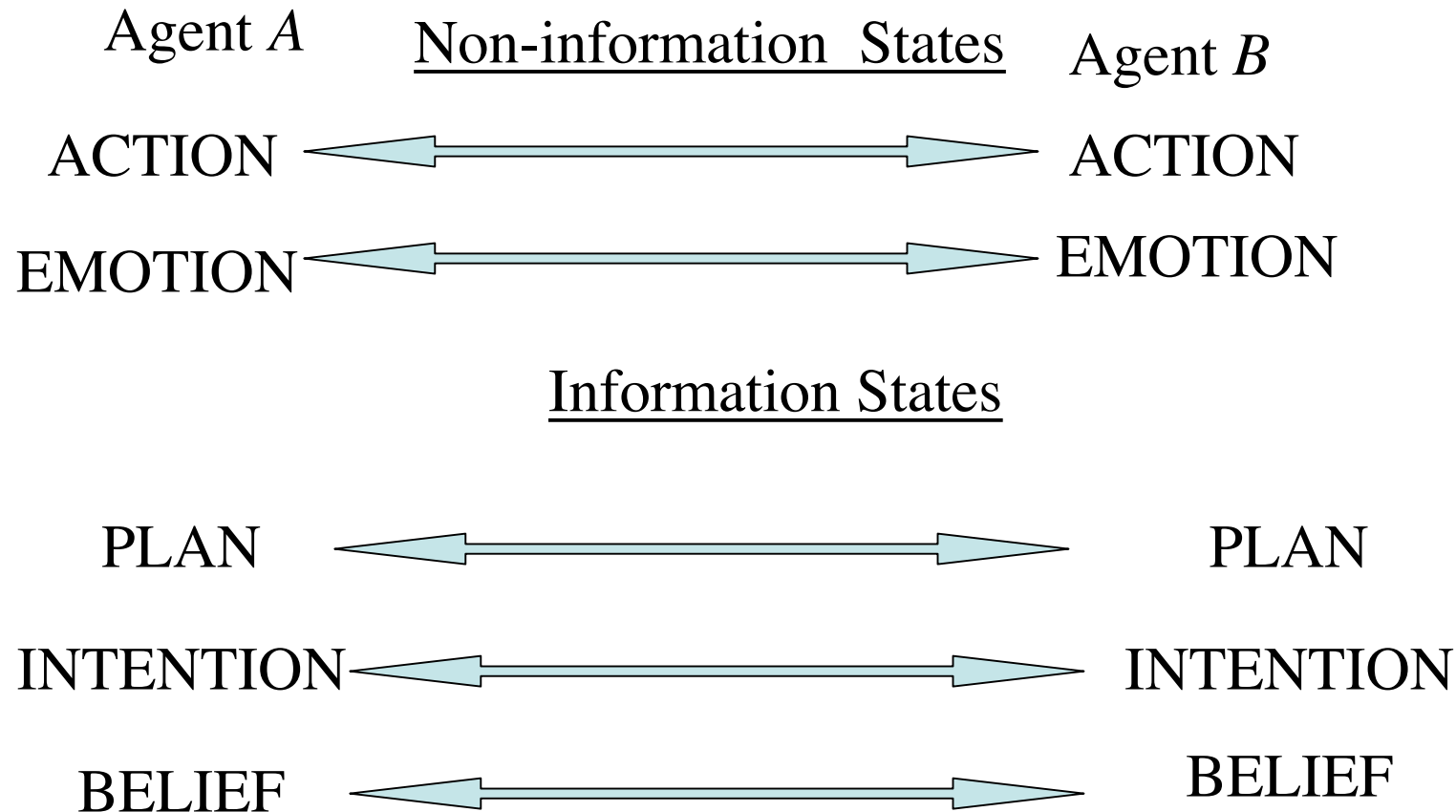
Overhearers' Understanding (Schober & Clark, 1989)



Conclusion

- Dialogue is a collaborative process(Clark & Wilkes-Gibbs, '86)
 - Only by being involved in the conversation can you ensure that what has been communicated has been understood or 'grounded'.

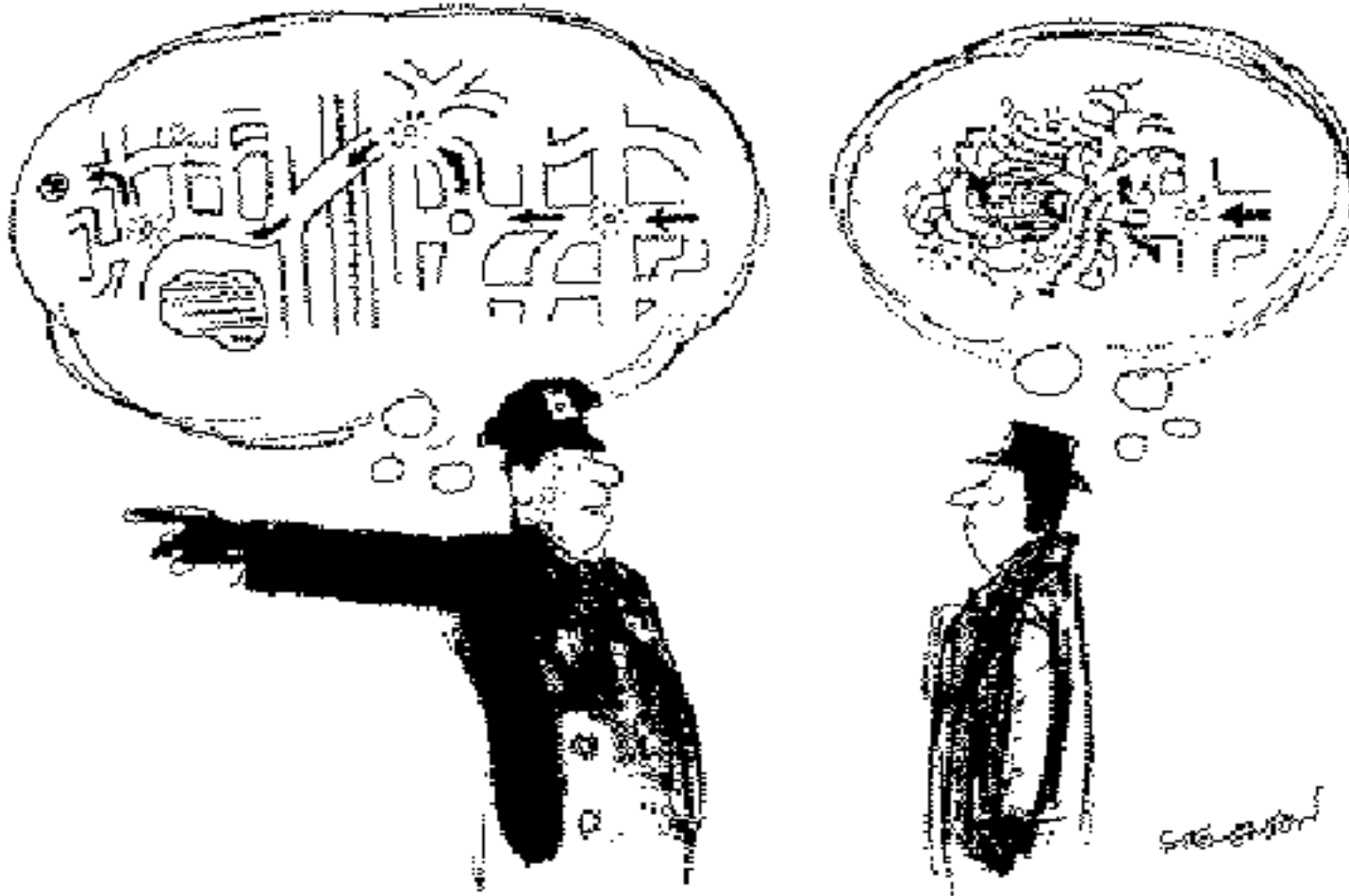
Interactive communication as alignment



Alignment of non-information states

- Behavioral mimicry (Dijksterhuis & Bargh, 2001)
 - Perception-behavior expressway
 - Postural alignment (Fowler et al. 2003)
 - Mimicry of incidental movements (Chartrand & Bargh, 1999)
- Emotional contagion (Neuman & Strack, 2000)
 - Infectious yawning

Dialogue and alignment of information states



Drawing by Stevanor: © 1974 The New Yorker Magazine, Inc.

Theories of Human Communication(2)

Information State Alignment (Pickering & Garrod, 2004)



- Two-way coupled process
- Meaning in the consensus
- Dialogue

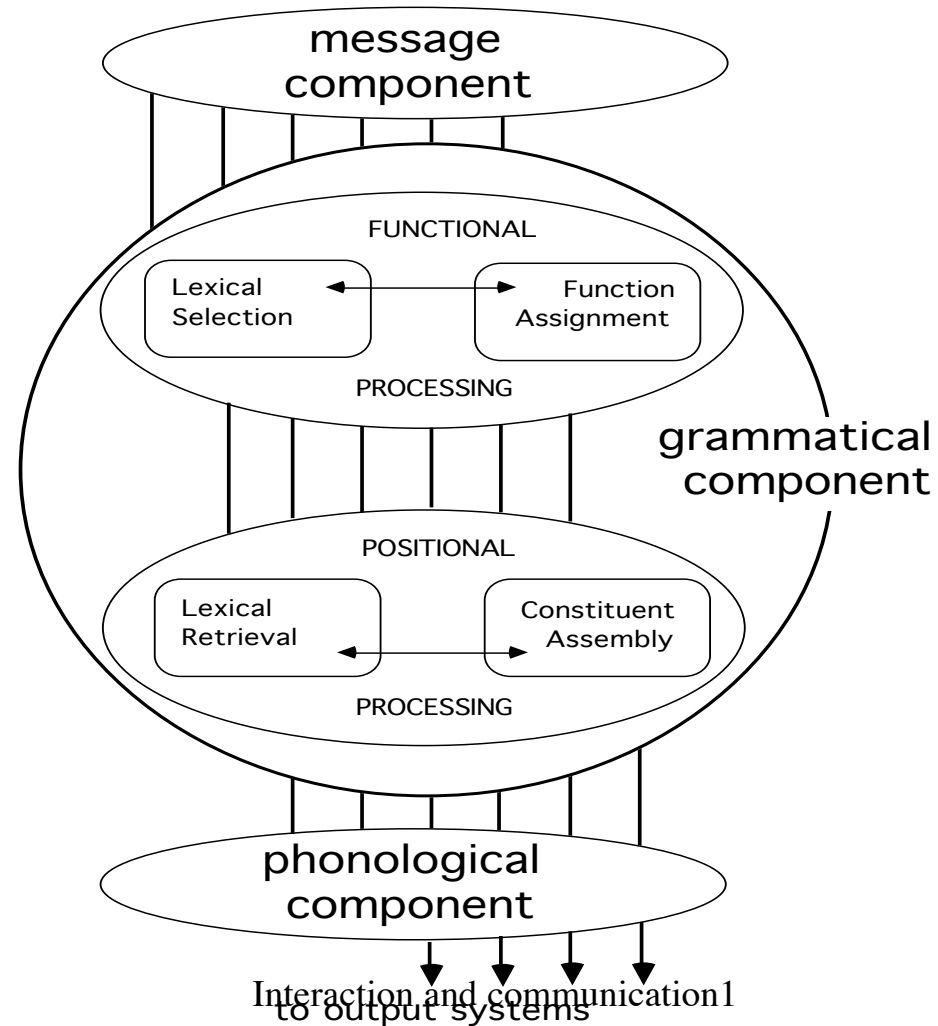
Contrasting monologue and dialogue

- Monologue
 - Decoupled production and comprehension
 - Meaning in the code
 - Communication as transfer of information
- Dialogue
 - Tightly coupled comprehension and production
 - Meaning in the consensus
 - Communication as alignment of information states

Decoupled Production & Comprehension

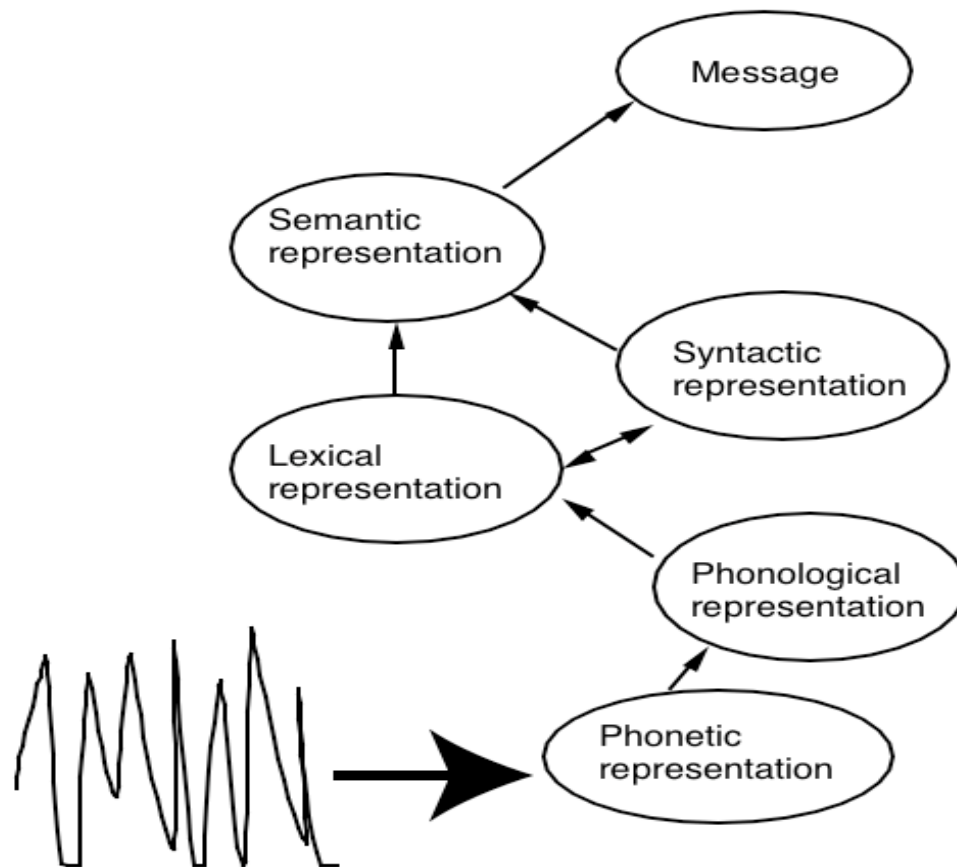
- Production as one process (from “intention to articulation”)
- Comprehension as one process (from sound to meaning)
- Comp/prod only linked by sound

Language production (Bock&Huitema, 2000)



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Language Comprehension(anon)



Dialogue as joint action(Clark, '95)

- Joint activities
 - court case, shopping, holding a meeting
 - *settings, roles & joint actions*
- Joint actions
 - *coupled* actions (e.g., ballroom dancing)
 - require *coordination*

How does alignment come about?

- “Language as action” approach
 - Joint actions and coordination directed inferences lead to aligned interpretations

Problems of coordination

- Autonomous Action - interacting with non-agents
 - How will non-agents behave?
- Joint Action - interacting with other agents
 - How will interacting agent behave? (Lewis, '69)
 - What do you think they expect you to do?
 - What do they think you expect them to do?
 - What do you think they think you expect them to do?
 - etc.
 - etc.

Meeting Problem

- Arranged to meet a friend at the station at 11.00 am but you haven't fixed precisely where to meet.
- Where do you go to meet them?

Coordination Equilibria

Agent1/ Agent2	X1 Clock	X2 Entrance	X3 Platform
Y1 Entrance	0	1	0
Y2 Clock	1	0	0
Y3 Platform	0	0	1

Non-inferential solution

- Coordination arises from incidental alignment
 - Common salience
 - Common precedence

Inferential solution

- Coordination arises from common knowledge
 - Agents *Xavier* and *Yolande* have common knowledge of P when:
 - 1) *X* and *Y* know that P
 - 2) *X* and *Y* know that (1)

Possible means of finding coordination equilibria

- Salience (Schelling, '62)
 - Choose the most obvious course of action
- Precedence (Schiffer, '72)
 - Choose what you chose before
- Convention (Lewis, '69)
 - Choose the action that it is common knowledge that everyone else will choose because it is common knowledge that the choice solves the coordination problem facing your community

Joint Actions (summary)

- interaction means joint action
- joint action requires coordination
- coordination problem solutions
 - non-inferential (incidental alignment)
 - salience & precedence
 - Inferential (inferred alignment)
 - convention

Alignment based on Common Ground

- Common ground (Stalnaker, 1978)
 - Common ground reflects what can reasonably be assumed to be known to both interlocutors on the basis of the evidence at hand. This evidence can be non-linguistic (e.g., if both know that they come from the same city they can assume a degree of common knowledge about that city; if both admire the same view and it is apparent to both that they do so, they can infer a common perspective), or can be based on the prior conversation.

‘Grounding’ the process of establishing common ground

- Inferences based on *triple co-presence* in which speaker, addressee and referent are openly present together through:
 - Physical co-presence
 - Linguistic co-presence
 - Community membership

Physical co-presence

- When two people are talking about something that they can both see and when they are each aware that the other can see it is physically co-present

Contrasting physical versus remote communication(Clark et al. 2004)

- Use of deictic gestures *this, that, here, there* massively increased when workspace is physically co-present between interlocutors as compared to not co-present
- Pointing gestures replace speech as grounding devices

Linguistic co-presence

- When two people have established through prior linguistic (or non-linguistic) feedback that they both know that P then P is in common ground

Conceptual Pacts

- “Ice skater” as a description of a tangram looking like a skater. Brennan & Clark(‘96) argue that it depends on grounding that description in the form of a “conceptual pact”

Community membership

- When two people have established that they both come from the same community then they can assume that peculiarities of the community are in common ground

Audience design

- Describing pictures of New York speakers take into account whether or not their partner is a native (Isaacs & Clark, '87)
- Native addressee: “The Chrysler building”
- Non-native addressee: “That big building on the left”

Limits on common ground inference

- Horton & Keysar ('96)
 - Speakers under time pressure did not take into account common ground to disambiguate their descriptions in a communication task
- Keysar et al. (2000)
 - Listeners initially looked at referents that they knew were not visible to the speaker in a communication task

Why is dialogue so easy?

- Grounding inferences depend upon modeling your interlocutor at some level we know that this is challenging
- The sheer amount of additional information that has to be taken into account in dialogue would suggest that it should be difficult anyway

Dialogue *should* be difficult by a mechanistic account

- Elliptical and fragmentary utterances
- Opportunistic planning
- Modeling the interlocutors' mind
- Interface problems
 - Latching turns(planning when to come in)
 - Speaking then listening :- Task switching
 - Planning while listening :- Multi-tasking

Example maze dialogue

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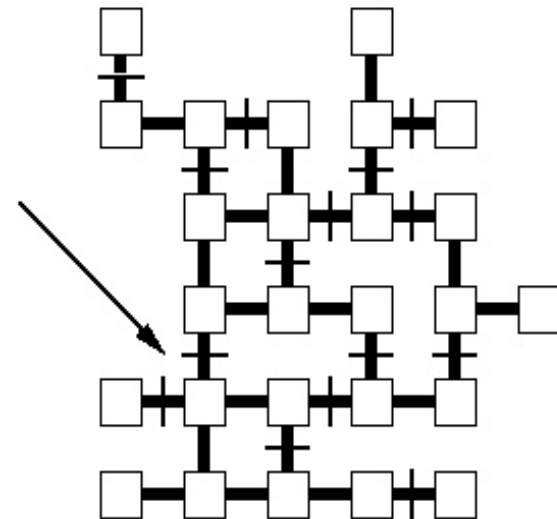
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Ease of dialogue is a challenge!

- Elliptical and fragmentary utterances
- Opportunistic planning
- Modeling the interlocutors' mind
- Interface problems
 - Latching turns(planning when to come in)
 - Speaking then listening :- Task switching
 - Planning while listening :- Multi-tasking

Next week

- Explain why dialogue is so easy
- Outline a mechanistic account of dialogue processing
- Indicate how the mechanism leads to establishment of proto-conventions