Interactive alignment and routinization as mechanisms for language change

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Overview

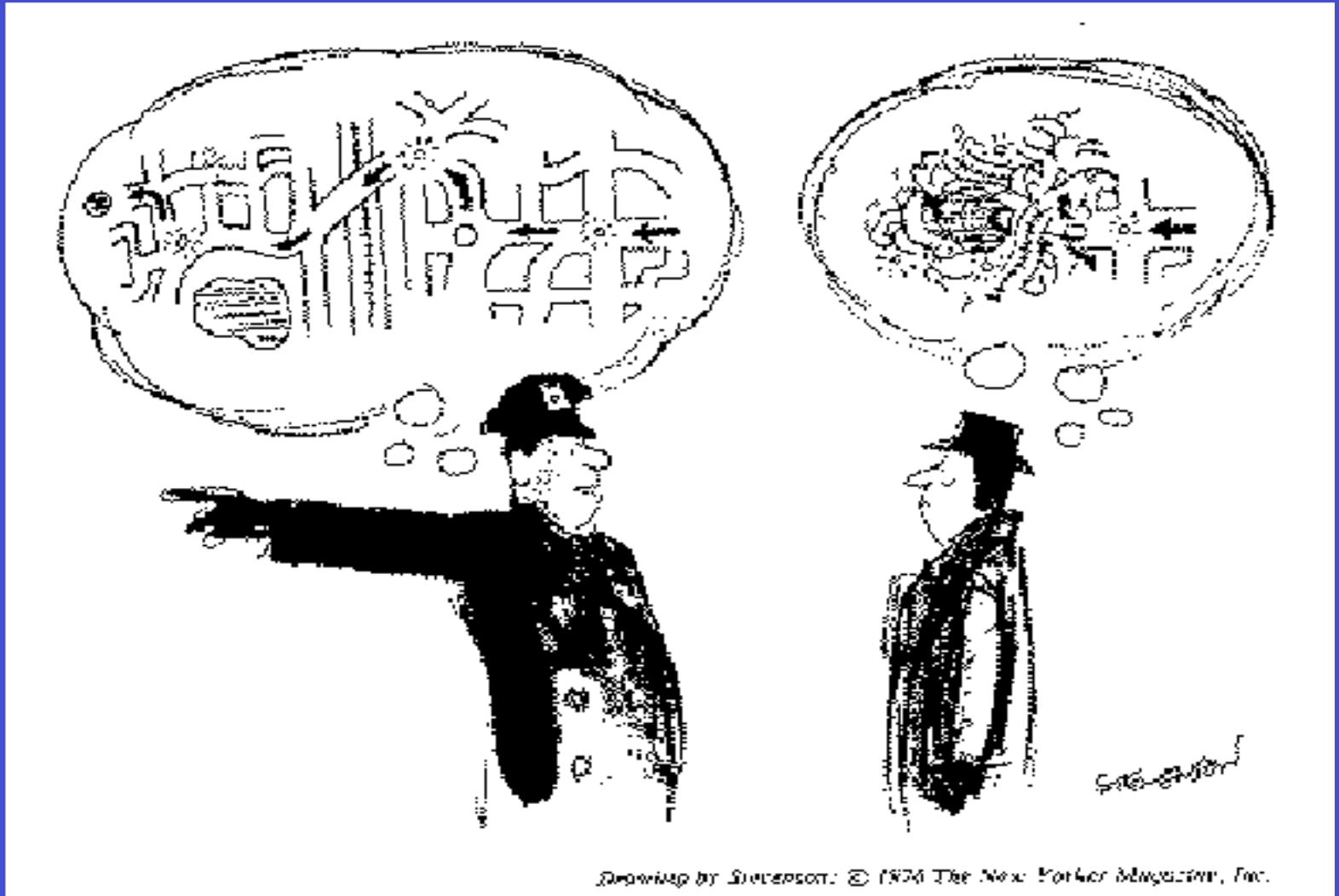
- Language change and transmission
- Dialogue as interactive alignment
- Two automatic mechanisms of alignment
- Short-term co-activation of linguistic structure
- Long-term routinization
- Routinization as a mechanism of change

Evolution requires transmission

- Biological evolution depends on genetic transmission

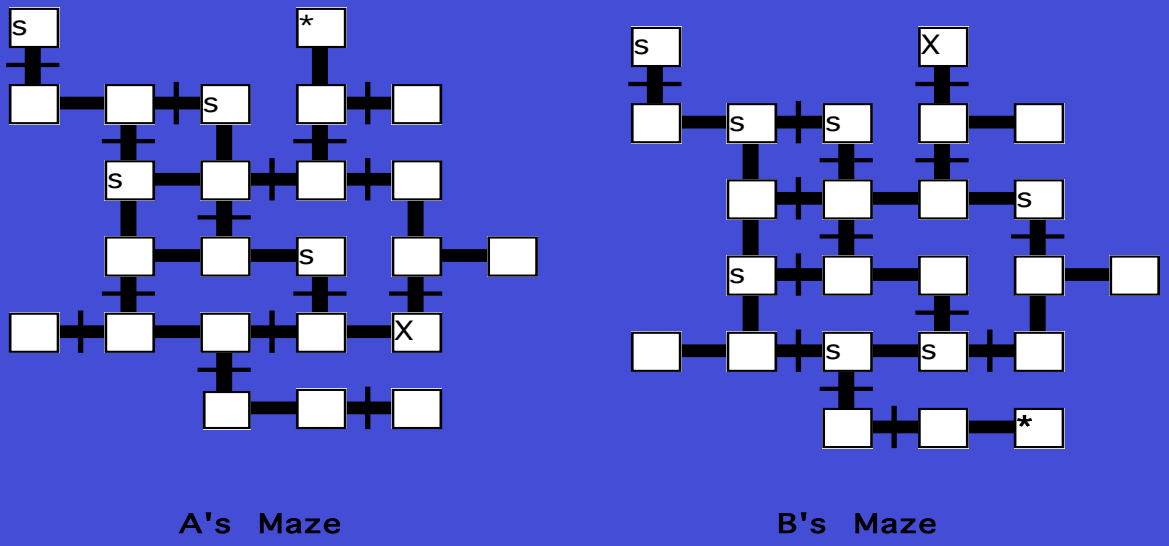
- Language change depends on interpersonal structural and lexical transmission
  - Transmission via initial acquisition? (Lightfoot, 1991)
    - Too sparse for normal rate of language change at a lexical level (Barr, 2004)
  - Automatic transmission during usage?
    - Interactional alignment during dialogue

Information ***alignment*** rather than information ***transfer***



Investigating alignment of representations in dialogue

Maze Game



A's Maze

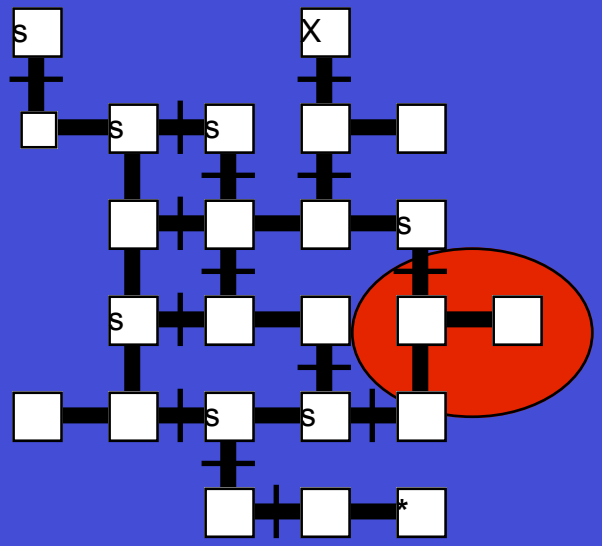
B's Maze

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

| = gate.

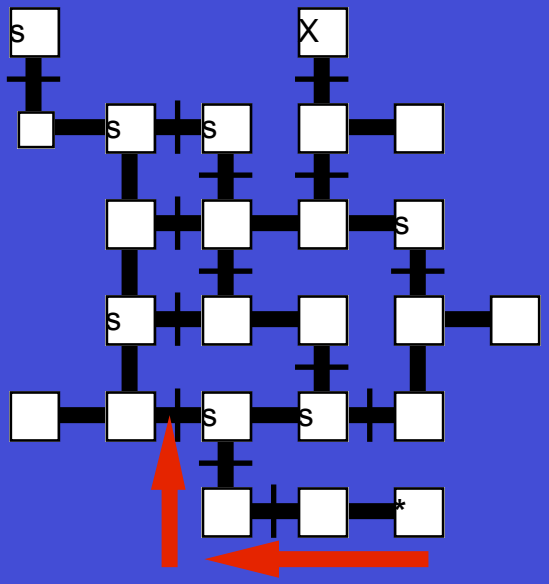
Description Schemes(1)

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



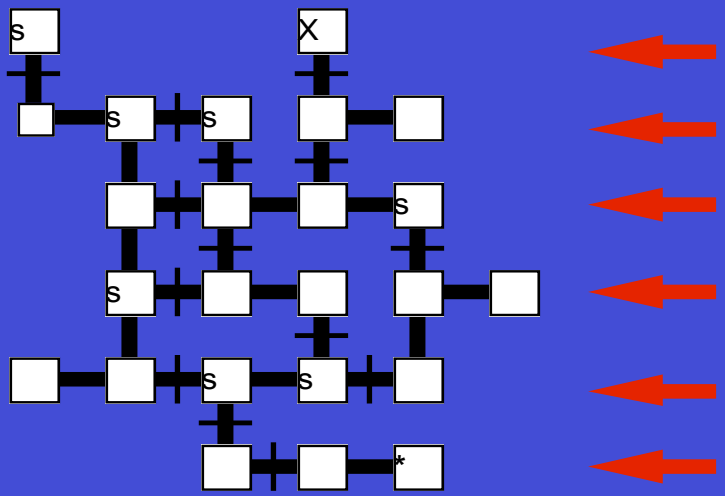
Description schemes (2)

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



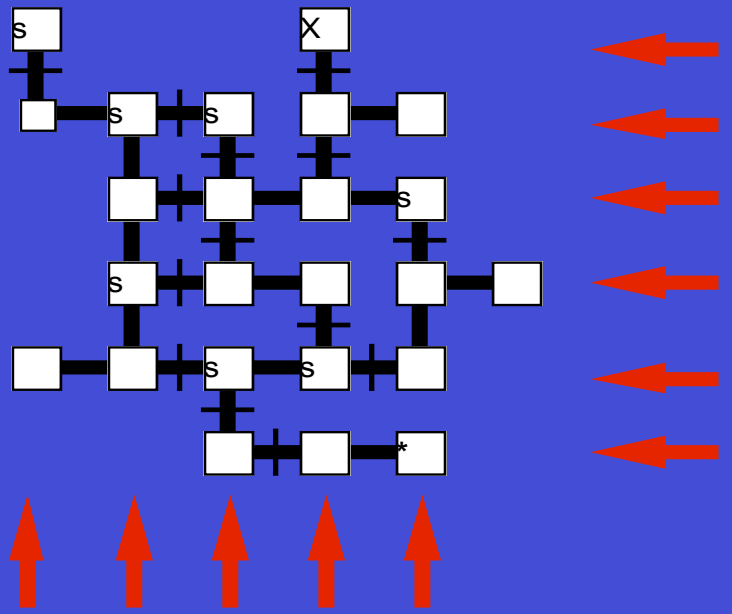
Description Schemes (3)

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



Description scheme (4)

- Matrix
  - Situation model: Co-ordinate System
  - Terminology: “A, 3”, “Row 2, Column 3”
  - Example: “I’m row two, column three”.



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 co-ordination + interactive repair

Cognition,1987, 27,181-218.

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)

Group alignment

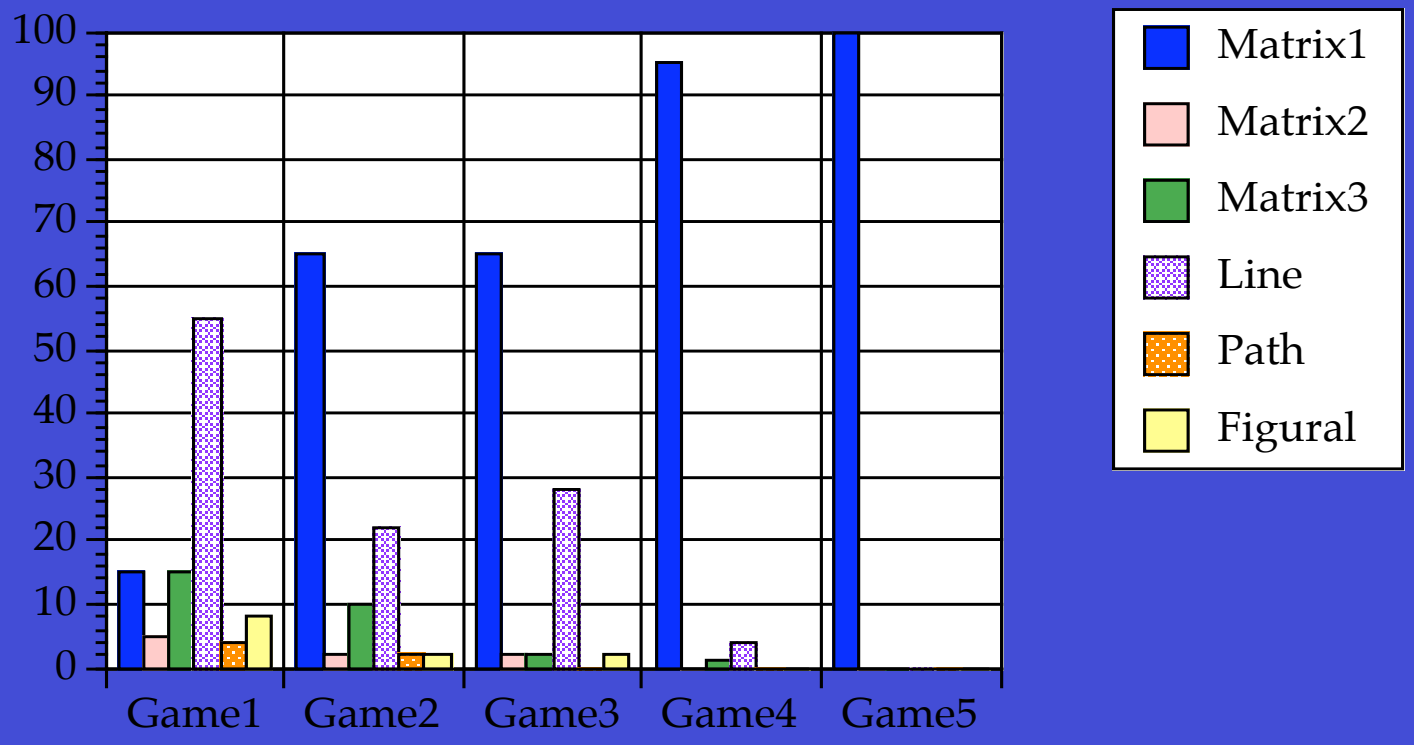
(Garrod & Doherty, 1994)

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

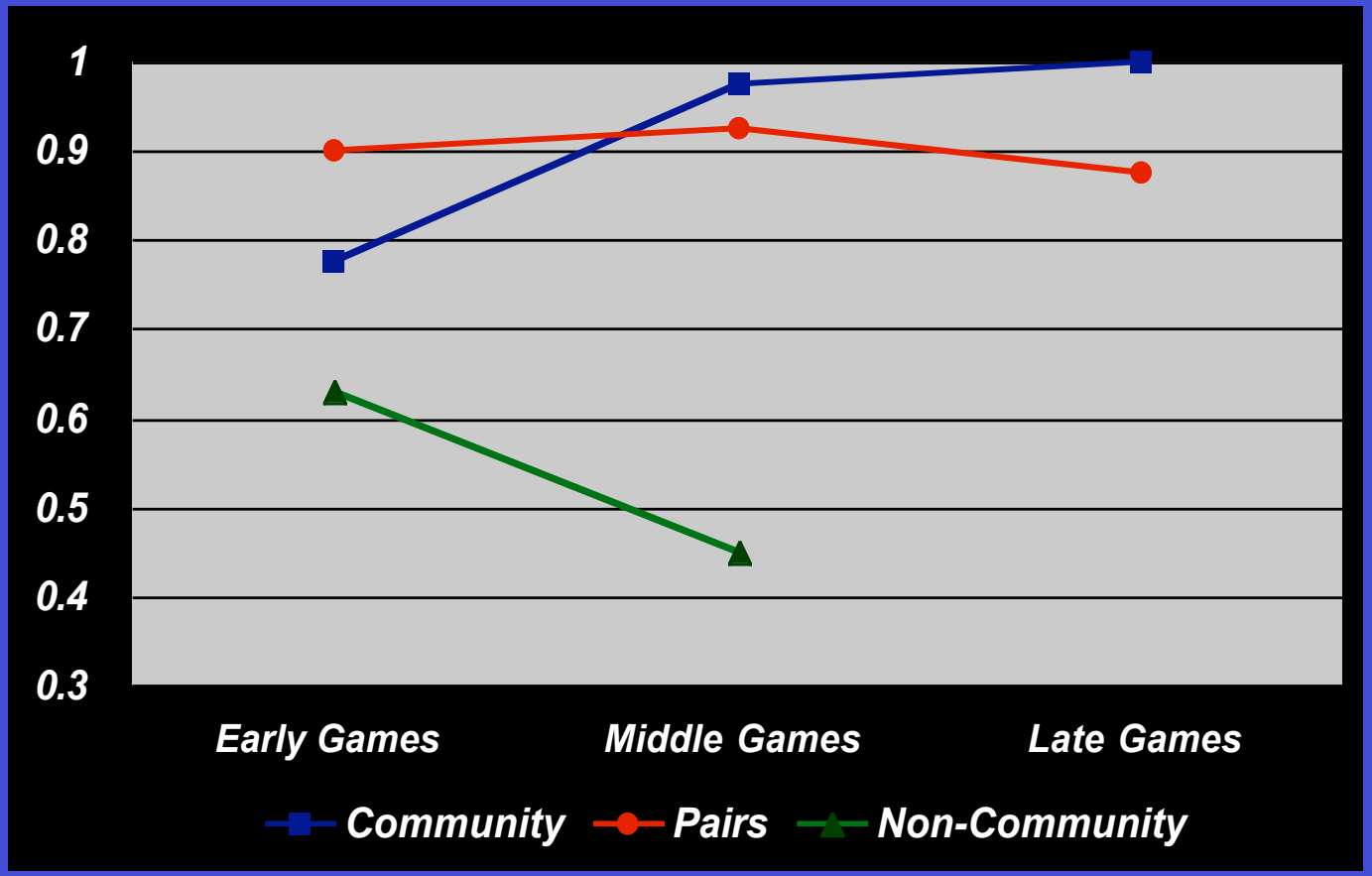
Cognition. 53,181-215.

Choice of Schemes by Group

% choice



Development of group alignment



Evidence of automatic alignment at many levels in dialogue

- Phonological-articulatory alignment (Krauss & Pardoe, in press; Bard et al. 2000)
- Lexical alignment (Garrod & Anderson, 1987; Brennan & Clark: 1994)
- Syntactic alignment (Branigan et al. 2000)
- Semantic/conceptual alignment (Garrod & Anderson, 1987; Markman & Makin, 1998)
- Alignment of reference frames(Schober, 1993; Watson et al. 2004)
- Alignment of situation models (Garrod & Anderson, 1987; Garrod & Doherty, 1994)

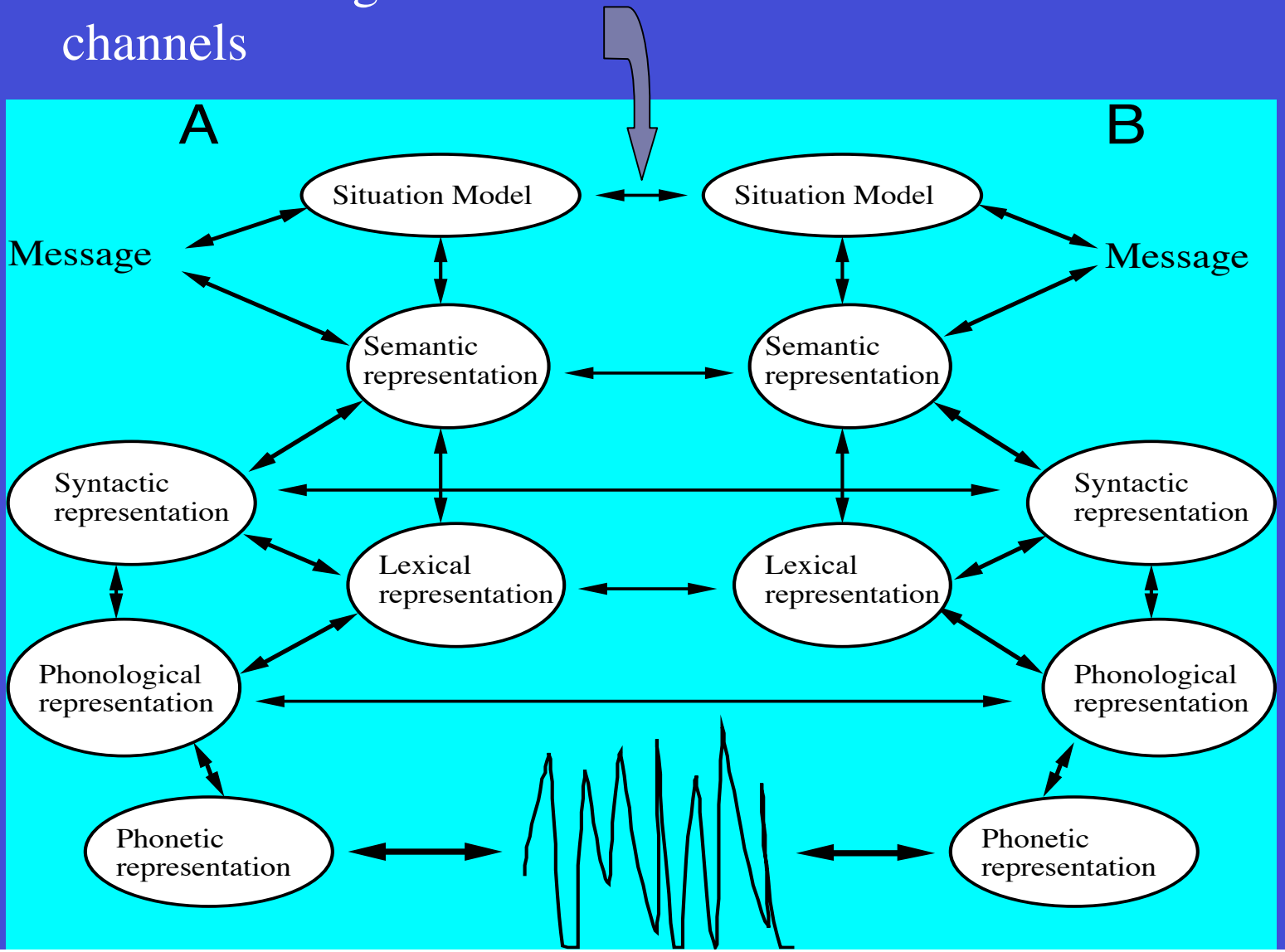
The interactive alignment model

- Assumes
  - Successful dialogue leads to aligned representations at many levels
  - "Priming" across interlocutors supports *direct (automatic) alignment channels* at these levels
  - Percolation between levels means that alignment at one level enhances alignment at others
  - Straightforward *alignment repair mechanism*
- Contrasts with the autonomous transmission model for monologue

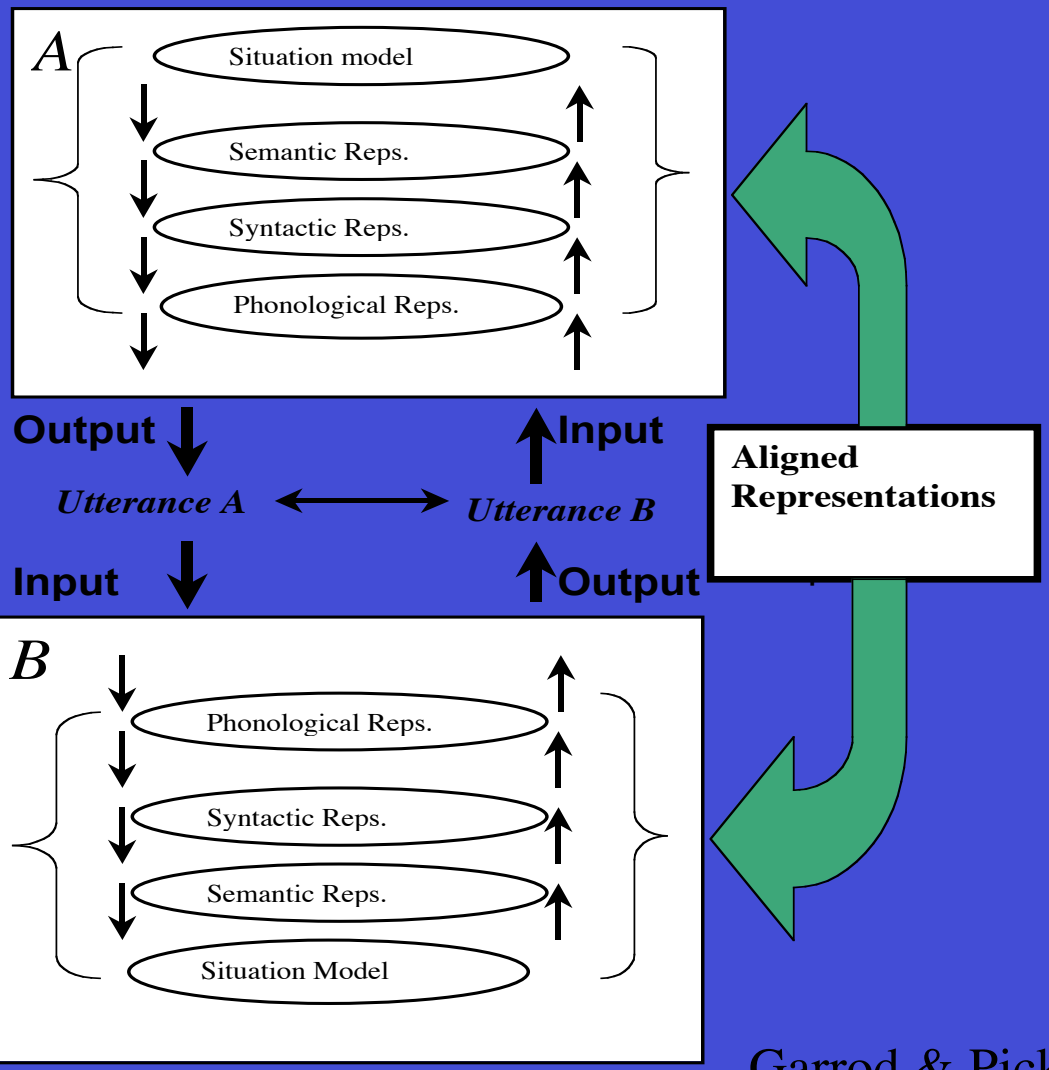
Pickering & Garrod, *Behavioral & Brain Sciences* (2004)

Interactive Alignment Model

Automatic alignment channels



Parity&Priming: +ve feedback system for alignment



Garrod & Pickering, TICS (2004)

Two automatic mechanisms of alignment?

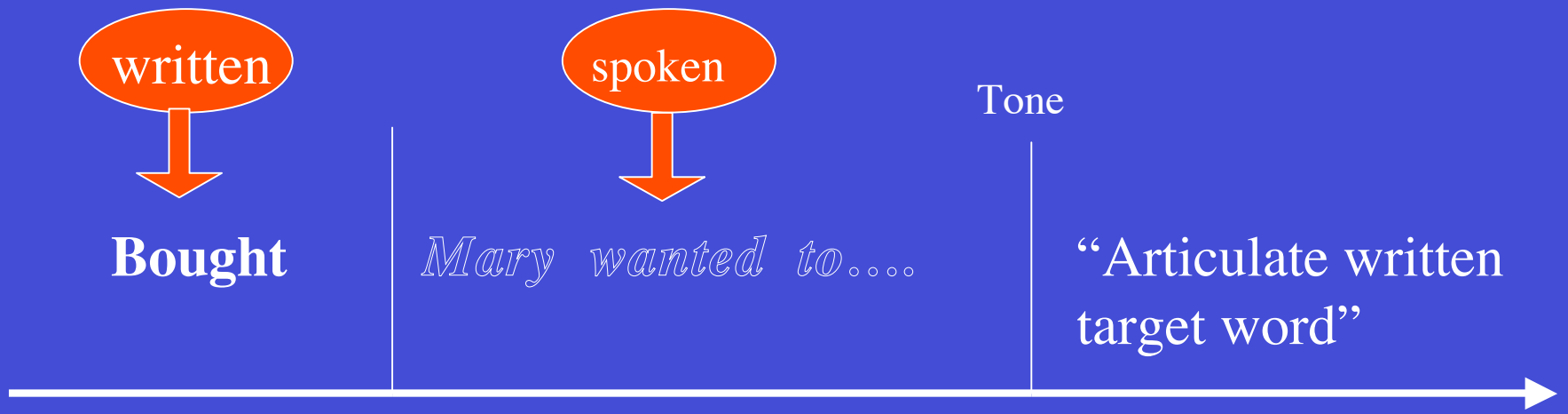
- Short-term local alignment due to transient co-activation of linguistic structure
  - A: “What does Tricia enjoy(like) most?
  - B: ENJOY/LIKE “Being called your highness”
  - B: LIKE “To be called your highness”(Morgan,1973)

- Long-term memory-based alignment or routinization

Short-lived syntactic alignment

- Depends on “priming” from comprehension to production and vice versa
- Evidence for syntagmatic syntactic priming from comprehension to production

Experiment to detect influences of comprehension on production



Syntactic priming experiment

Example prime fragments:

(1)Mary wanted to……

(2)She knew that she ….

Target words:

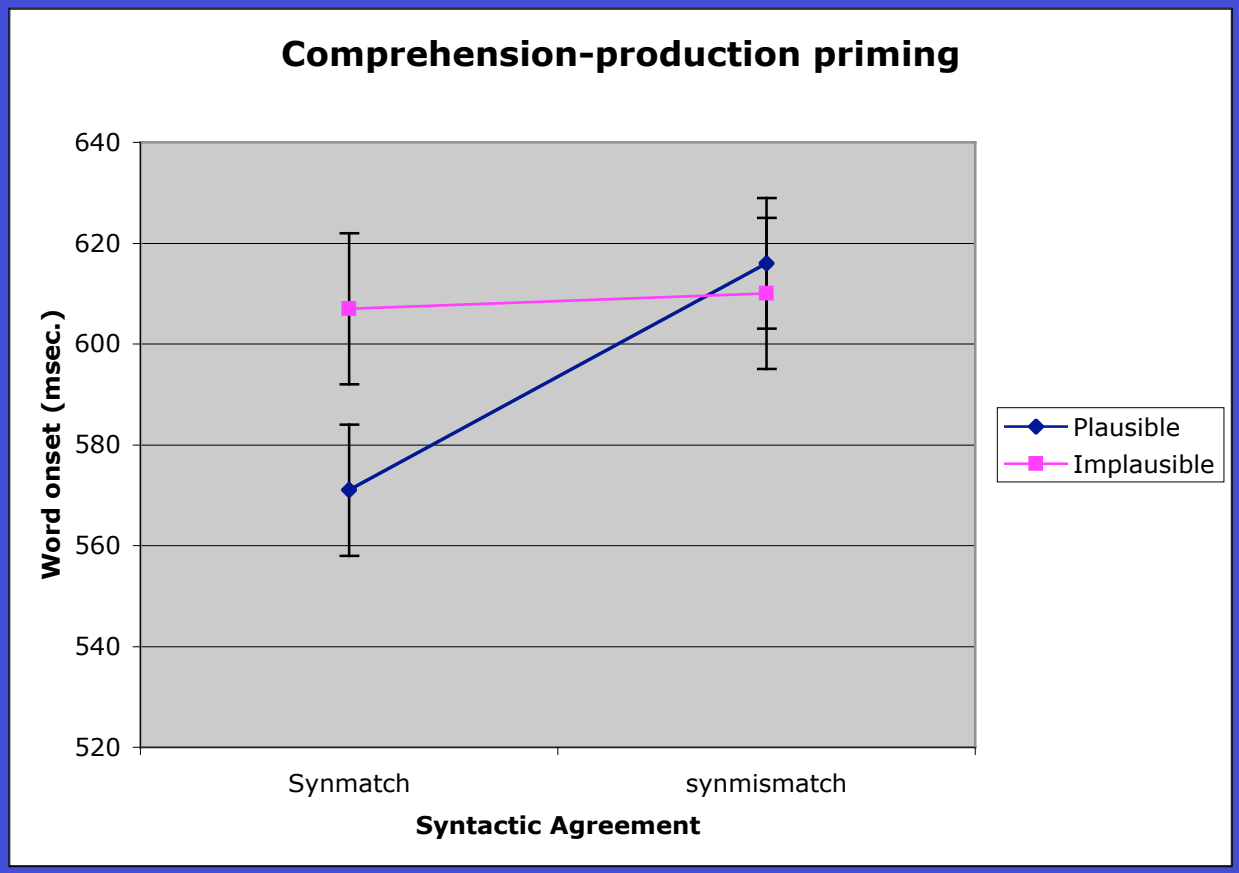
(a) ***buy*** *(b)* ***bought***

syntactic consistency (Verb tense agreement)

1+ a, 2 + b - syntactically agrees

1 + b, 2 + a - syntactically “disagrees”

Production onset latency



Priming effect (plausible) = 37 msecs

$F_{(1,23)} = 25.5$, $p<0.01$

Automatic alignment mechanisms

- Short-term priming
  - As illustrated
- Long-term priming
  - Routinization process

Alignment & Routinization

- Routines in general
  - language fragments with high mutual information content (Charniak, 1993), e.g., idioms, stock phrases
- Why routines? - (Kuiper, '96)
  - Short-circuits levels of representation in production

Example of routinization

1-----**B:** O.K. Stan, let's talk about this. Whereabouts –whereabouts are you?

2-----**A**: Right: er: I'm: I'm extreme right.

3-----**B:** Extreme right?

……

8-----**A:** You know the extreme right, there's one box.

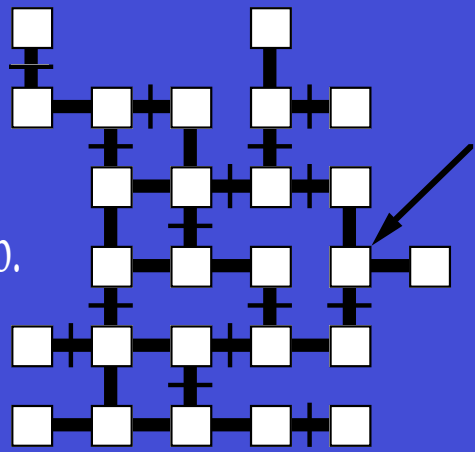
9-----**B:** Yeah right, the extreme right it's sticking out like a sore thumb.

10----**A:** That's where I am.

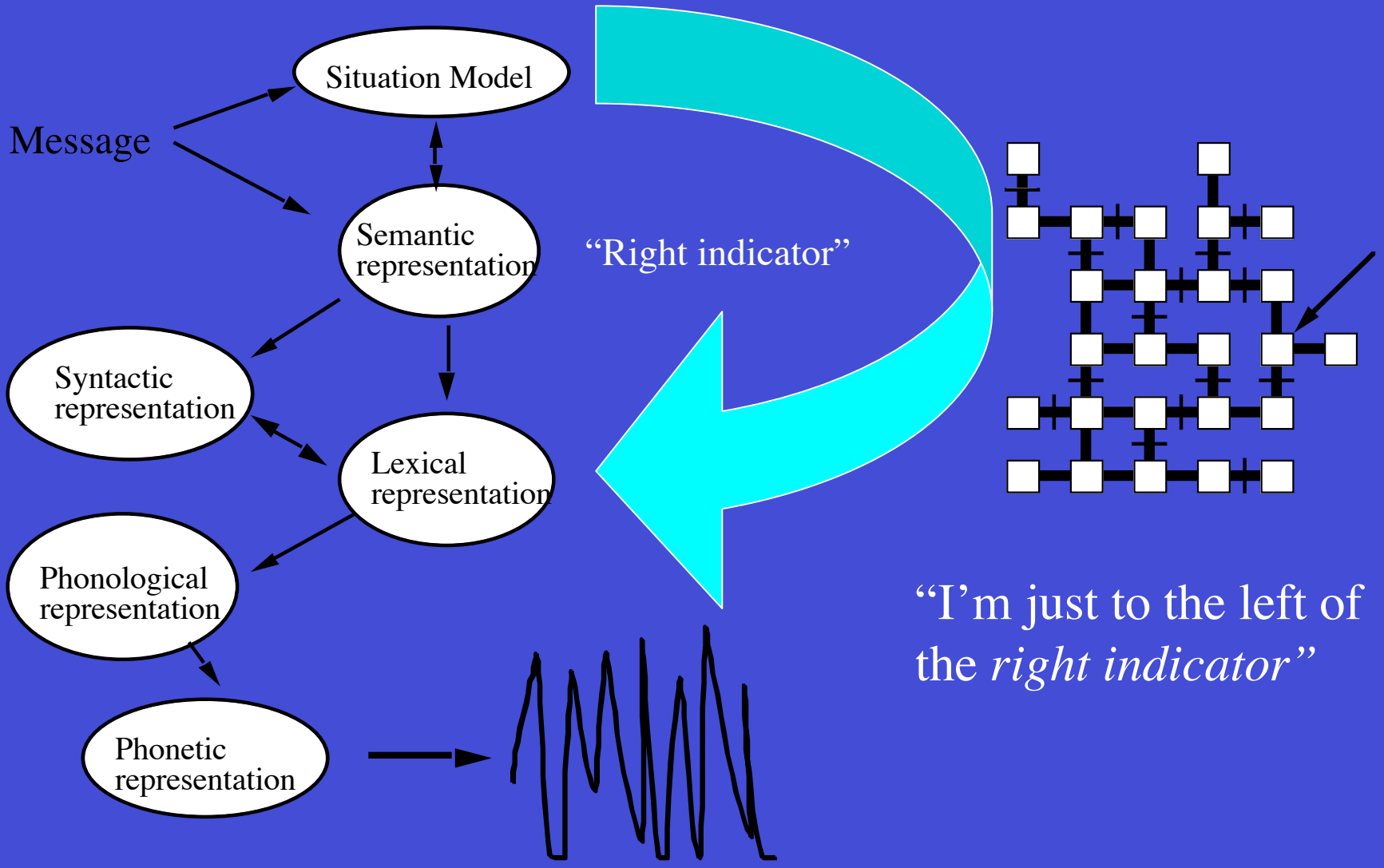
11----**B:** It's like a right indicator.

12----**A:** Yes, and where are you?

13----**B**: Well I'm er: that right indicator you've got.



short-circuiting production



Routinization

- Dialogue enables routines to be set up ‘on the fly’
- Dialogue is extremely repetitive
  - 70% words in London-Lund conversation corpus occur as part of recurrent combinations
- Dialogue Routines
  - ‘dialogue lexicon’ as a set of lexical routines
  - aligned syntactic, lexical, semantic fragments as routines (e.g., description schemes in G&A,‘87,G&D ’94)
  - idiosyncratic to the dialogue participants

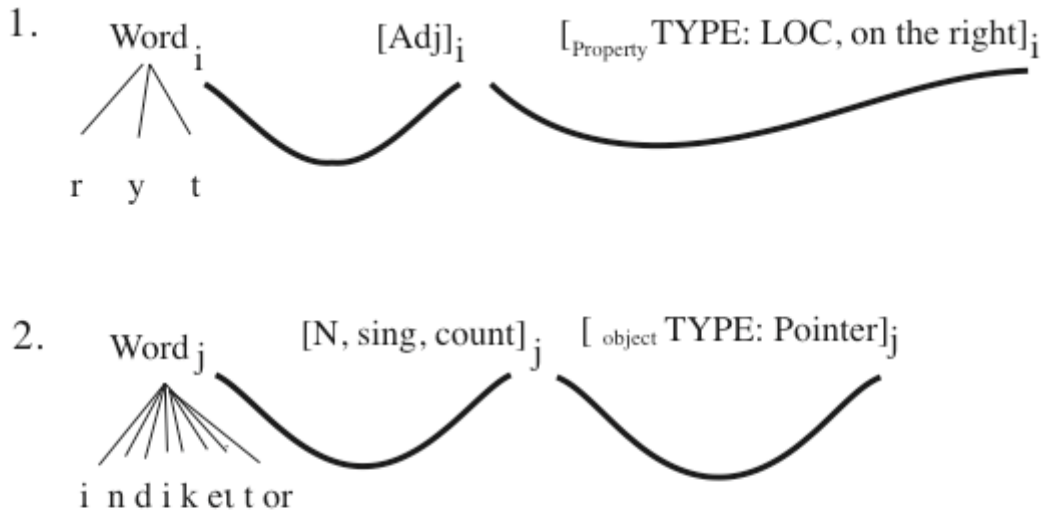
Defining Routines

- Routines are stored representations
- Jackendoff(2002) : Any linguistic information that is not computed on-line is stored as a lexical representation
- Routines are therefore lexicalisations in Jackendoff's (2002) terms

Jackendoff's lexical representations

- Simple lexicalisations - traditional lexical items
  - Mappings between *phonological, syntactic, conceptual/semantic* representations
- Complex lexicalisations - idioms, stock phrases etc.
  - Partial mappings between *phonological, syntactic, conceptual/semantic* representations

Simple Lexical Representations
“right” “indicator”

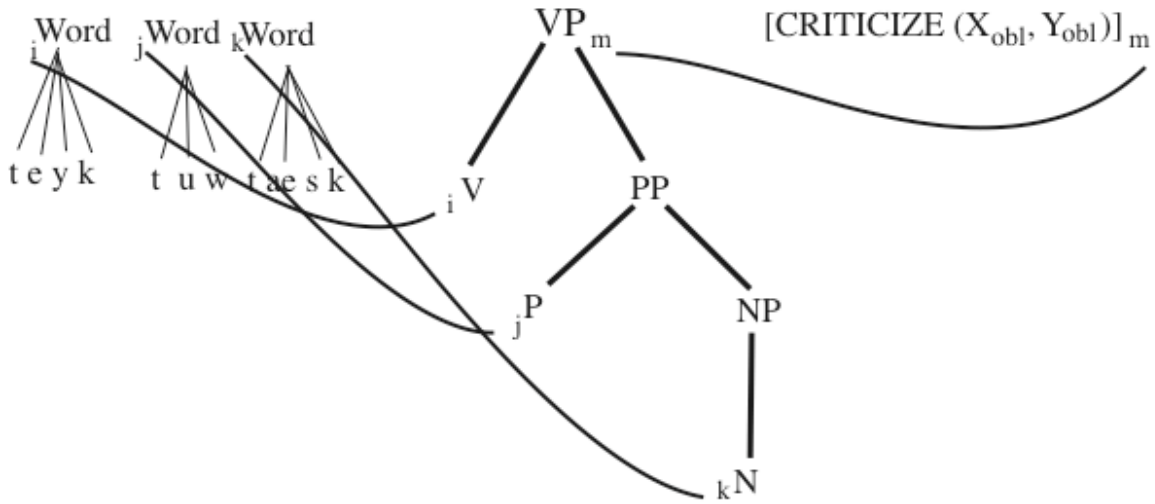


Complex lexical representation

John took Mary to task

In Jack (2002) *take to task* is a complex lexicalisation

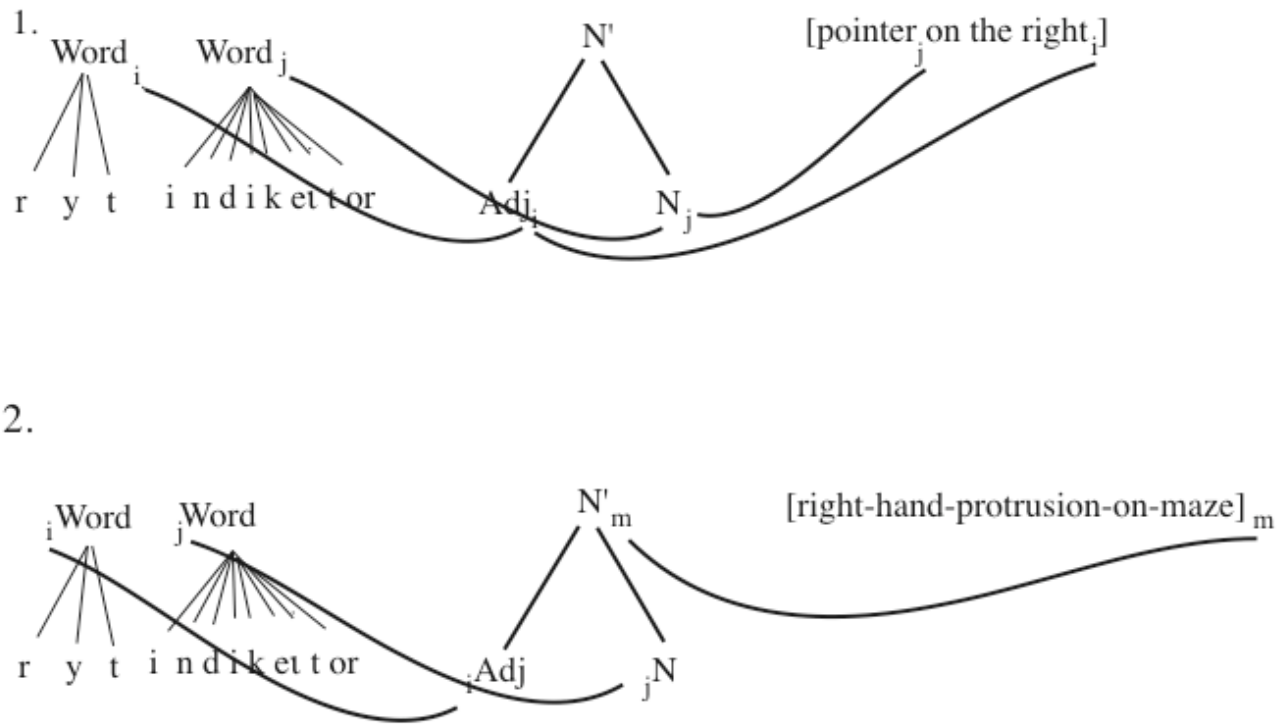
Complex Lexical Representations
“take to task”



Dialogue routines

- Non-productive routines - self-contained like non-productive idioms e.g., *kick the bucket*
- Semi-productive routines - like semi-productive idioms (constructions) e.g., *Drink/Dance/Sing your way through the evening*

Non-productive routine “right indicator”



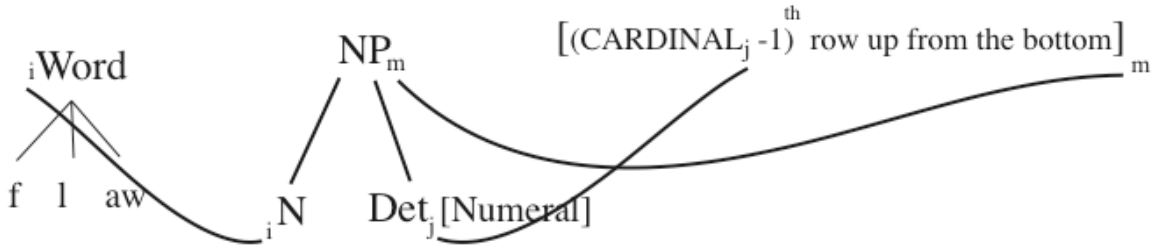
Semi-productive routine

Line Scheme (Garrod & Anderson, 87)

I'm on the first floor, ..third floor, ..fifth floor etc.

"Nth floor" routine

Semi-productive routine(1)
"Nth *floor*"



Semi-productive routine 2

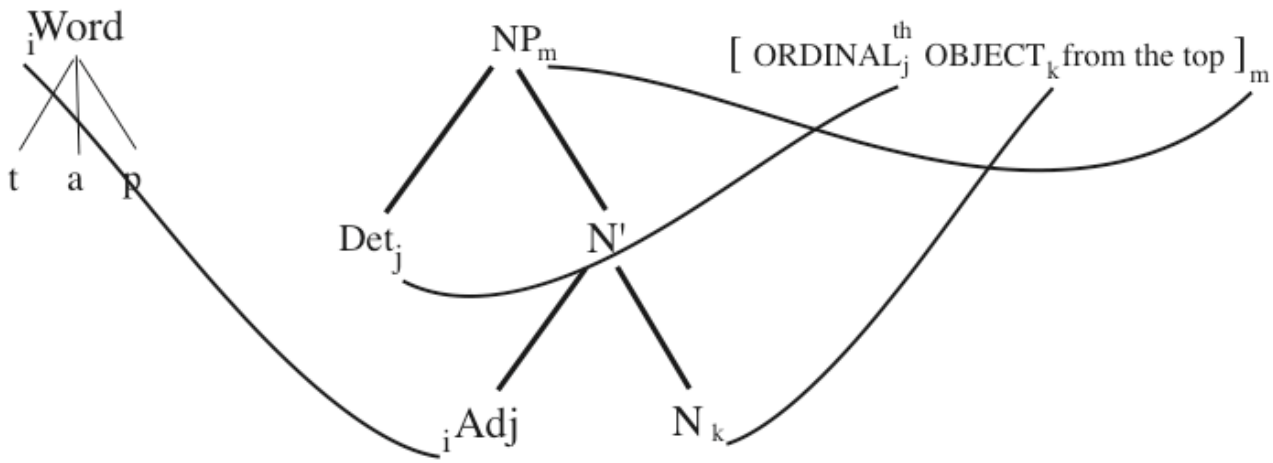
Line Scheme (2)

I'm second bottom row

I'm third left

Nth *top*/*bottom*/*left*/*right* routine

Semi-productive routine(2)
“Second *top* row”



Evidence for long-term alignment & routinization

- Communal lexicons (Clark, '98)
- Community alignment vs. non-community misalignment in maze game dialogues

Group alignment

(Garrod & Doherty, 1994)

- Isolated Pairs
  - 5 pairs play nine games each
- Virtual Community Group
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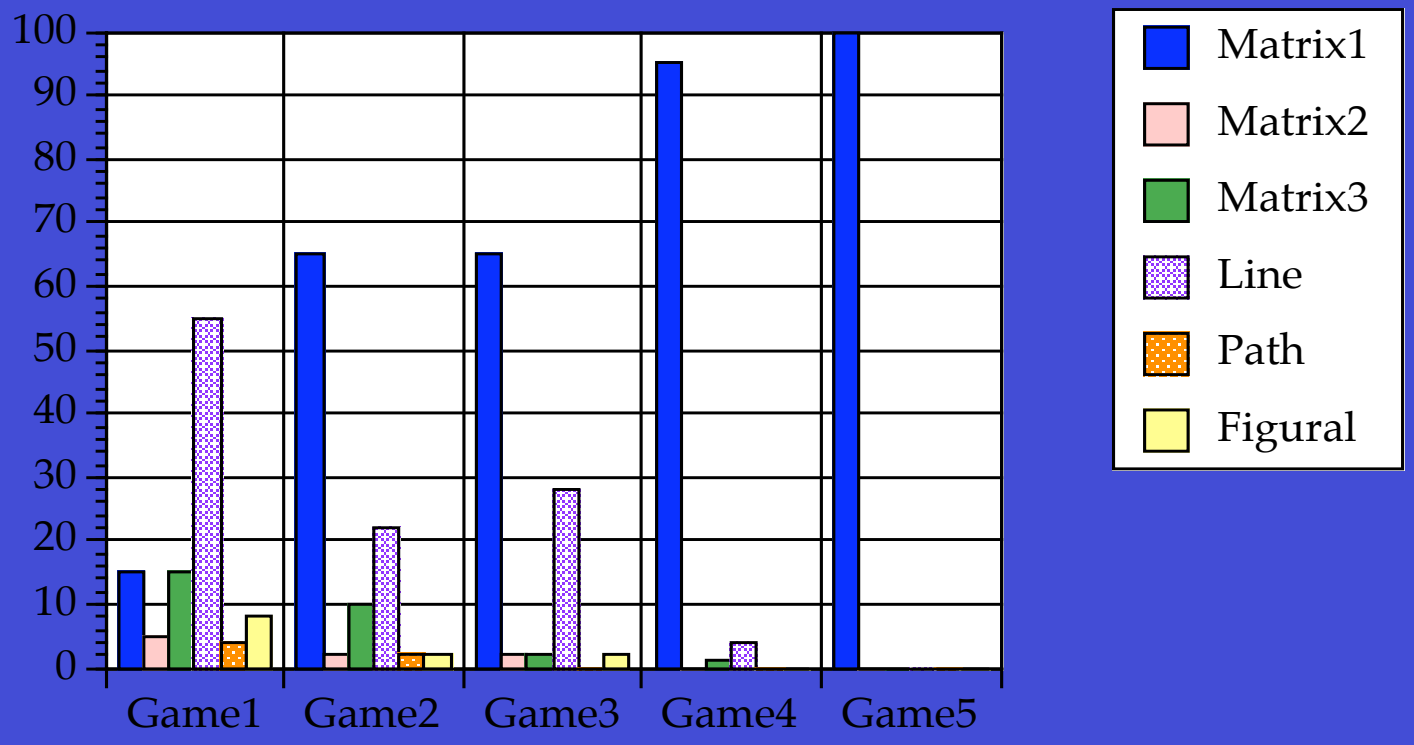
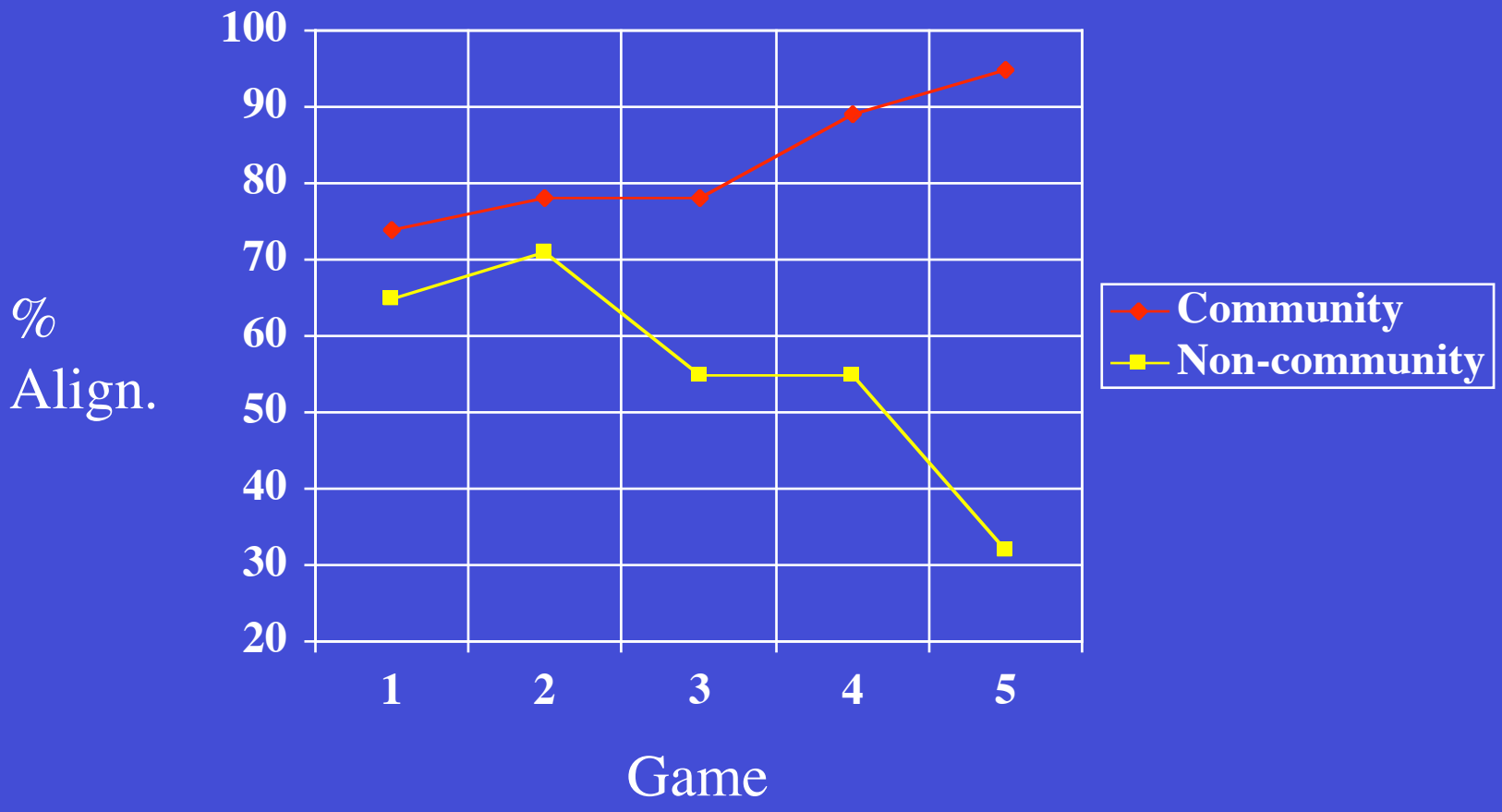
% choice



Evidence for long-term routinization



Community versus Non-community effects

- Community convergence -
  - Systematic routinization across the community
- Non-community divergence -
  - Local alignment clashes with unsystematic (unshared) long-term routinization across non-community

Summary & Conclusion

- Two automatic mechanisms of interactive alignment
  - Short-term co-activation of aligned structures
  - Long-term establishment of aligned memory representations or routines
- Routinization
  - Mechanism for driving language change in communities
  - Simulation of automatic community convergence using a similar mechanism (Barr, 2004)

The End

Thank you

The End -- Thank you