

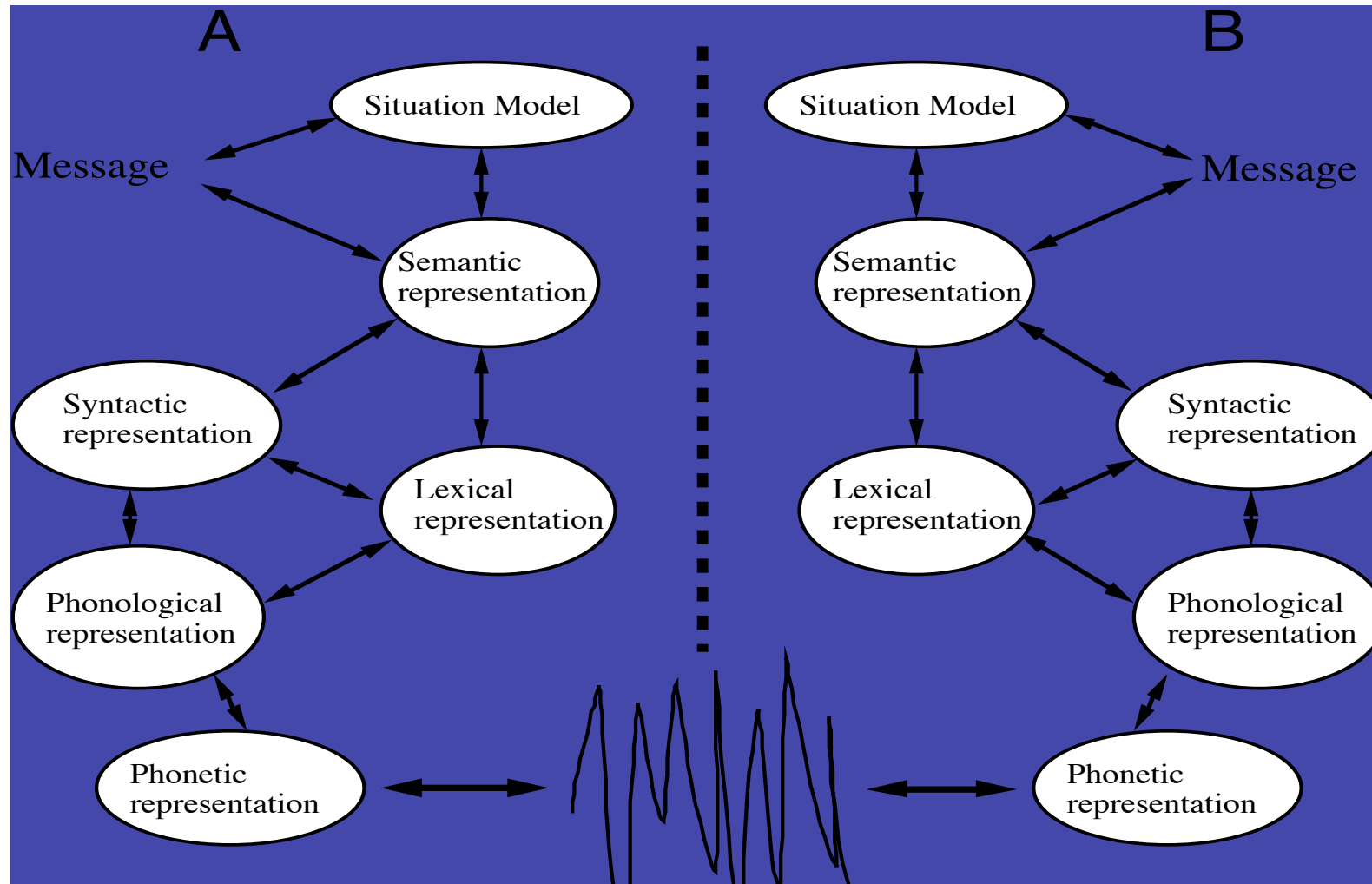
Interaction and communication (3)

Simon Garrod

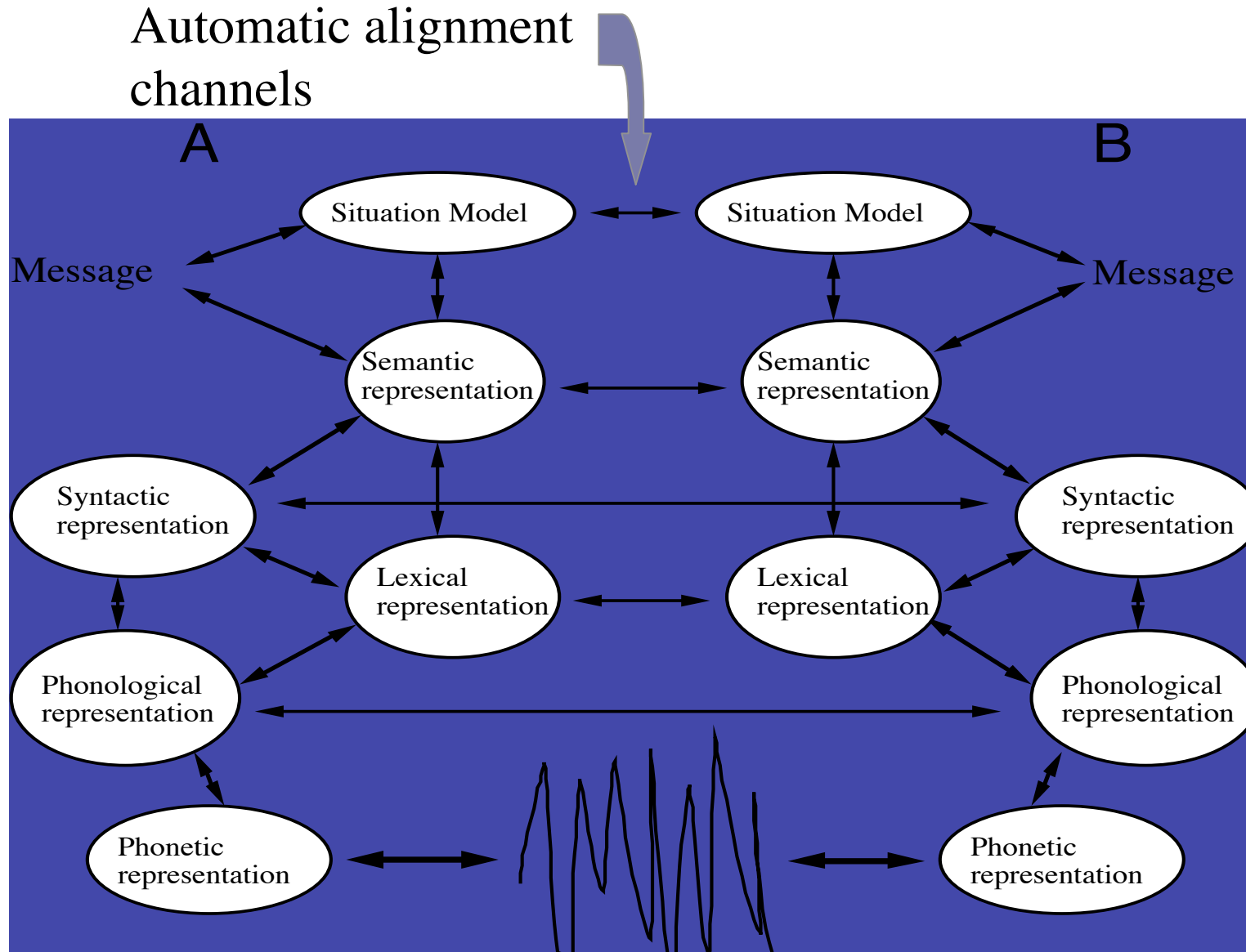
Lecture 2

- Why is dialogue so easy?
- Mechanistic account of dialogue processing
- Outline the interactive alignment model

Autonomous Transmission Model



Interactive Alignment Model



Lecture 3

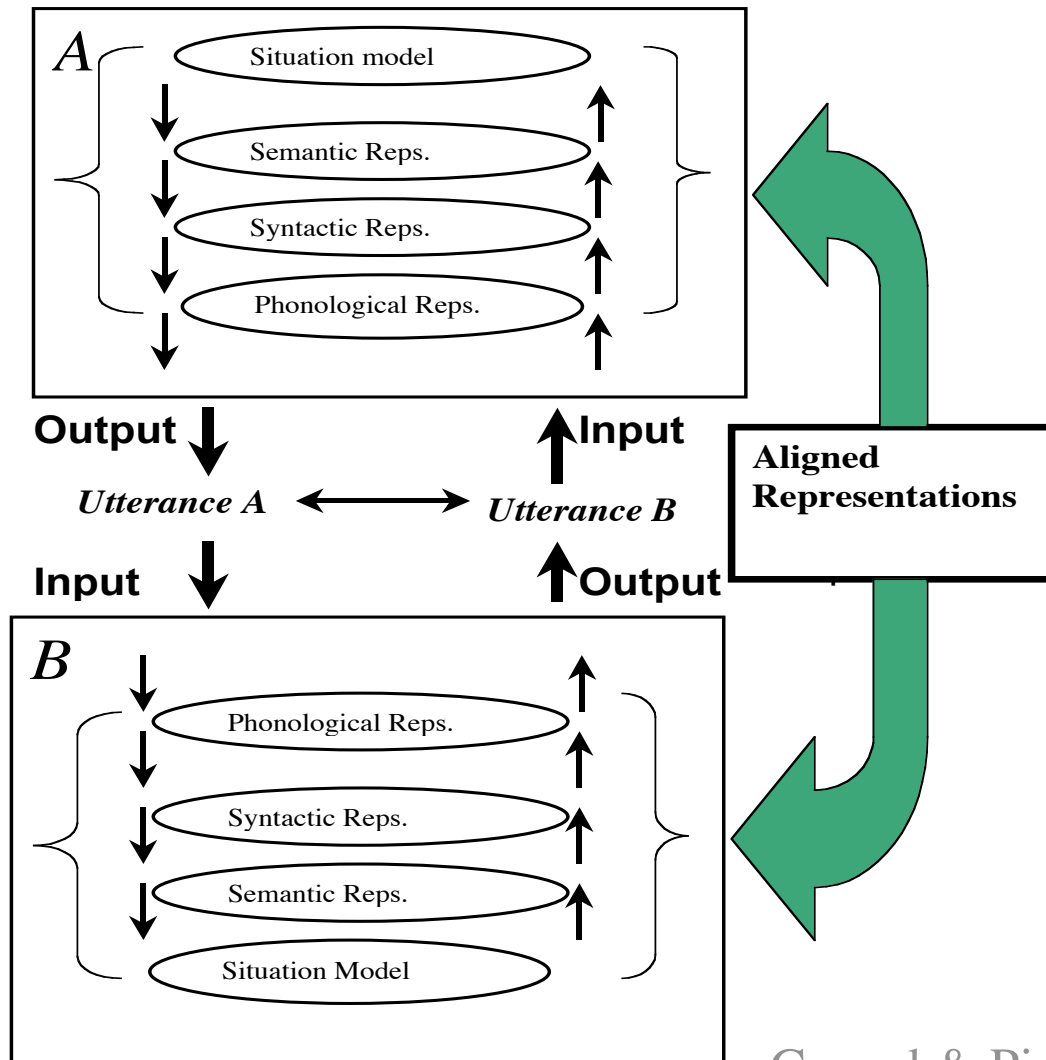
- Additional features of interactive alignment
- Parity of representation between production and comprehension
- Routinization of language during dialogue

Interactive Alignment

Assumptions:

- Priming at many levels
- Parity of the representations used in production and comprehension
- Interaction between interlocutors, hence output/input coordination
- Interactive repair processes

Parity & Priming: +ve feedback system for alignment



Garrod & Pickering, TICS (2004)

Parity of comprehension and production

- Autonomous production/comprehension *vs* Aligned production/comprehension
- Interactive alignment predicts influences from comprehension to production & from production to comprehension

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.

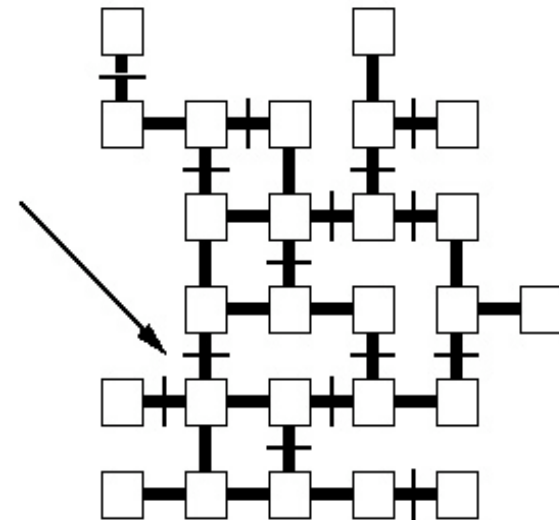
8----**A:** One up (*1 sec.*) I take it we've got identical mazes?

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

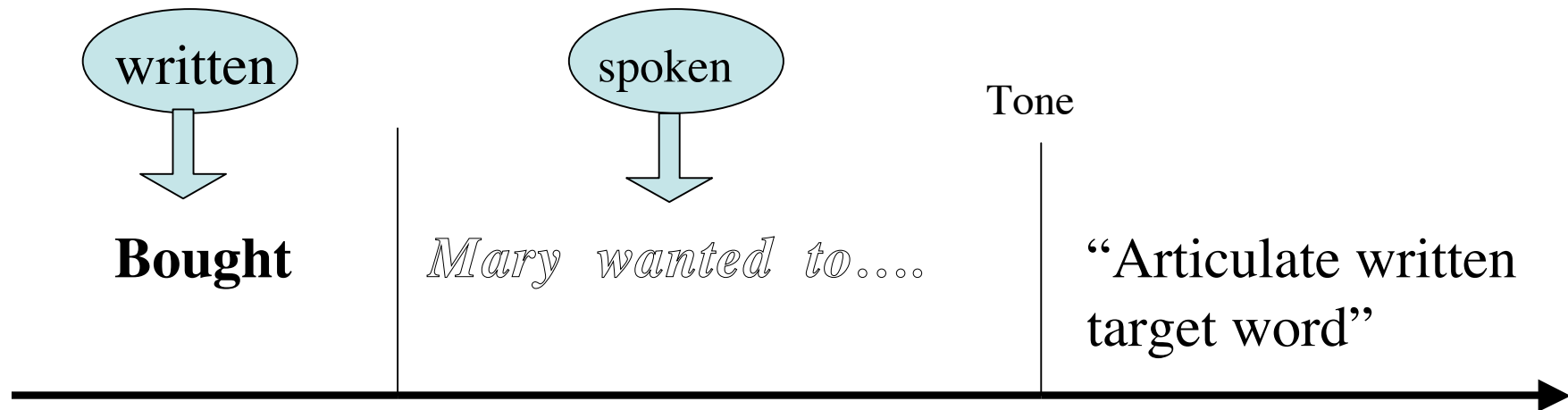
10----**A:** Uh-huh:

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

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



Experimental paradigm for comprehension to production influences



Syntactic priming experiment

Example prime fragments:

(1) *Mary wanted to.....*

(2) *She knew that she had....*

Target words:

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

syntactic predictability (V agreement)

1 + a, 2 + b - syntactically agrees

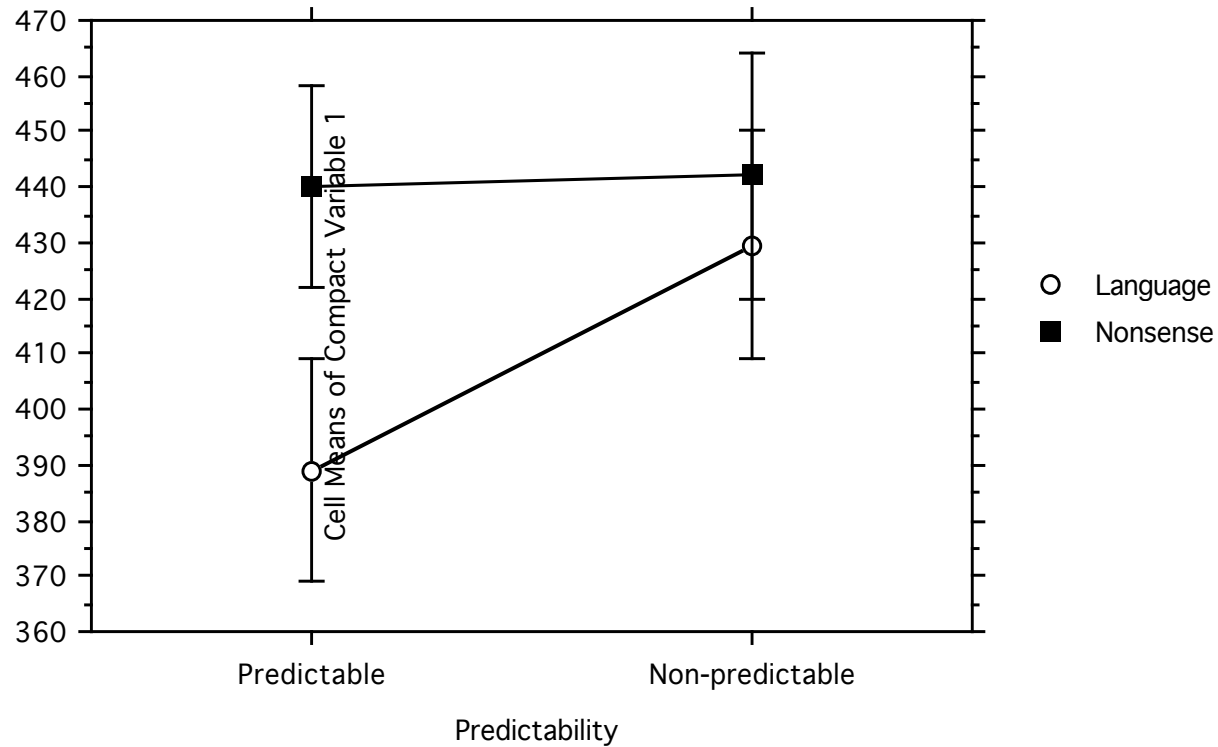
1 + b, 2 + a - syntactically “disagrees”

Experiment 1

Interaction Plot
Effect: Prime * Predictability
Dependent: Compact Variable 1
With Standard Error error bars.

Priming effect = 41 msec

$F(1,19) = 11.6, p < 0.01$

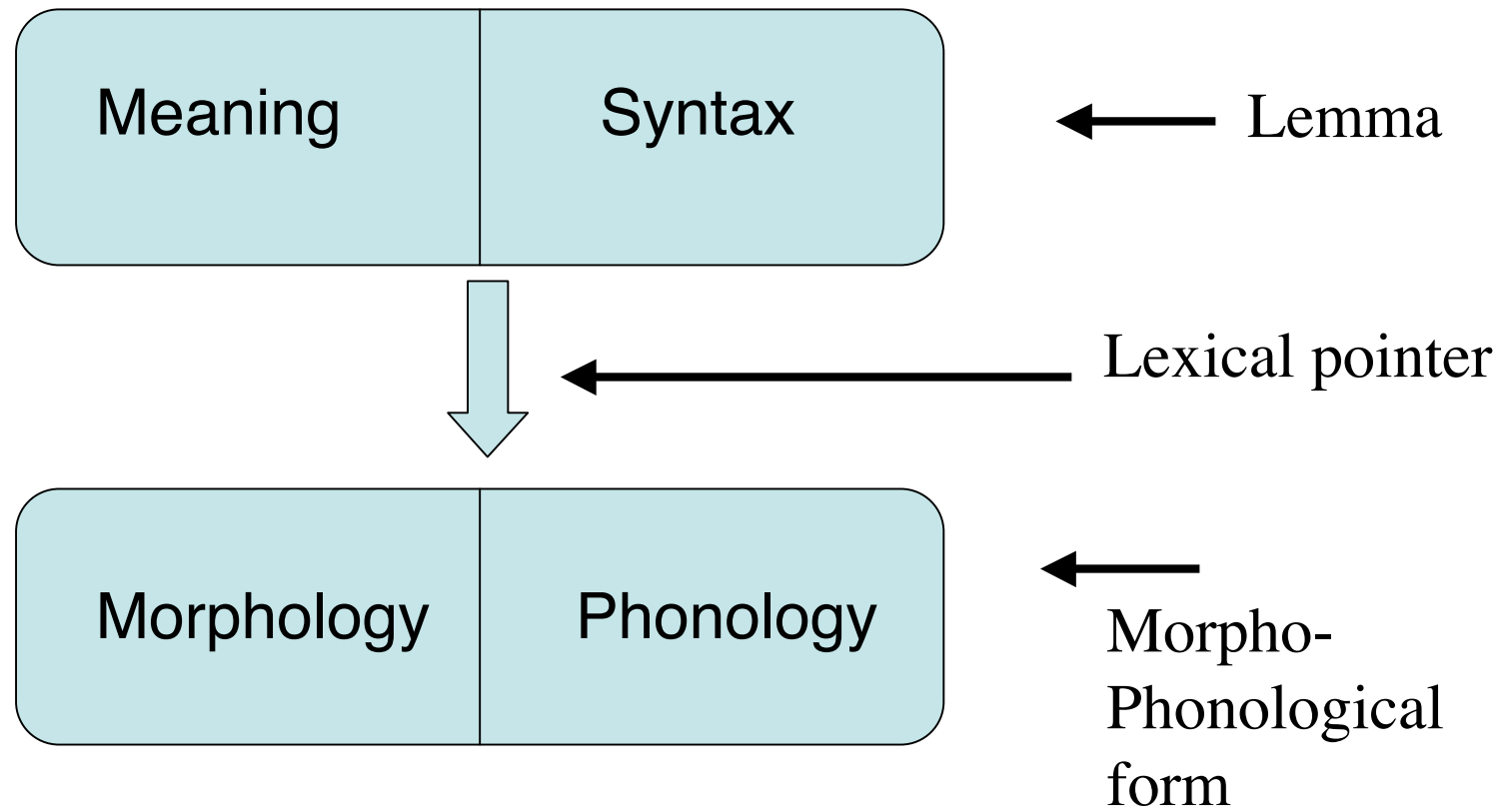


Explanation

Assumes

- Abstract representation of target word
[lemma + syntactic marker]
- Syntagmatic syntactic priming from
comprehension to production

Lemma organisation (Levelt & Schriefers, '87)



Target word representation (Potter & Lombardi, '98)

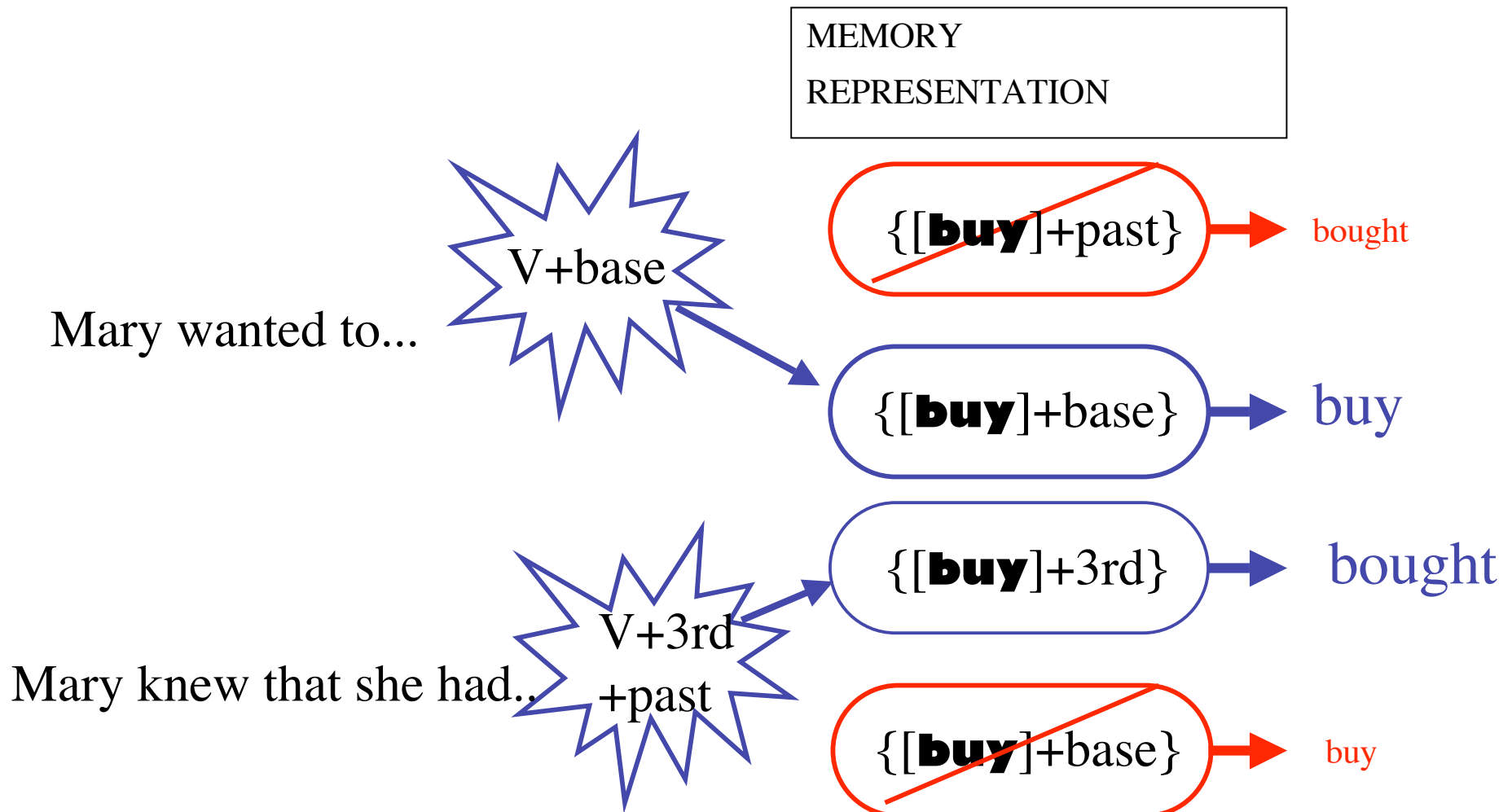
BOUGHT

{[**buy**] + past perfect tense marker, 3rd
sing...}

BUY

{[**buy**] + present tense marker, base form..}

Cross-modal syntagmatic priming



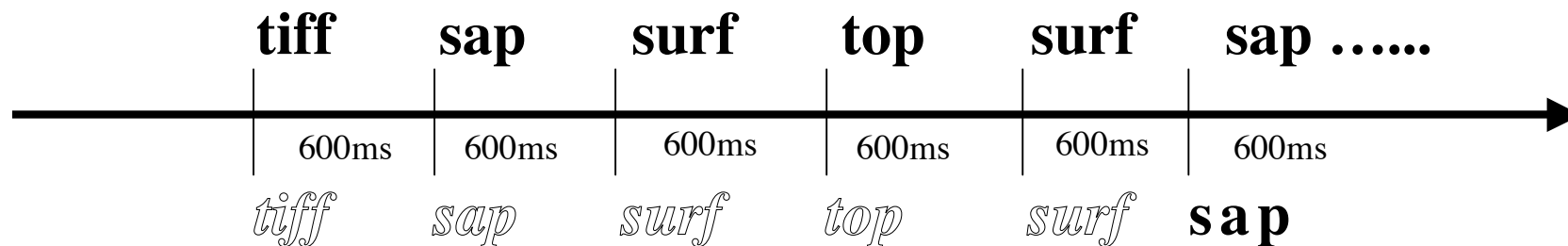
Phonology Experiment

- *Peter Piper picked a peck of pickled pepper*
- Can you twist someone else's tongue?
- Tongue twisters accounted for in terms of either phonological segment confusion or motor program articulator confusion

Cross-modal tongue twister paradigm

(based on Wilshire '99)

Control
(written)



Experimental
(spoken → written)

→
RT to articulate
+ dysfluencies

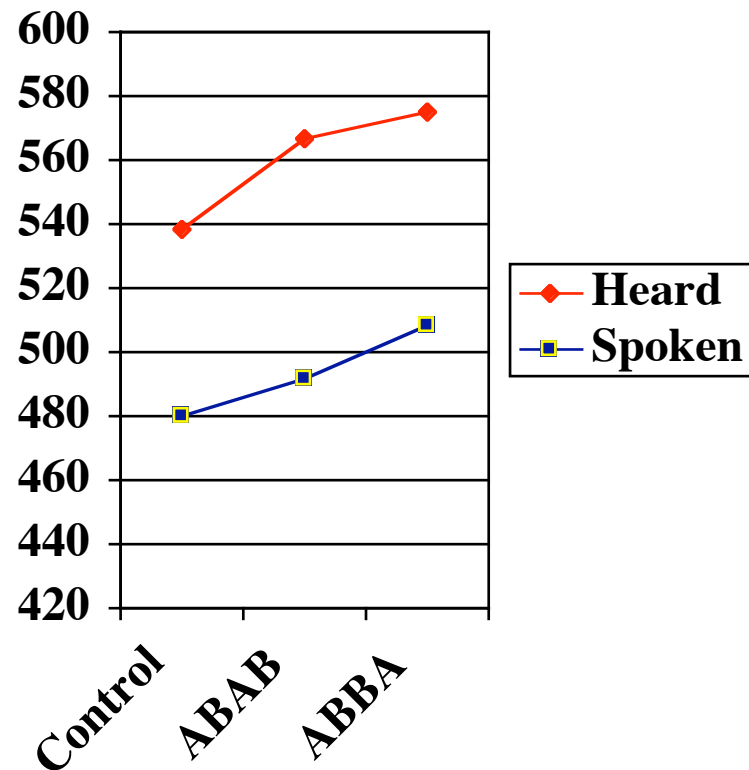
Analysis of tongue-twister errors

Table 1: Speech Errors Elicited in the Spoken Mode.

<i>Error Type</i>	<i>Condition</i>			<i>Total</i>
	<i>ABAB</i>	<i>ABBA</i>	<i>Control</i>	
<i>Anticipation</i>	1	19	3	23
<i>Preservation</i>	1	1	1	3
<i>Uncategorisable Error</i>	9	3	4	16
<i>Total</i>	11	23	8	42

Tongue-twister

- Word duration in msec. for 'spoken' vs. 'heard' tongue-twister contexts compared to non-tongue-twister control condition



Parity conclusion

- Evidence for parity of representation at a syntactic level between comprehension and production
- Evidence for parity of representation at a phonological level for comprehension and production

Two processes of alignment?

- Short-term alignment due to transient co-activation of linguistic structures
 - A: *What does Tricia enjoy most?*
 - B: *Being called “your highness”*
 - B: **To be called “your highness”*
(*What does Tricia like most? To be/Being called..*)
- Long-term memory-based alignment due to *routinization*

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

Routinization

- Dialogue enables routines to be set up ‘on the fly’
 - Consequence of extended interactive alignment and ‘chunking’
- 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,’94)
 - idiosyncratic to the dialogue participants

Repetition in 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.

128 words 47 repetitions (36%)

Repetition in 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*etc.*

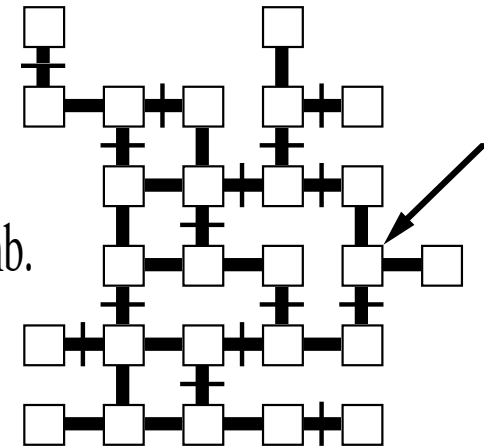
[28 utterances later]

- 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:

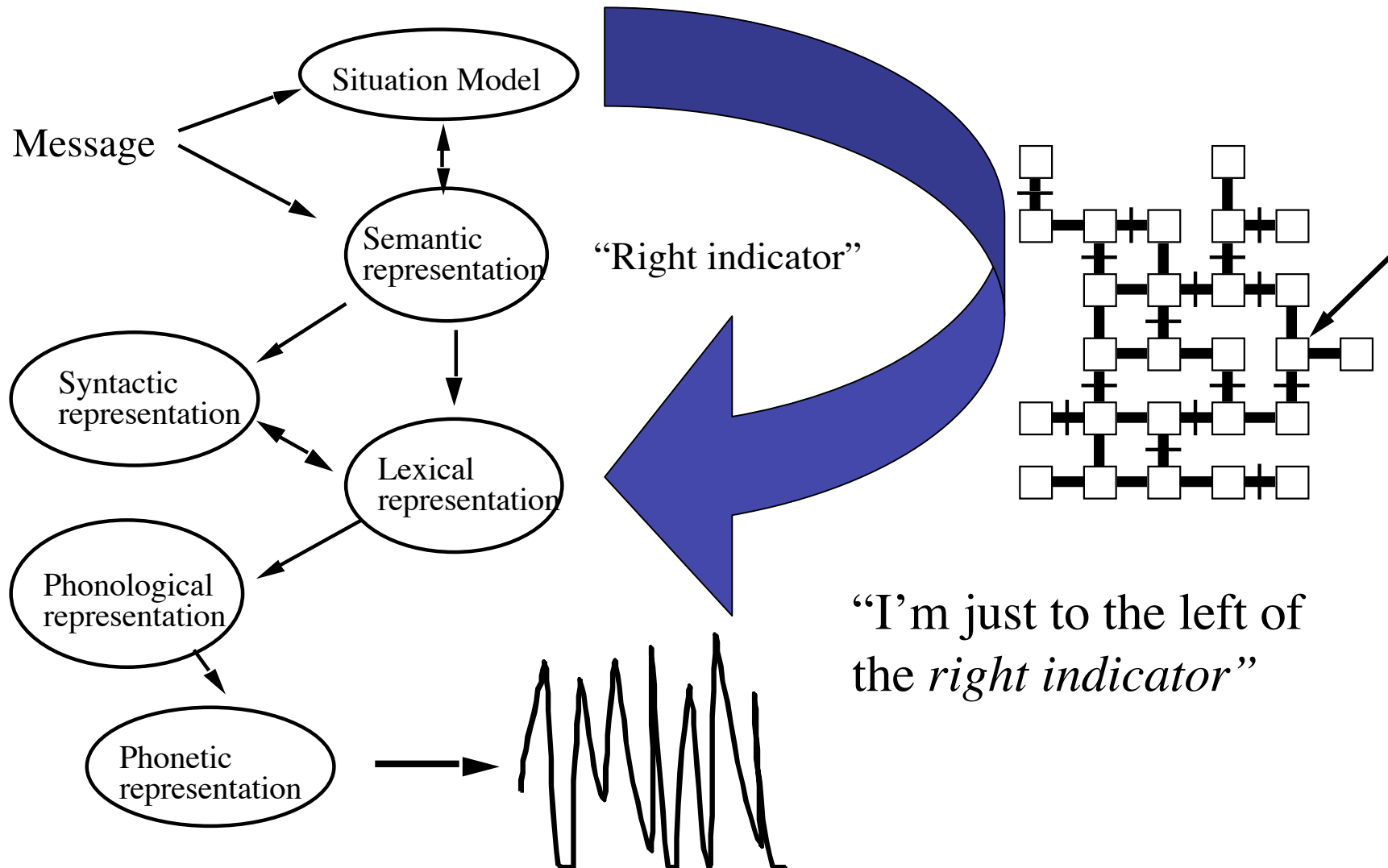
127 words 104 repetitions (85%)

Example maze dialogue

- 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



Defining Routines

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

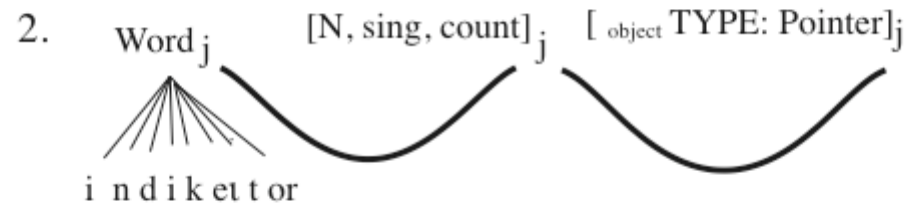
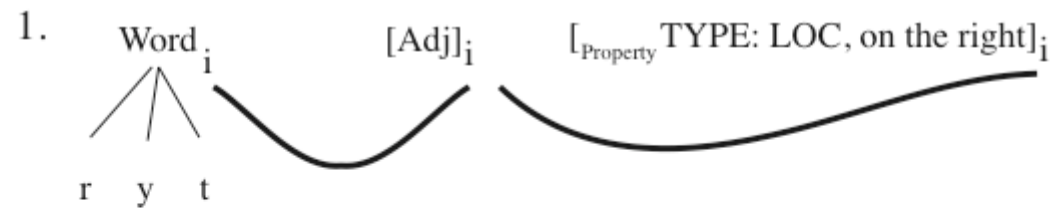
Jackendoff's lexical representations

- Traditional lexical items - *right, indicator*
 - *phonological, syntactic, semantic* sub-representations, with multiple interface links
- Complex lexical items - *take-to-task*
 - *Phono., synt., sem.* sub-representations with partial interface links

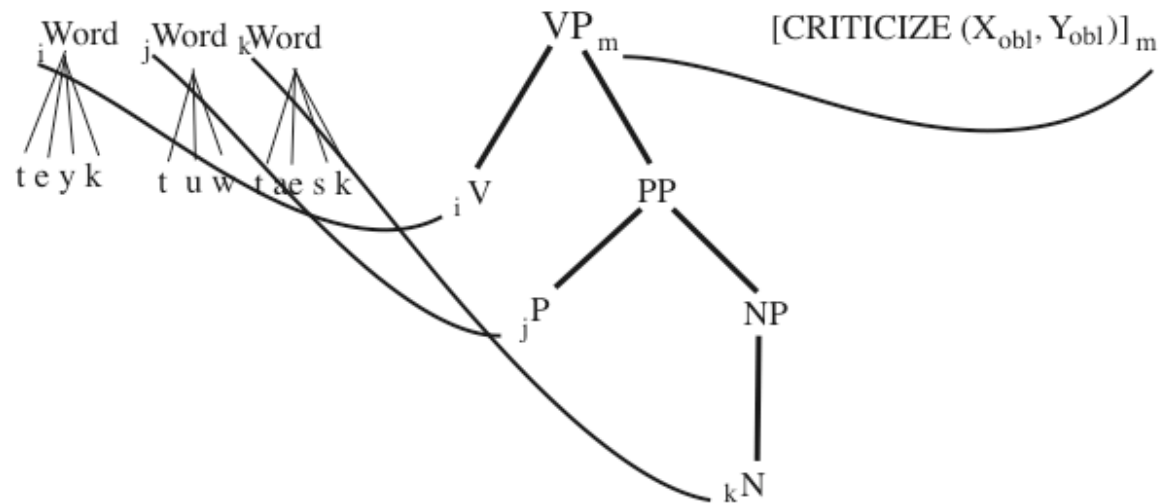
Evidence for the syntactic integrity of routines

- Priming of syntactic category but not semantic type (Peterson et al. 2001)
 - *kick the bucket*
 - (all contexts) *kick the* - primes N over V
 - (idiom context) *kick the* - no priming for concrete over abstract noun
 - (literal context) *kick the* - primes concrete over abstract noun

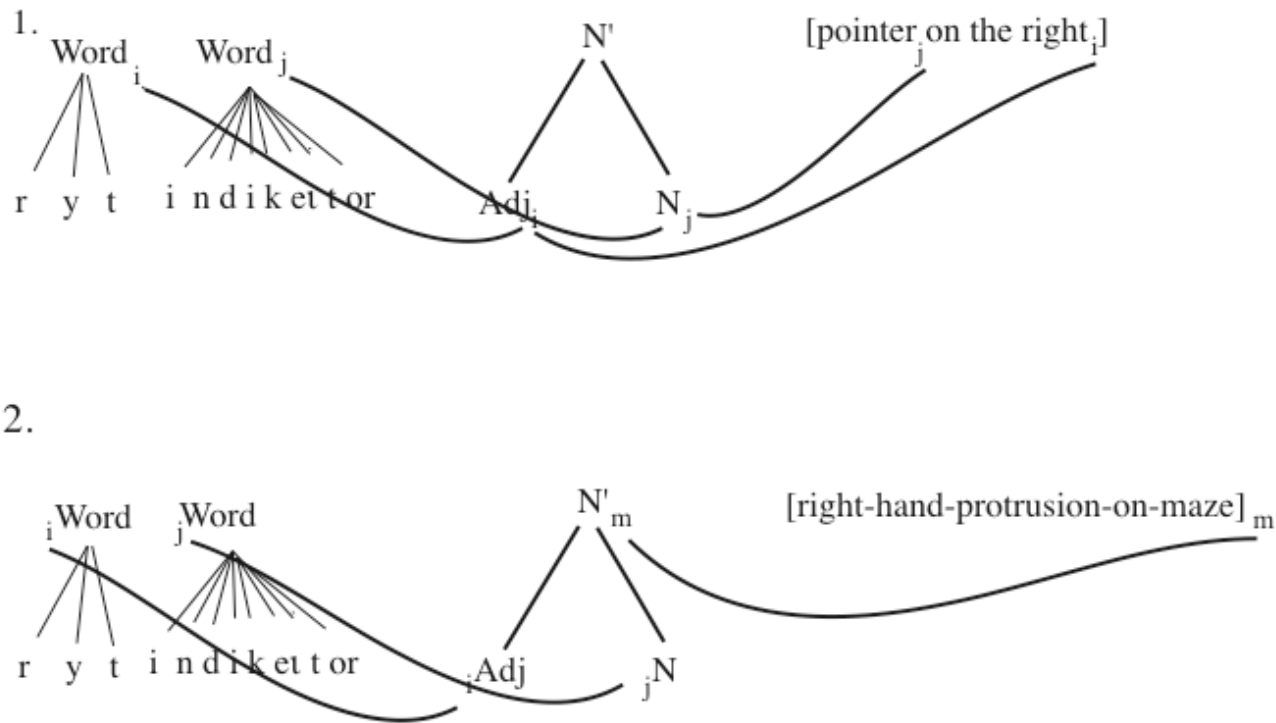
Traditional Representations for “right” & “indicator”



Complex Lexical Representations “take-to-task”



Representation of the routine for “right indicator”



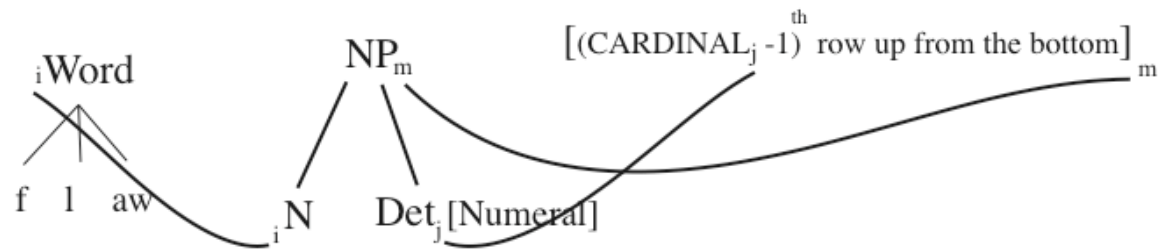
Semi-productive routine

I'm on the fourth floor

“Nth floor” routine

Semi-productive routine(1)

“nth *floor*”



Semi-productive routine 2

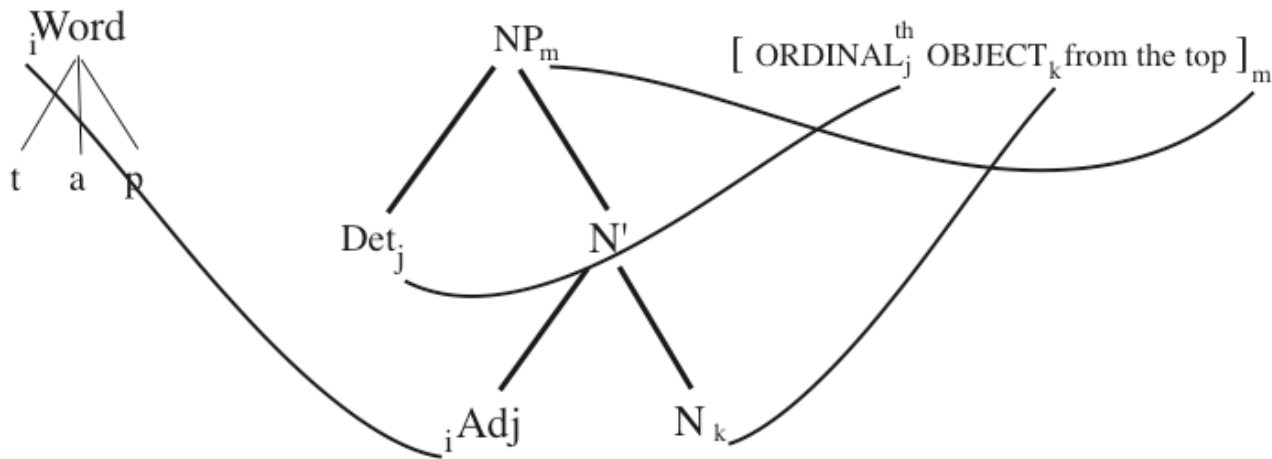
I'm second bottom row

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

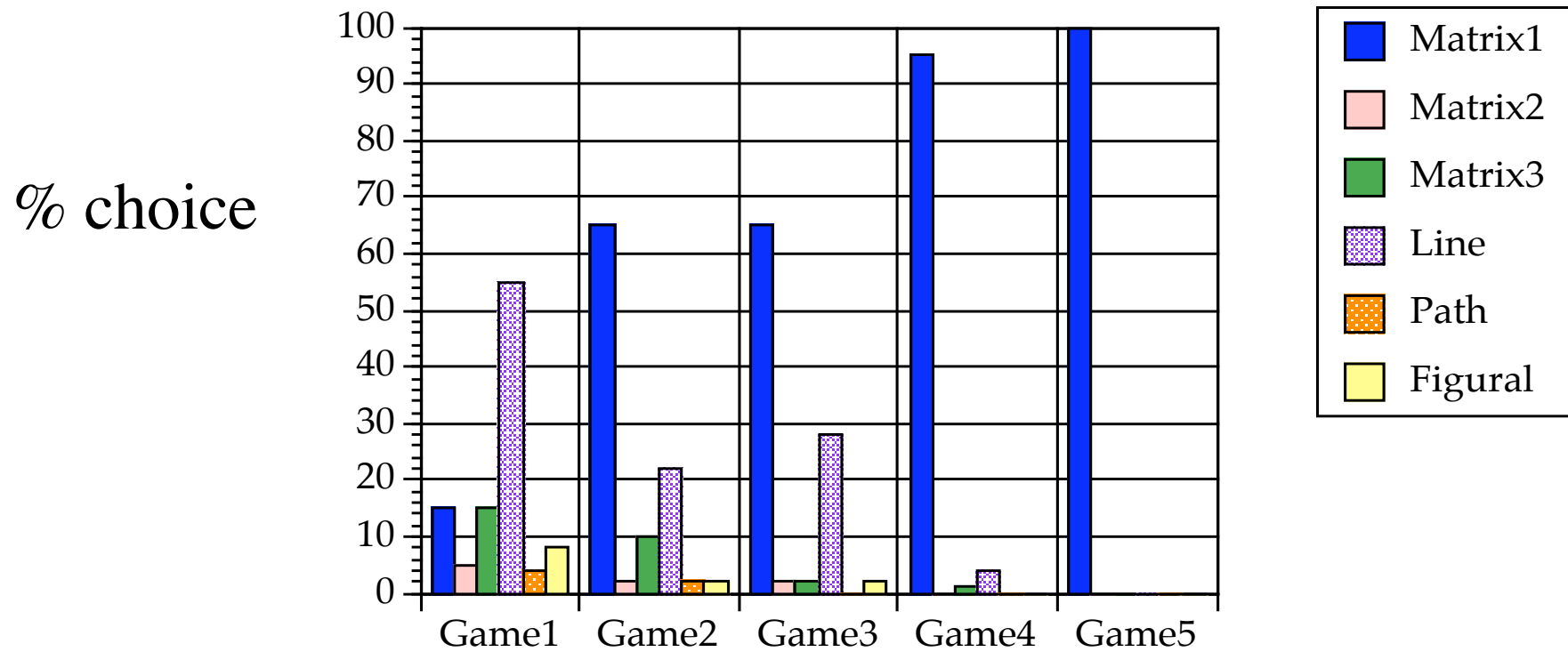
Group alignment

(Garrod & Doherty, 1994)

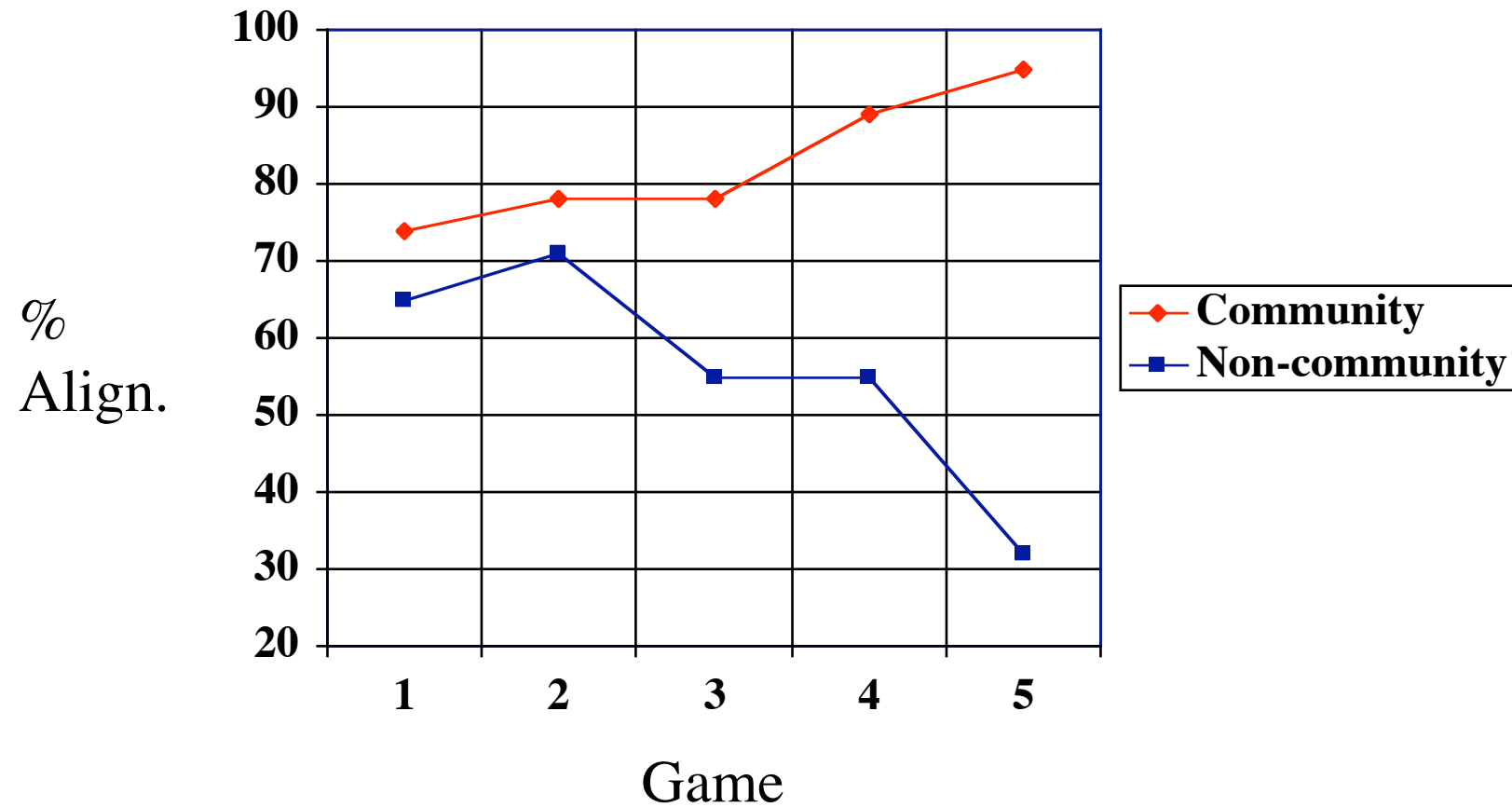
- Isolated Pairs
 - 5 pairs play nine games each
- Virtual Community Group
 - 10 players play each of the other 9
- Non-Community Group
 - 5 lead players play 5 games with different partners with **no common history** of prior interaction

Cognition. 53,181-215.

Choice of Schemes by Group



Evidence for long-term routinization



Community versus Non-community effects

- Community convergence -
 - Systematic routinization across the community establishing a communal lexicon
- Non-community divergence -
 - Local alignment clashes with unsystematic (unshared) 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
- Increase efficiency of processing
 - Production - by reducing or simplifying decision space
 - Comprehension - by resolving ambiguity