

Interaction and communication (2)

Simon Garrod

Background

“Language as action” vs “Language as product”

- LA does not account for mechanisms of dialogue processing
- LP does not take into account the basic dialogue setting for language processing

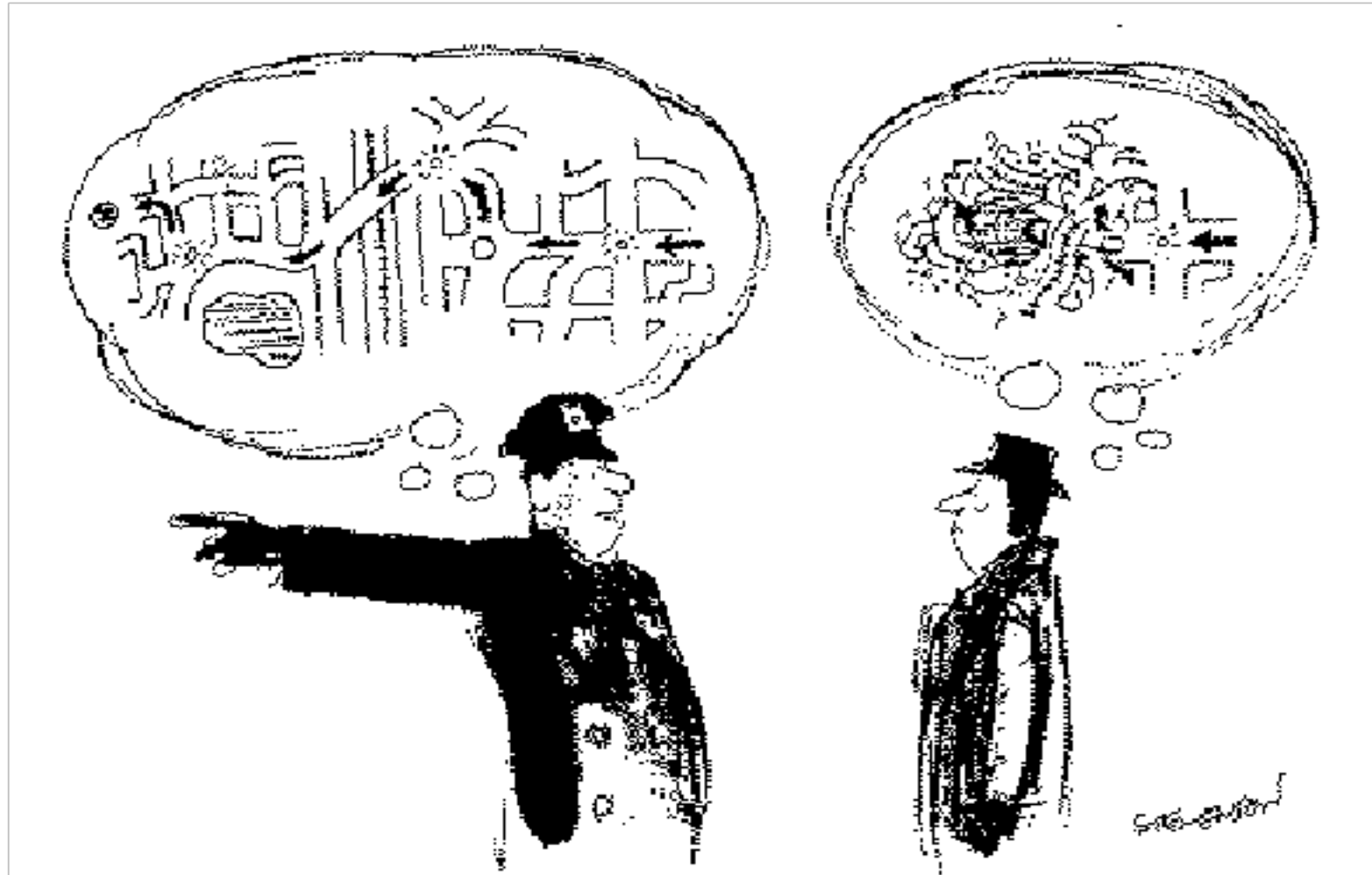
Overview

- Interactive Alignment model
 - Evidence of automatic alignment processes
 - In situation model and lexical choice
 - In phonology and syntax
 - Evidence for alignment at one level enhancing alignment at other levels
 - Basis of interactive alignment

Mechanistic theory of dialogue?

- Dialogue is basic
- Mechanistic theory should:
 - Reflect different processing context of dialogue and monologue
 - 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

Dialogue and alignment



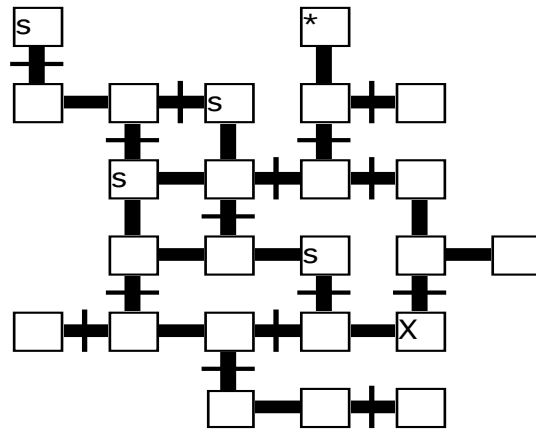
Drawing by Stevanor: © 1974 The New Yorker Magazine, Inc.

Situation models

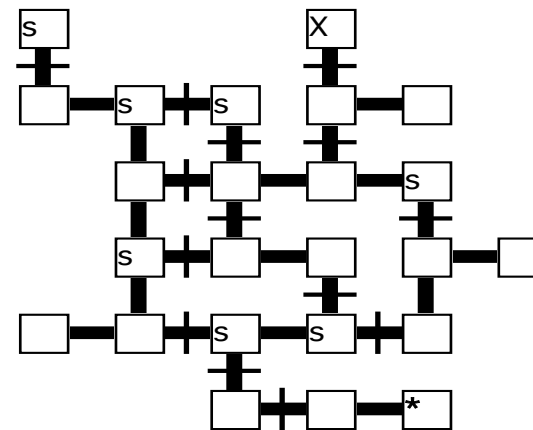
- Multidimensional representation of the situation under discussion (e.g., Zwaan & Radvansky, 1998)
 - In some sense what people are thinking about (“working memory”)
 - Most work is in monologue (e.g., text comprehension)
 - Key dimensions may be space, time, causality, intentionality, and reference to main characters
 - Example issue: choice of reference frame(e.g., *left of*)

Investigating linguistic alignment

Maze Game



A's Maze



B's Maze

key: * = finish position, X = player's position, S = switch box

| = gate.

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.

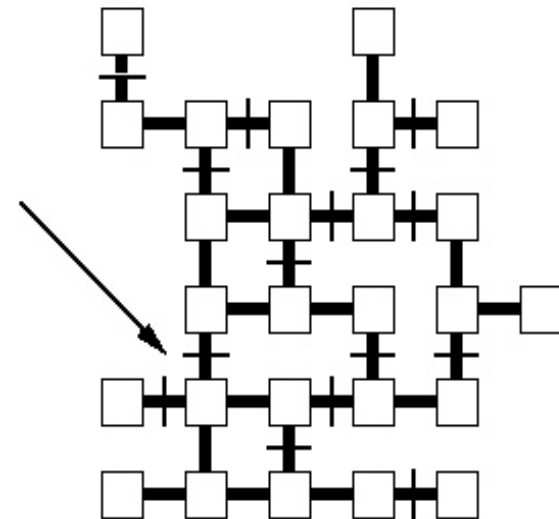
8----**A:** One up (*1 sec.*) I take it we've got identical mazes?

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 ...



Examples of maze descriptions

“See the rectangle at the bottom right, I’m in the top left hand corner”

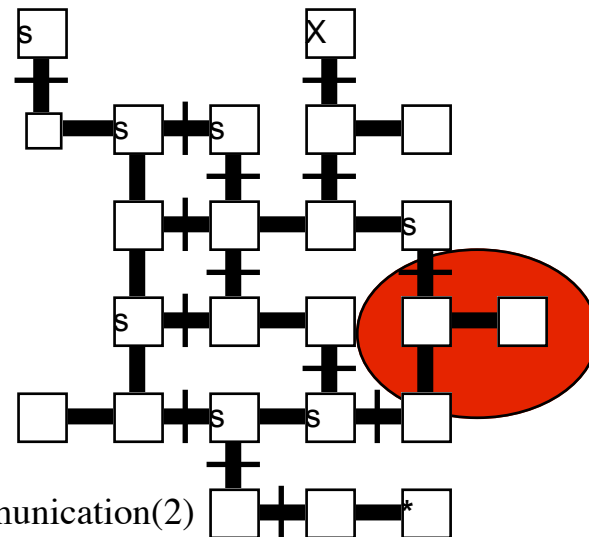
“See the bottom right, go two along and two up. That’s where I am”

“I’m one up on the diagonal from bottom left to top right”

“I’m on the third row and fourth column”

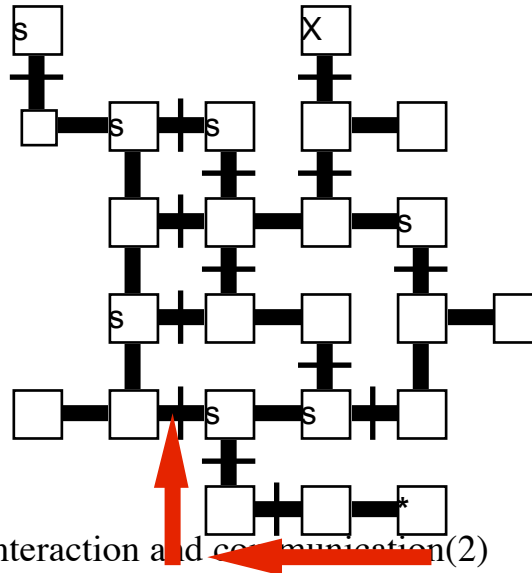
Description Schemes (1)

- Figural
 - Concept: Figure Segmentation
 - Terminology: “right-turn indicator” “L shape”
 - Example: “See the middle right-turn indicator. I’m on the end of it ”



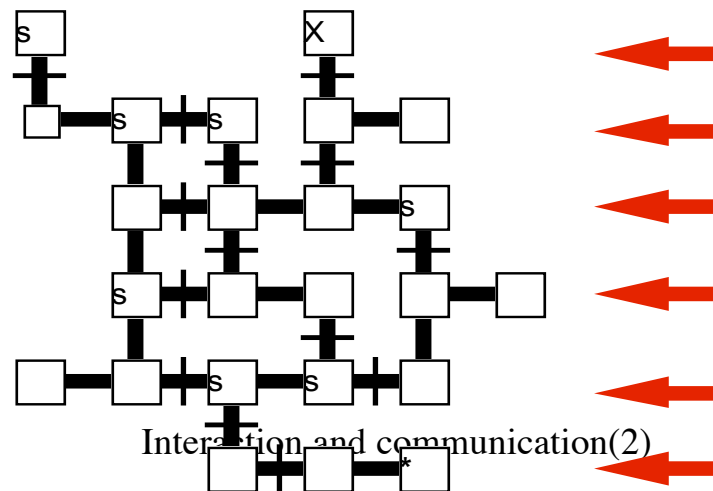
Description schemes (2)

- Path
 - Concept: Path Network
 - Example: “bottom right, along two, up one”



Description Schemes (3)

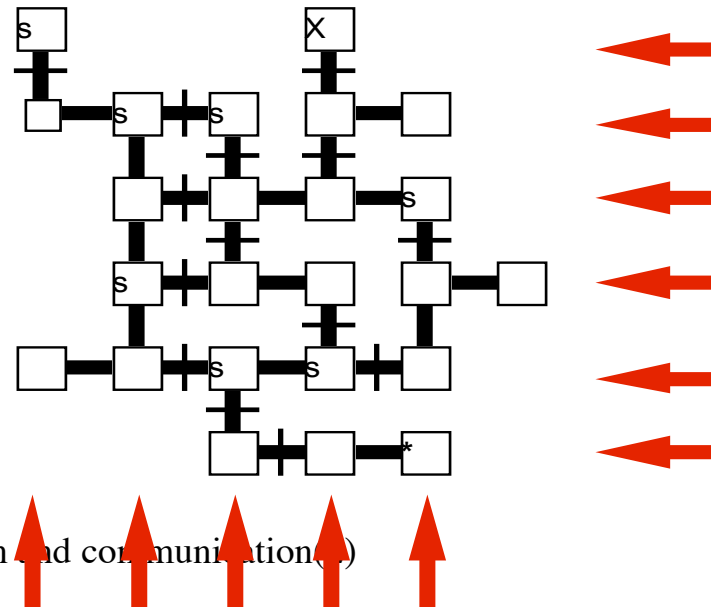
- Line
 - Concepts: // Lines or Levels
 - Terminology: “Row”, “Layer”, “Level”
 - Example: “Third row two along”



10/18/05

Description scheme (4)

- Matrix
 - Concepts: Co-ordinate System
 - Terminology: “A, 3”, “Row 2, Column 3”
 - Example: “I’m third row, fourth column”.



10/18/05

Interaction and communication

Original Findings

- Garrod & Anderson (1987)
 - Pairs of individuals align on unambiguous description schemes
 - The schemes develop over a period of time to fit the pairs' needs
 - Alignment is not controlled by explicit negotiation but rather by output/input coordination + interactive repair

Alignment on Schemes

- After playing 2 games 95% of interlocutors are using the same scheme as their partner
- Schemes change over time
 - Move from figural/path to line/matrix (i.e., toward more abstract conceptual models)

Role of explicit negotiation

- Occurred only 15 times in 56 games & on 9 occasions only after the pair had aligned on a scheme (87% were in connection with matrix descriptions)
- Negotiated schemes had no better chance of surviving than non-negotiated schemes
- Therefore, *negotiation is not responsible for alignment*

Output-Input Coordination

- Match the most recent utterance from your partner with respect to:
 - lexical choice (G&A,'87)
 - lexical meaning(G&A,87; Brennan & Clark, '96)
 - conceptual model(G&A,'87)

Dialogue & alignment of representations

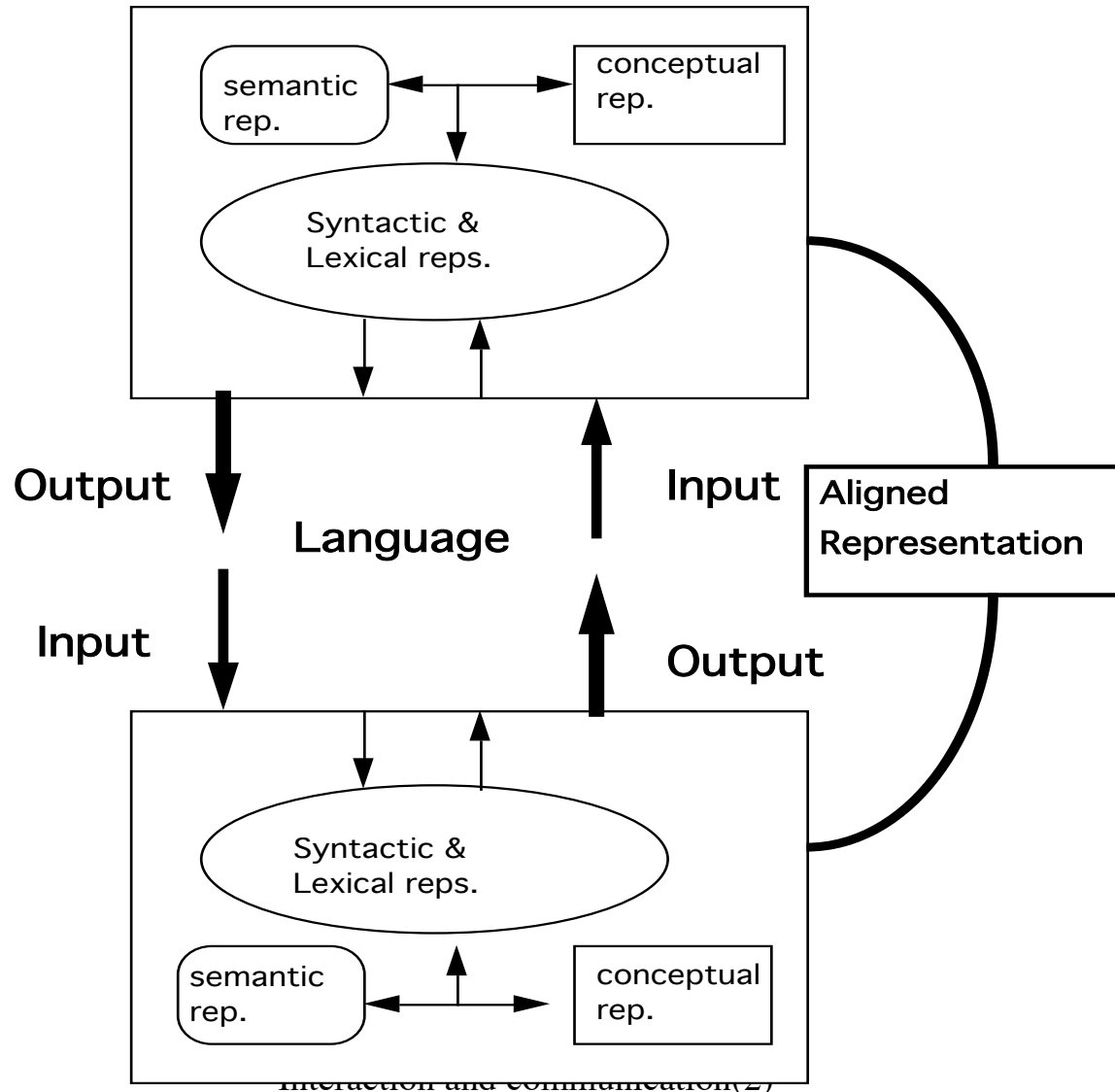
Evidence for *automatic* alignment of situation models

- Garrod & Anderson, ('87), Markman & Makin, ('98) Schober, ('93)

Evidence for *automatic* lexical and semantic alignment


- Garrod et al. ('87, '93, '94), Brennan & Clark ('96)


Output - Input Coordination & alignment of representations



Coordination among communities

- Output/input Coordination Model

– Communication  Alignment of Mental Representations

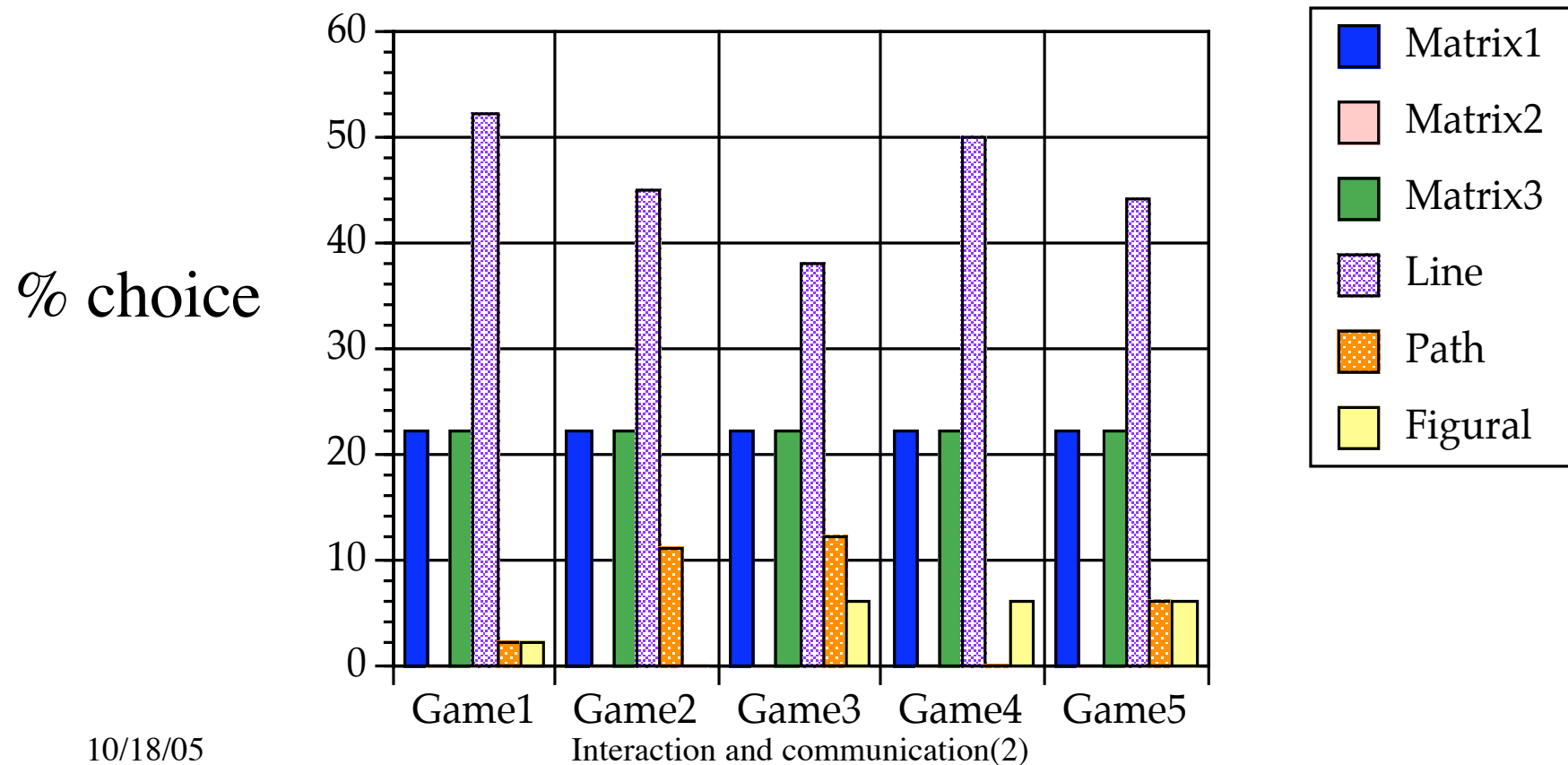
– Communities of communicators  Aligned Representations

Group Coordination

(Garrod & Doherty, 1994)

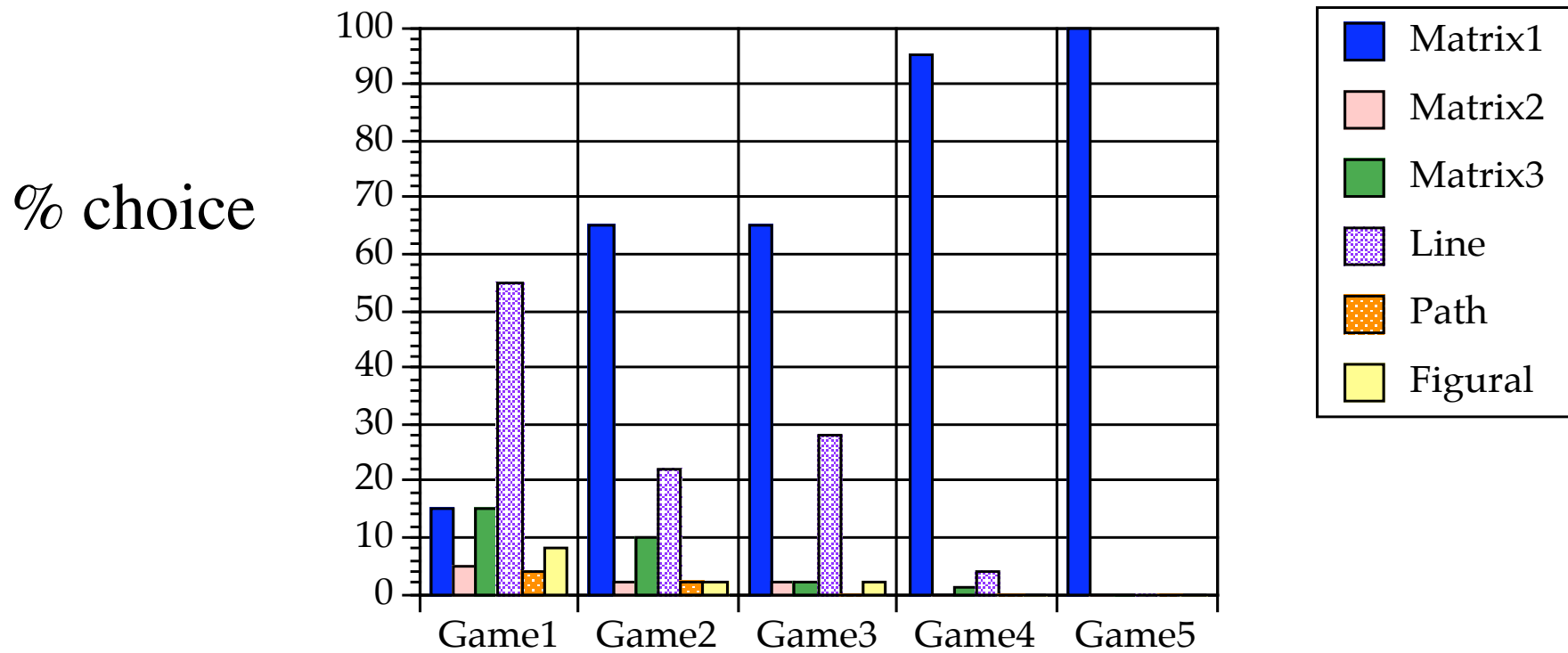
- Isolated Pairs
 - 5 pairs play ten games each
- Virtual Community Group
 - 10 players play each of the other 9
- Non-Group
 - 5 lead players play 5 games with different partners with **no** common history of prior interaction

Choice of Schemes by Pairs



10/18/05

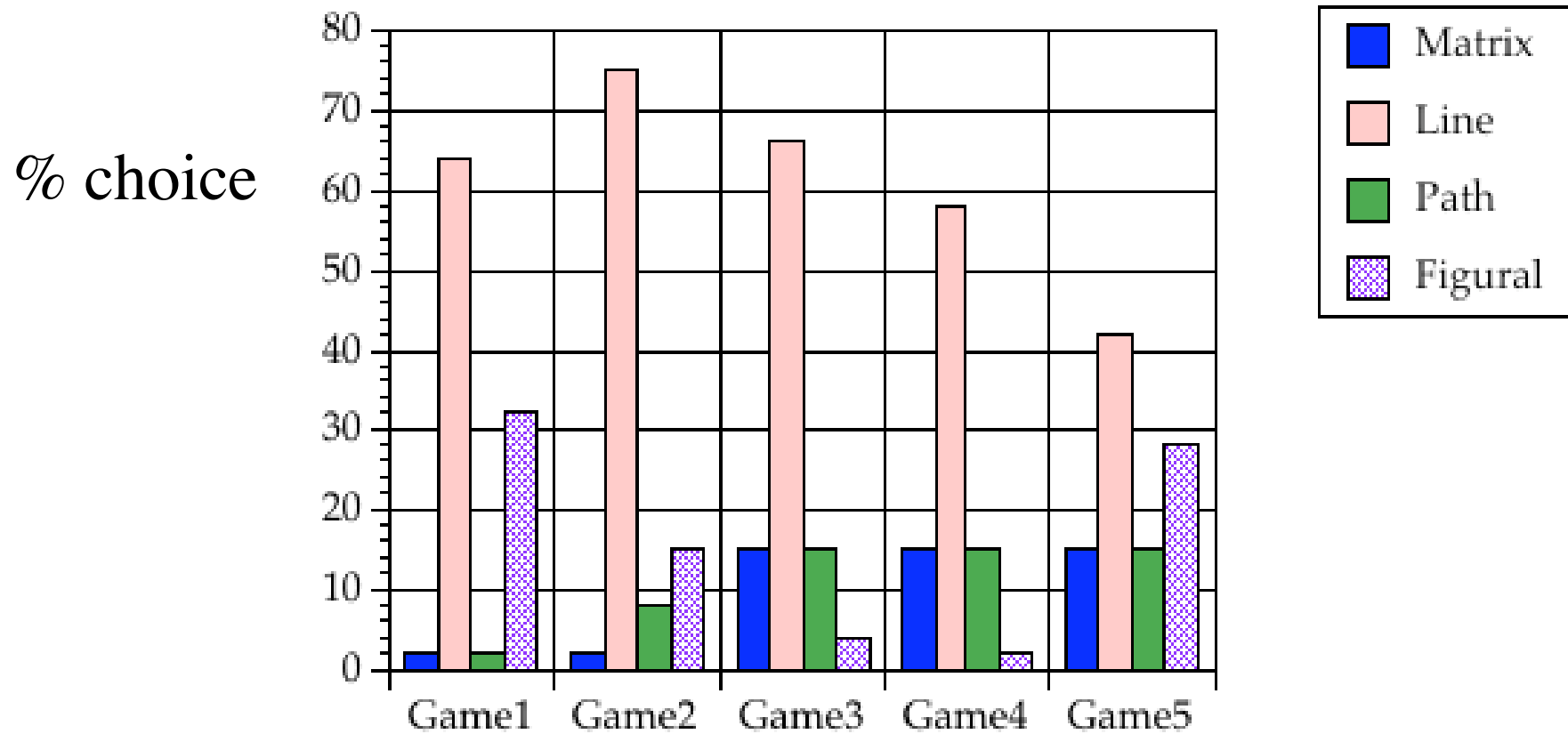
Choice of Schemes by Group



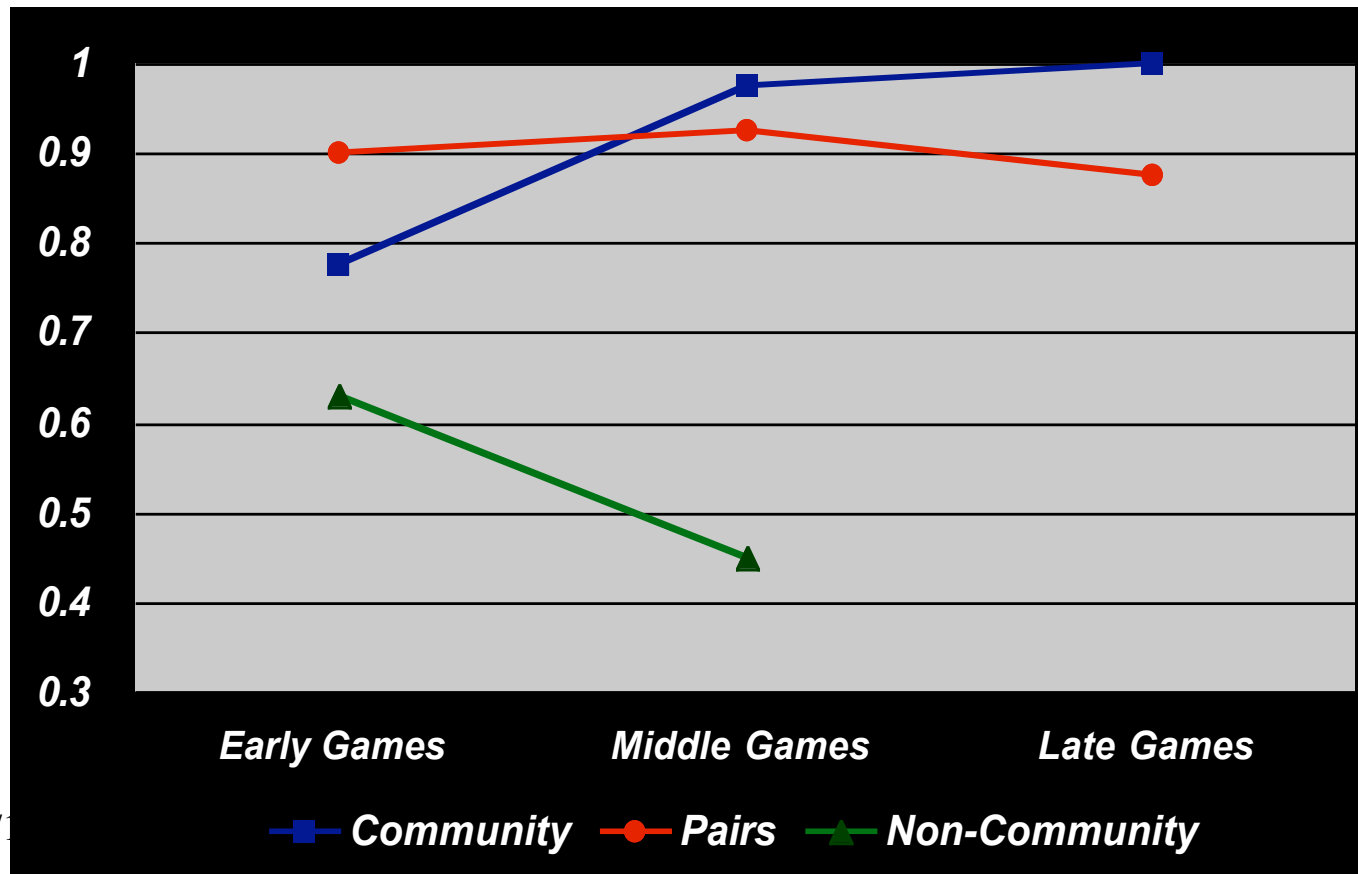
10/18/05

Interaction and communication(2)

Choice of Schemes by Non Group



Development of Group Coordination



Conclusions

(Garrod & Doherty '94)

- Pairs of conversationalists naturally align their concepts & language
- Not controlled by explicit negotiation but by Output/Input coordination
- Groups of pairs with a common history of interaction align as a “language community”

Summary of referential processing studies

- Alignment at semantic level
 - Alignment of specific lexical meanings
- Alignment at level of situation model
 - Alignment of description schemes

Alignment at other levels

Evidence for phonological (articulatory) alignment

(Map task)

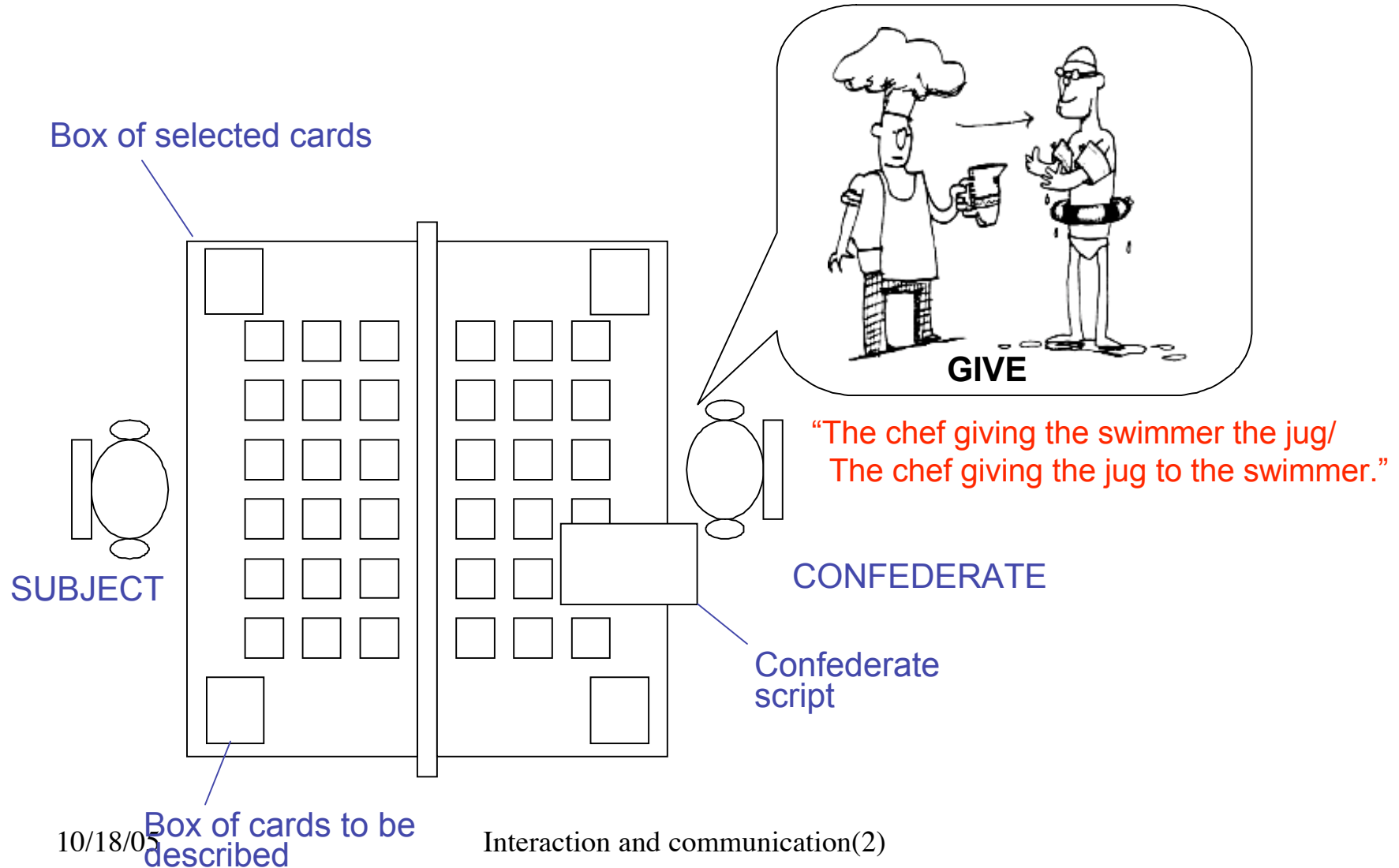
- Articulatory reduction by interlocutor (Bard et al. 2000)
- Alignment of vowel space (Krauss & Pardo, in press)

Evidence for syntactic alignment (Levelt & Kelter, '82)

- syntactic priming, dialogue > monologue
- interlocutors > side participants (Branigan, Pickering & Cleland, 2001)

Syntactic alignment in dialogue

(Branigan et al., 2000)

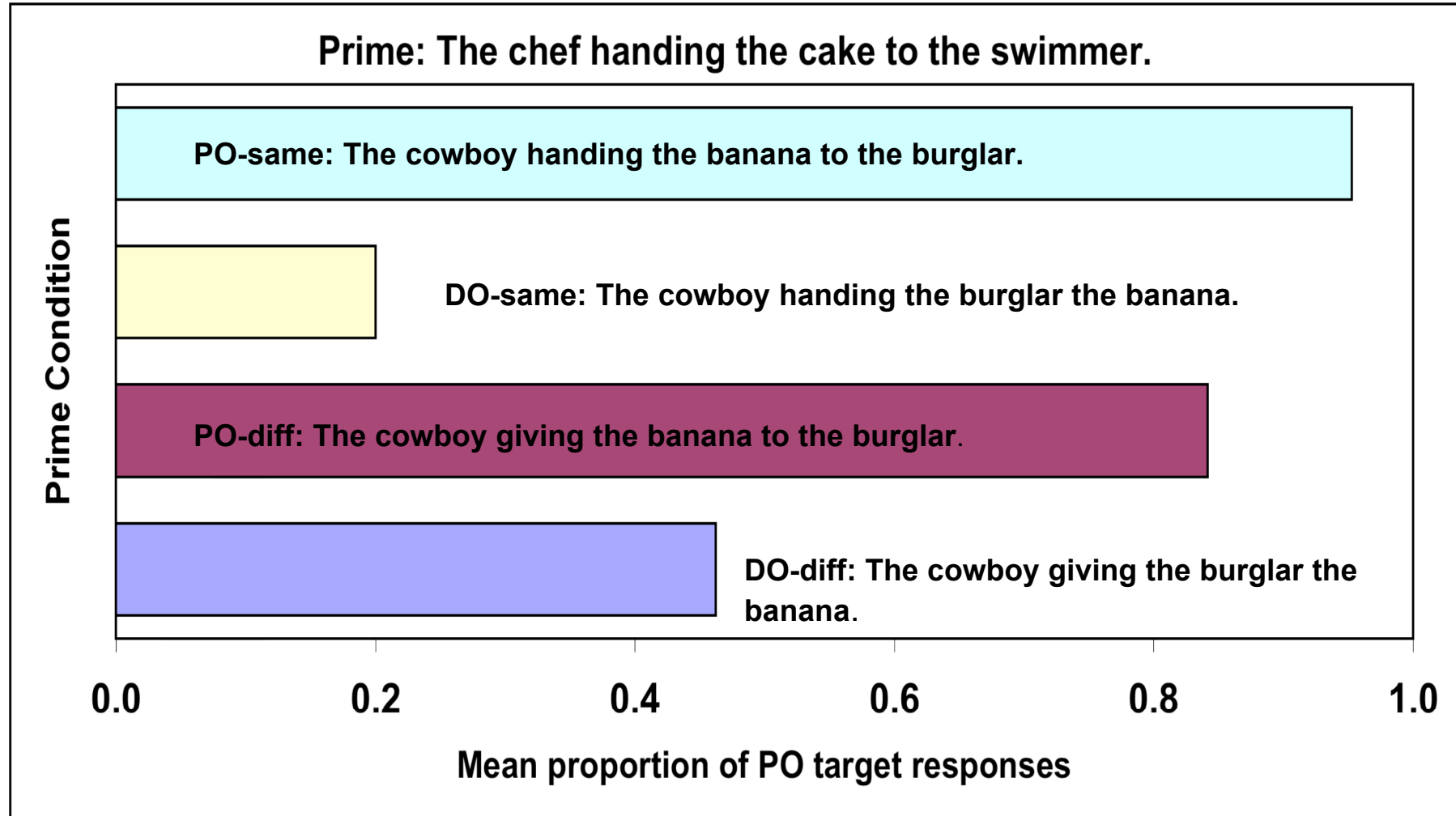


- Confederate describes picture card:
The chef handing the cake to the swimmer (PO)
- Subject hears description and selects the card that matches that description from the pile.
- Subject picks up first card from her box:



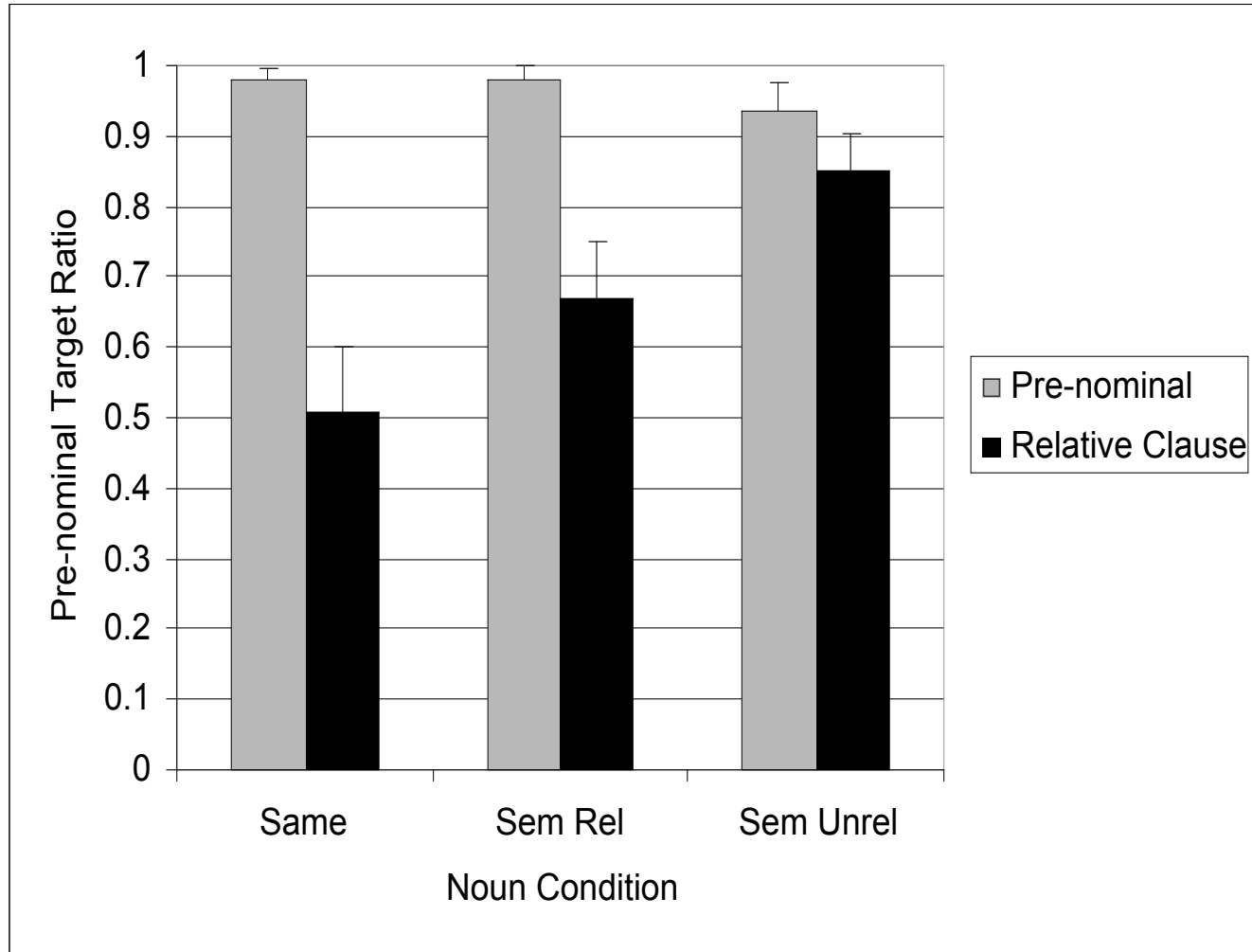
- Subject description:
The cowboy handing the banana to the burglar (PO)

Results



Semantic relatedness increases syntactic repetition

- Syntactic priming of noun phrase structure (Cleland & Pickering, 2003)
 - C: *the red door* → S: *the red goat*
 - C: *the door that's red* → S: *the goat that's red*
 - Normal syntactic priming effect
 - C: *the sheep that's red* → S: *the goat that's red*
 - Enhanced priming effect
 - Semantic alignment → syntactic alignment



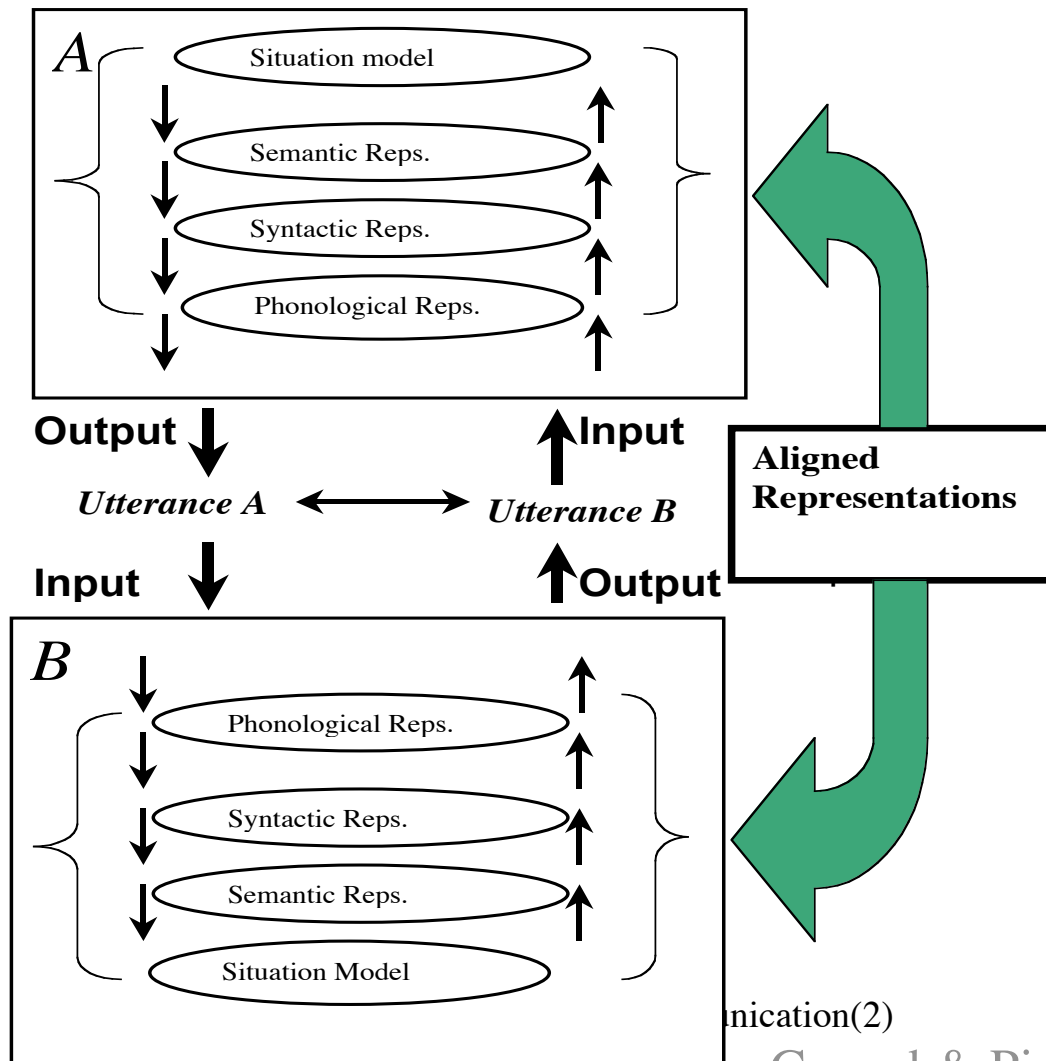
10/18/05

Interaction and communication(2)

Alignment at one level leads to greater alignment at other levels

- Syntactic alignment is enhanced by lexical overlap (Brannigan et al. 2000)
- Syntactic alignment is enhanced by semantic overlap (Cleland et al. 2002)
- Syntactic alignment is enhanced by matching conceptual role assignments (Griffin & Weinstein-Tull, 2003)

Parity & Priming: +ve feedback system for alignment



10/18/05

Communication(2)

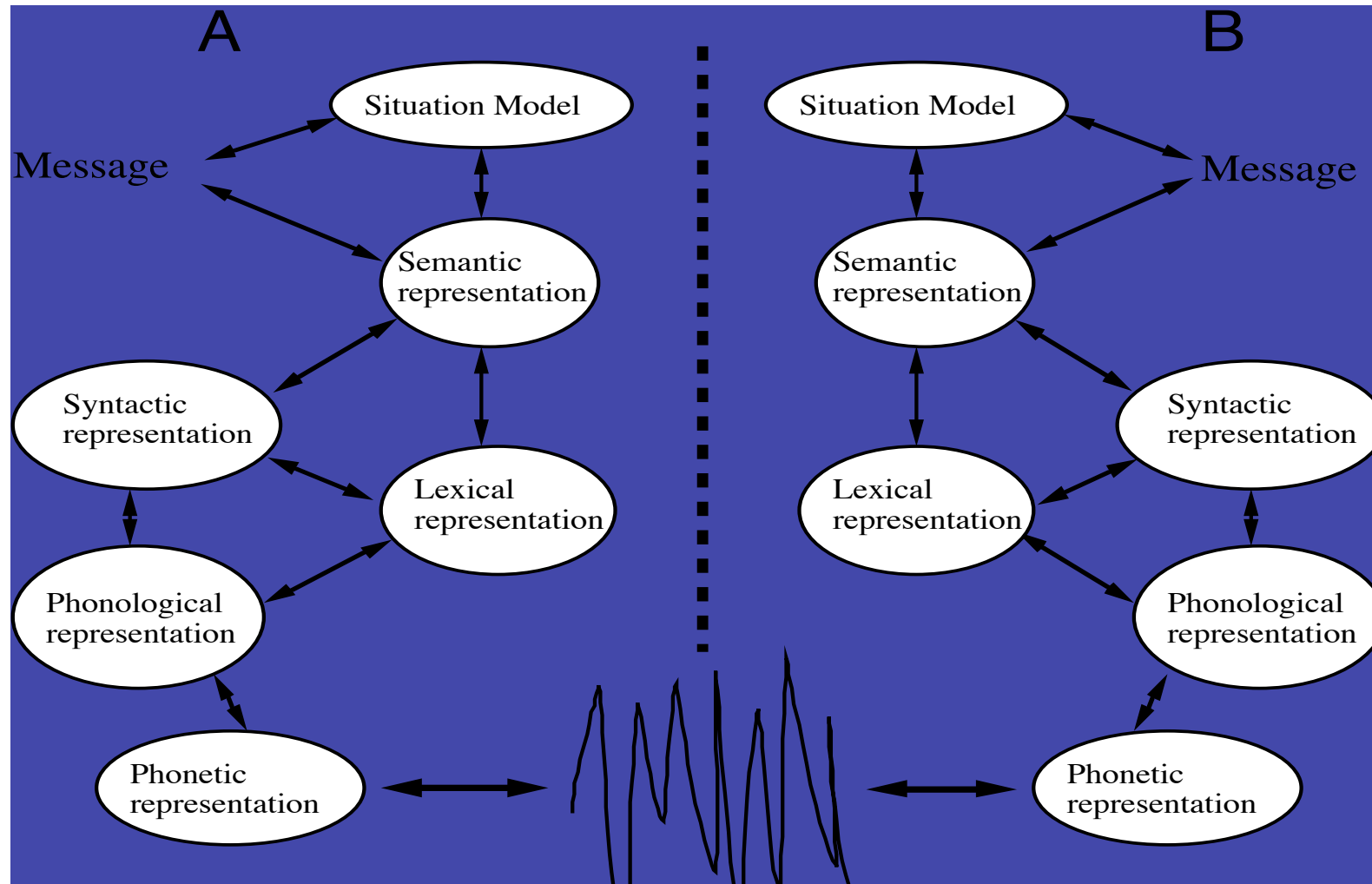
Garrod & Pickering, TICS (2004)

The interactive alignment model

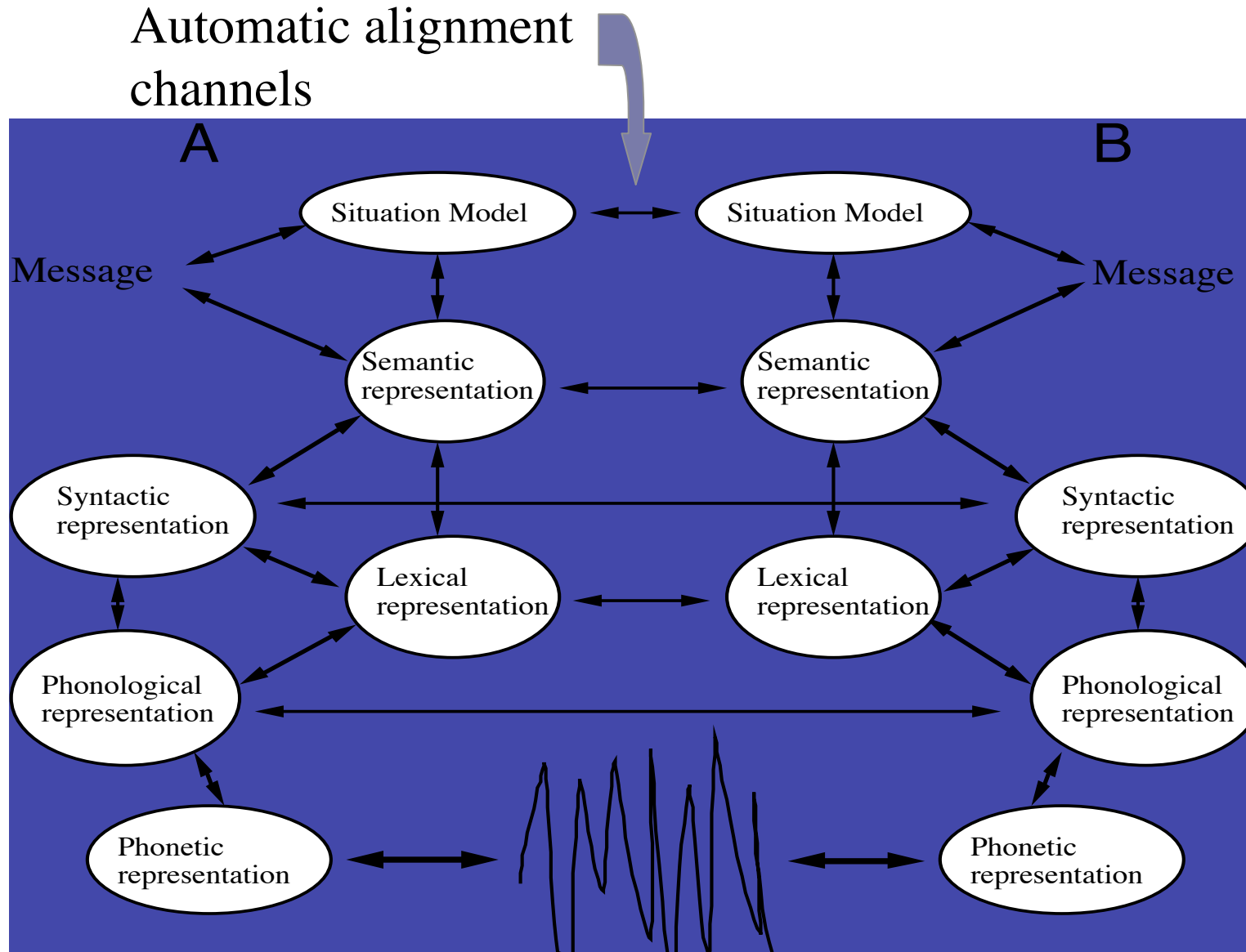
(Pickering & Garrod, 2004)

- Assumes
 - Successful dialogue leads to aligned representations at many levels
 - Priming across interlocutors supports *direct alignment channels* at these levels
 - Percolation between levels means that alignment at one level enhances alignment at another
 - Straightforward *alignment repair mechanism*
- Contrasts with the autonomous transmission model
Behavioral & Brain Sciences, 27 (2004)

Autonomous Transmission Model

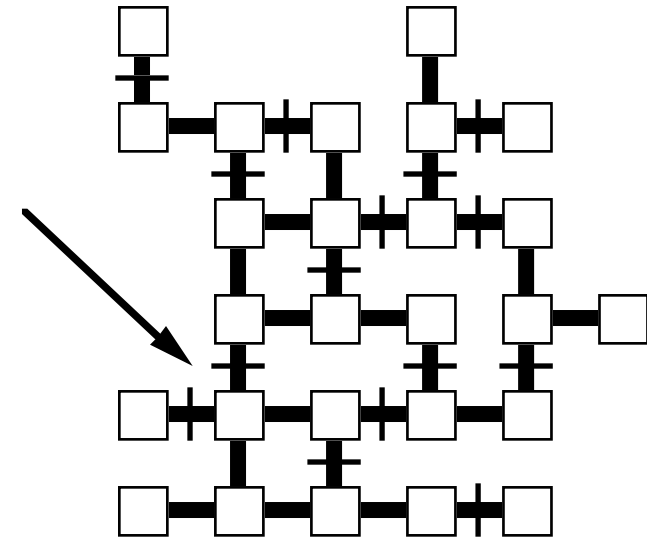


Interactive Alignment Model



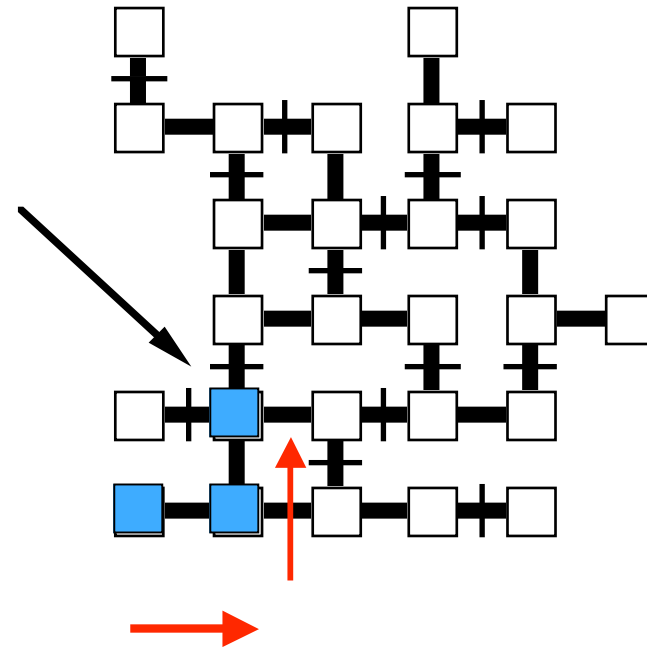
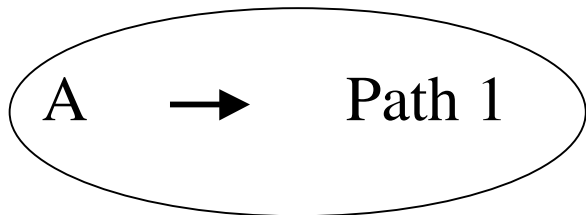
Alignment Repair Process

- 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**.
.....
41----B: You are starting from the left, you're **one along, one up**?
42----A: **Two along** : I'm not in the first box, I'm in the **second box**:
43----B: You're **two along**:
44----A: **Two up** (1 sec.) counting the: if you take : the first box as being one up :
45----B: (2 sec.) Uh-huh :
46----A: Well : I'm **two along, two up**: (1.5 sec.)
47----B: **Two up** ? :
48----A: Yeah (1 sec.) so I can move down one:
49----B: Yeah, I see where you are:



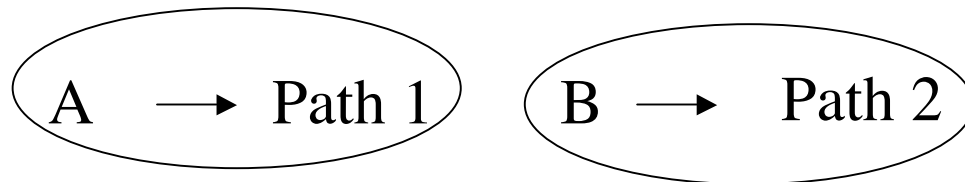
Stage 1

- 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?

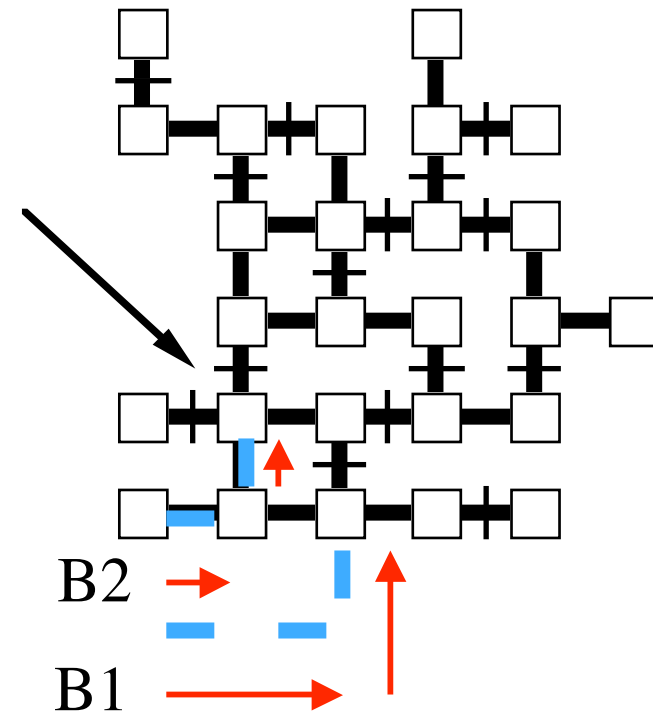


Stage 2

- 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?**



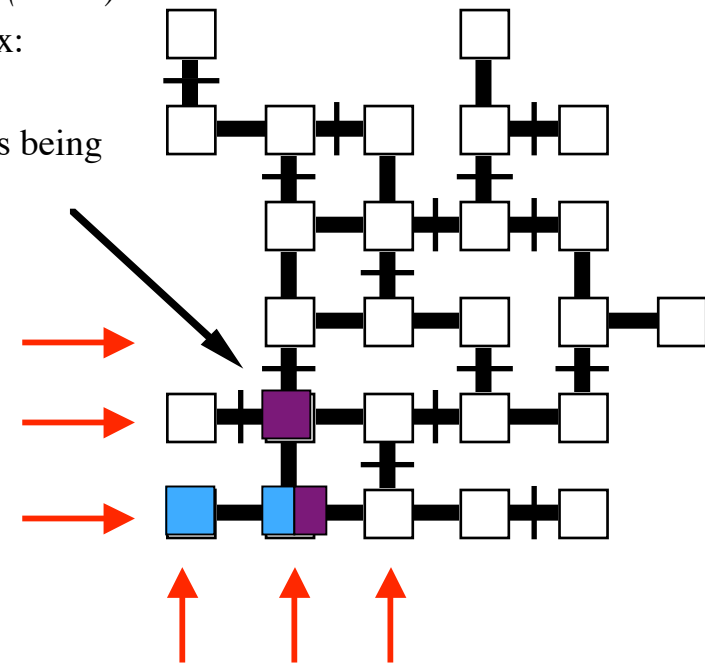
Misaligned situation model



Stage 3

- 41----**B:** You are starting from the left, **you're one along, one up?**(2 sec.)
42----**A:** **Two along** : I'm not in the first box, I'm in the second box:
43----**B:** You're **two along**:
44----**A:** **Two up** (1 sec.) counting the : if you take : the first box as being
 one up :
45----**B:** (2 sec.) Uh-huh :
46----**A:** Well : I'm **two along, two up:** (1.5 sec.)
47----**B:** Two up ? :
48----**A:** Yeah (1 sec.) so I can move down one:
49----**B:** Yeah I see where you are:

A & B Co-ordinate Description



Aligned situation model

Contrasting monologue and dialogue processing

- Monologue - Autonomous transmission
 - Decoupled production and comprehension
 - Dominated by global frequency of representations [lexical frequency (Morton, '69), meaning frequency effects (Rayner et al. '94), frequency of syntactic configurations (MacDonald, '94)]
- Dialogue - Interactive alignment
 - Tightly coupled production & comprehension
 - Dominated by local alignment rather than global frequency (e.g., use of *routines*)

Take home message

- Interlocutors align at many linguistic levels
- Parity & priming give positive feedback system for alignment
- Alignment at one level enhances alignment at other levels
- Simple interactive repair system for alignment