Interactivity and competition in language production
LING 611 Spring 2021

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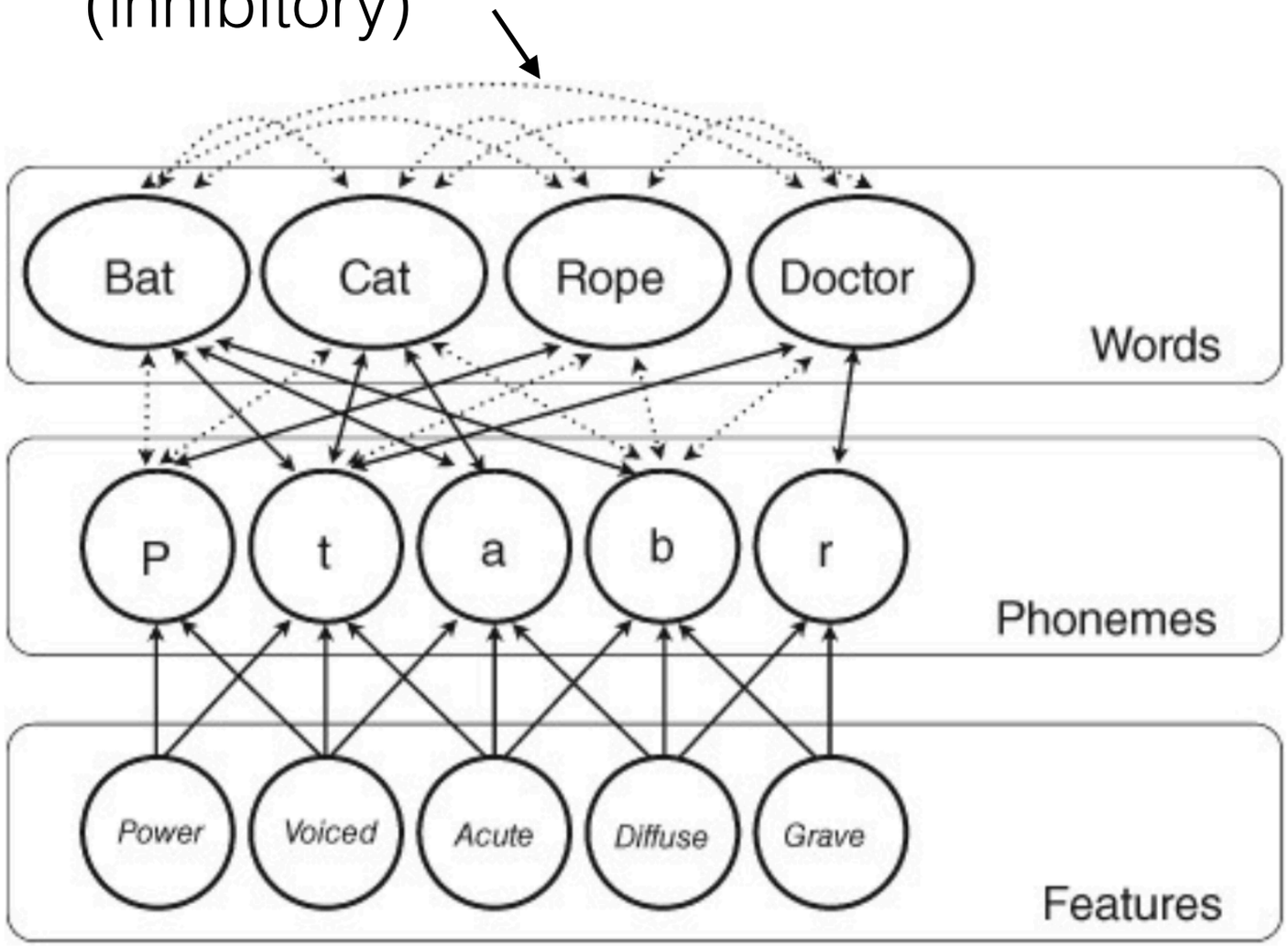
Interactivity and competition

Lateral connection
(inhibitory)



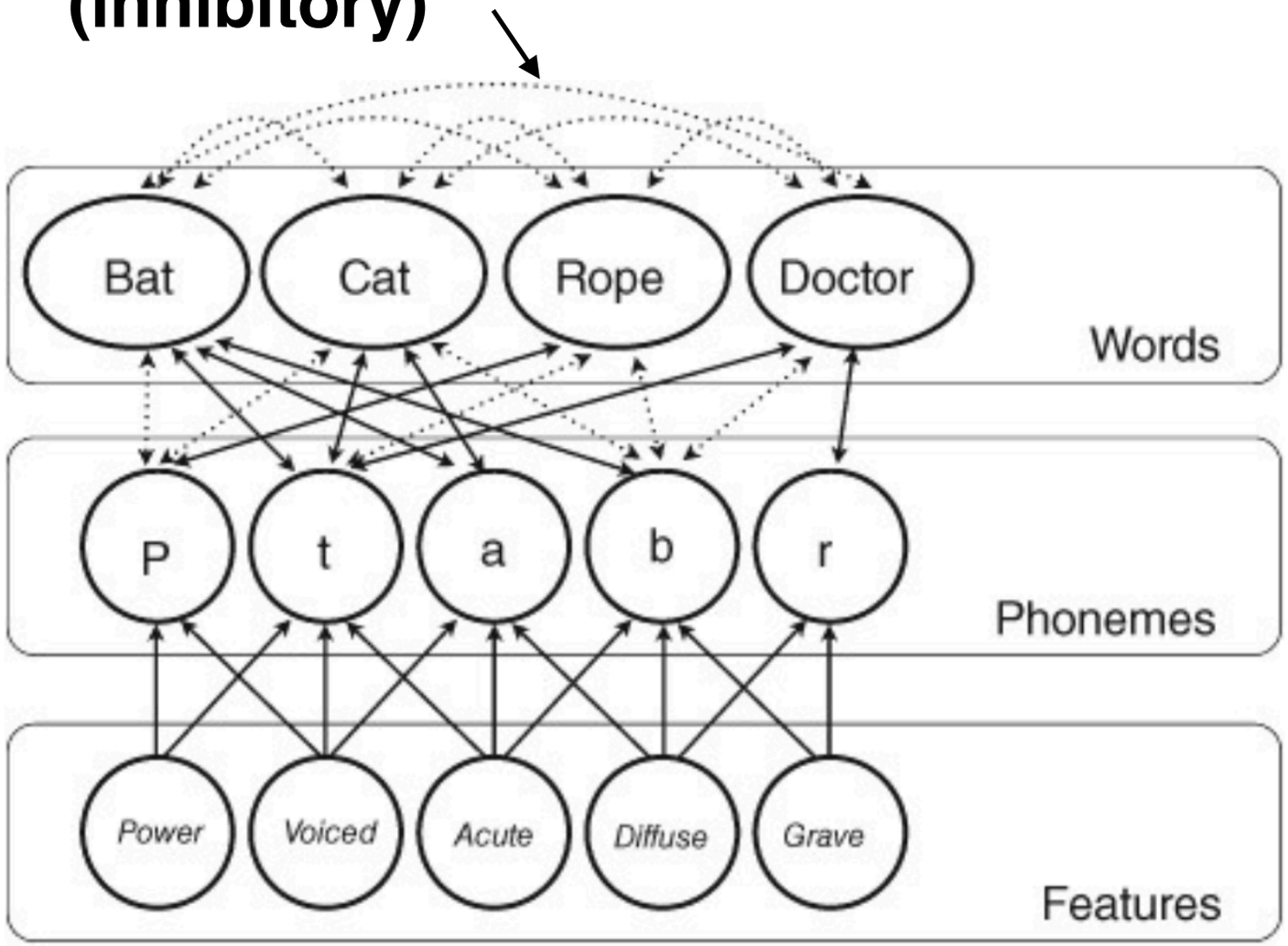
Top-down
connection
(excitatory)

TRACE model

What are the *functions* and *origin* of those connections?

Interactivity and competition

Lateral connection (inhibitory)



Top-down connection (excitatory)

TRACE model

What are the *functions* and *origin* of those connections?

Lateral inhibition

Mach-band illusion

Lateral inhibition

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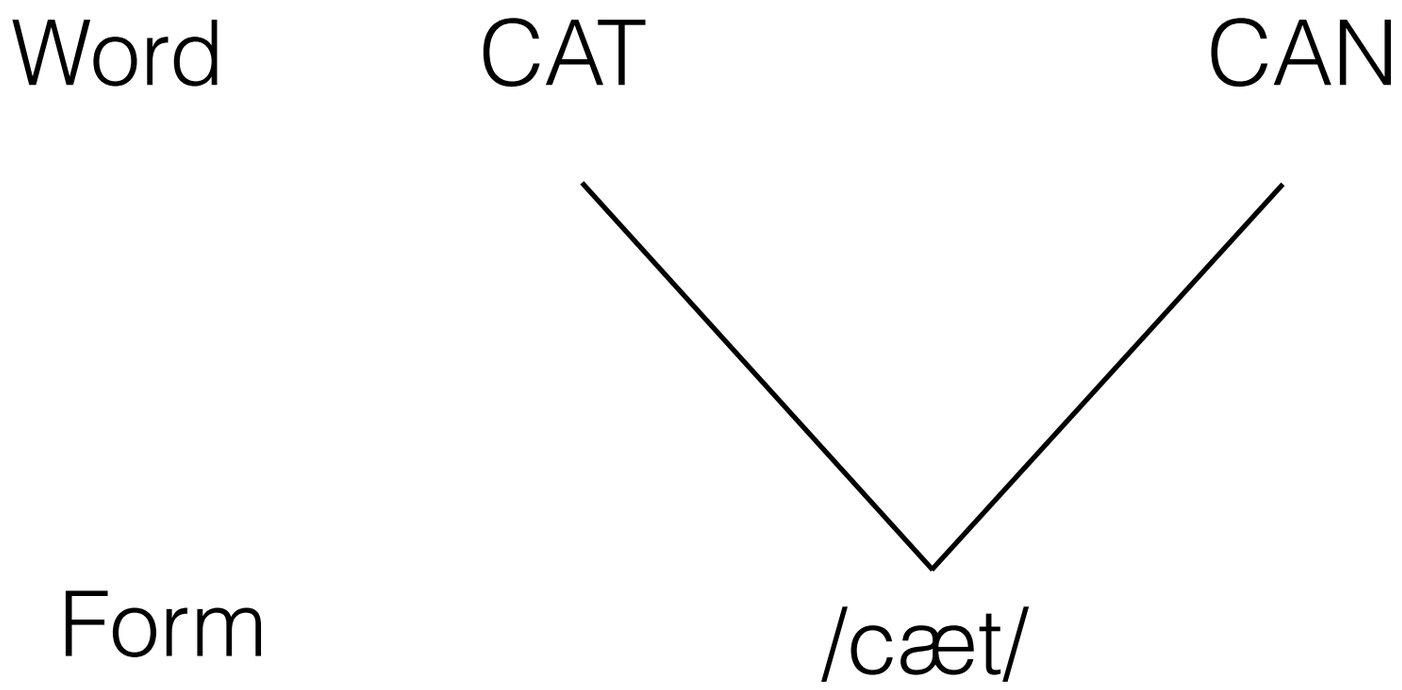
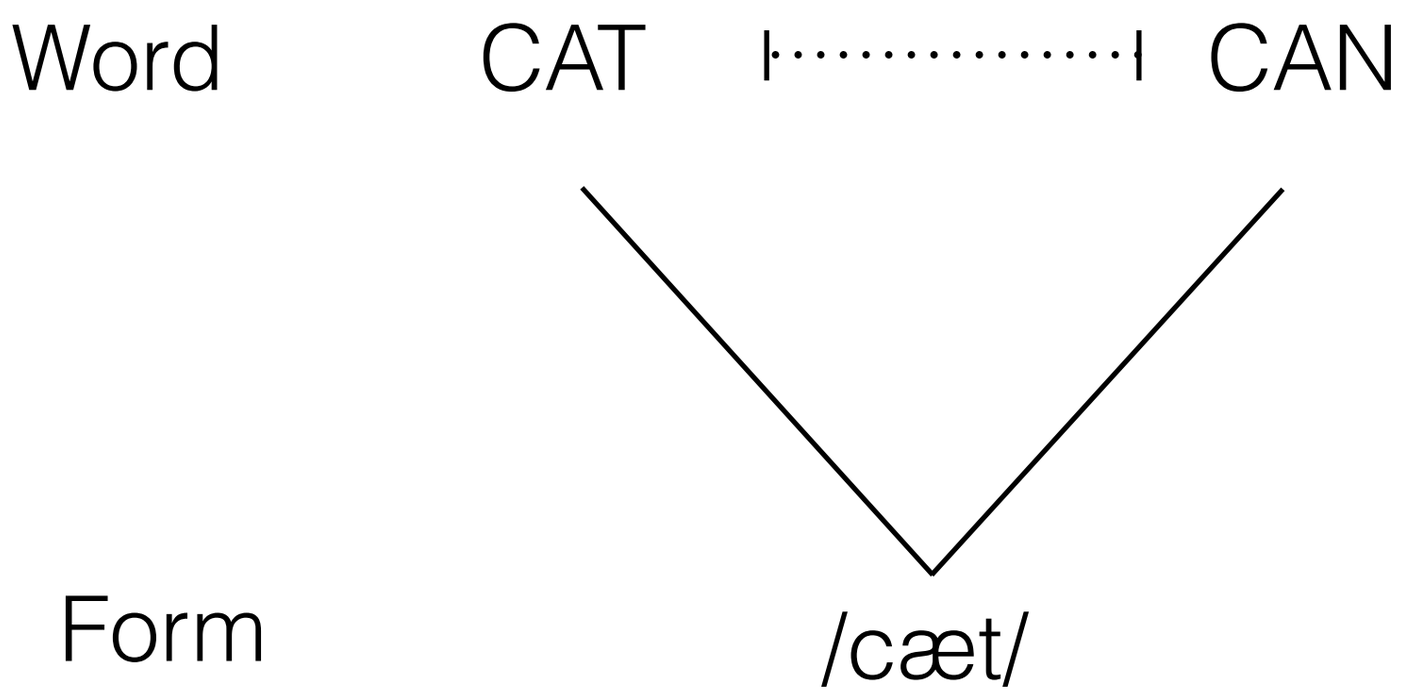
Lateral inhibition in word recognition?



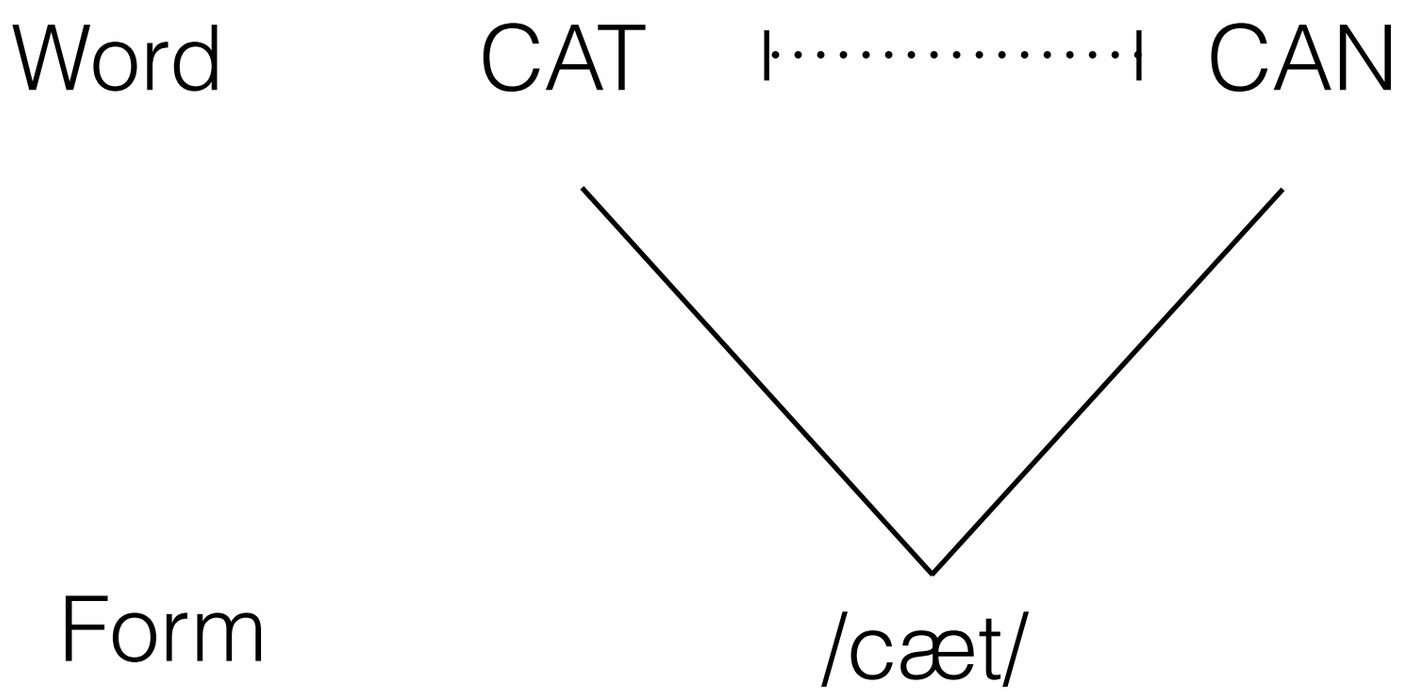
How do you ensure that ‘CAT’ wins the competition?

Lateral inhibition in word recognition?



Inhibitory connection between CAT and CAN

Lateral inhibition in word recognition?



Inhibitory connection between CAT and CAN

Discussion: behavioral prediction??

Form-based competition in comprehension?

Table 1
Examples of Target Stimuli and Their Corresponding Word Primes Used in Experiments 1A and 1B

	Primes				
Target	Identical	3 Phonemes	2 Phonemes	1 Phoneme	Unrelated
still	still	stiff	steep	smoke	dream
plague	plague	played	plead	pants	dance
green	green	grief	grope	goals	clump

Table 2
Mean Shadowing Times (in Milliseconds) and Error Rates for the Primed Session as a Function of Number of Phonemes in Common Between the Word Prime and Word Target in Experiments 1A and 1B

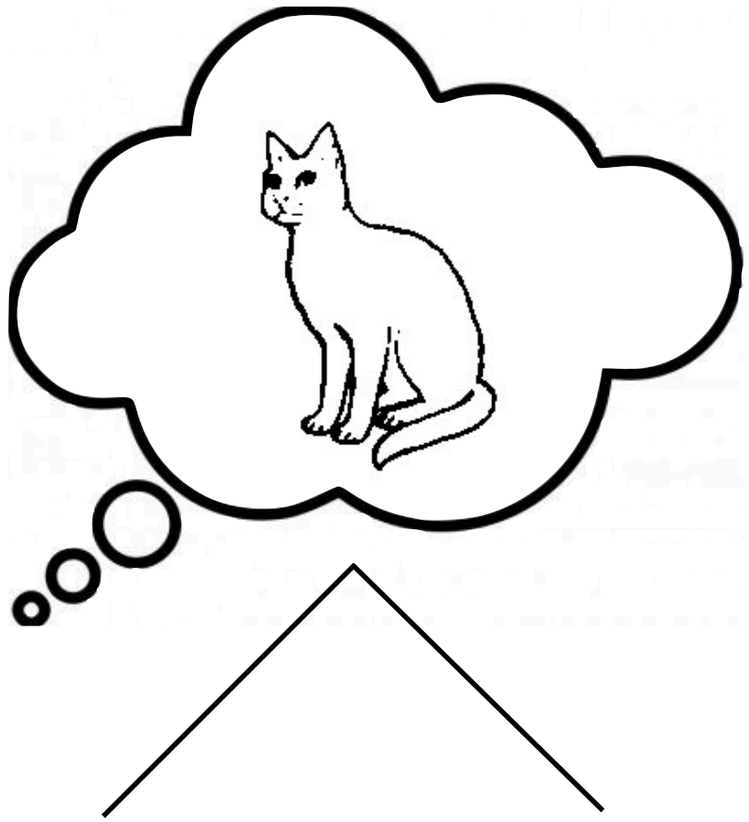
Number of shared phonemes	Experiment 1A: auditory prime		Experiment 1B: visual prime	
	RT	Error	RT	Error
0	916	.01	866	.06
1	888	.01	840	.03
2	895	.01	848	.06
3	918	.02	884	.03
All	901	.02	843	.04

Note. RT = reaction time.

Slowiaczek & Hamburger (1992)

Lateral inhibition in word production?

Concept

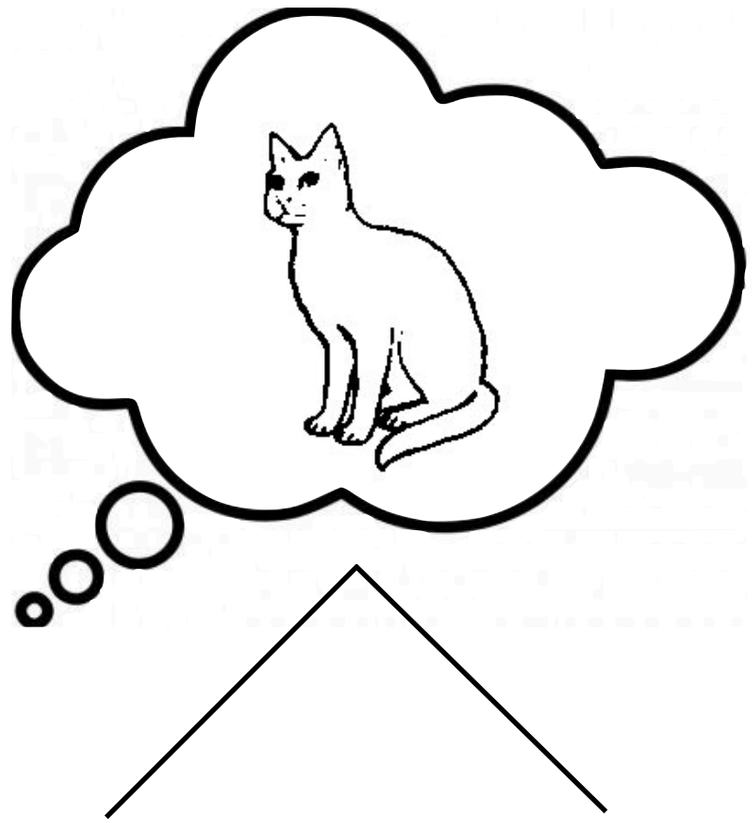


Lemma DOG CAT

How do you ensure that ‘CAT’ wins the competition?

Lateral inhibition in word production?

Concept



Lemma DOG CAT

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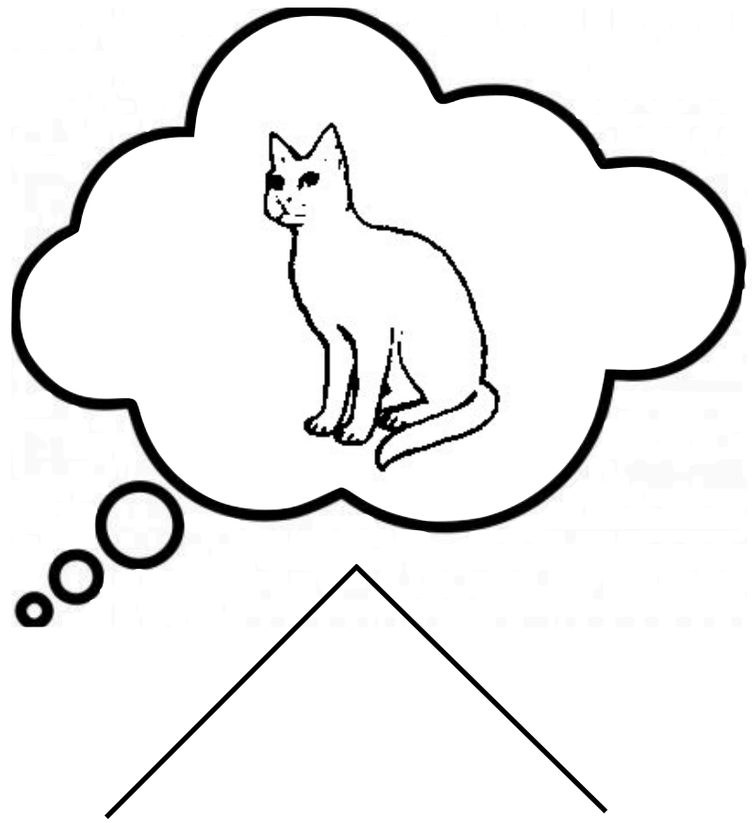

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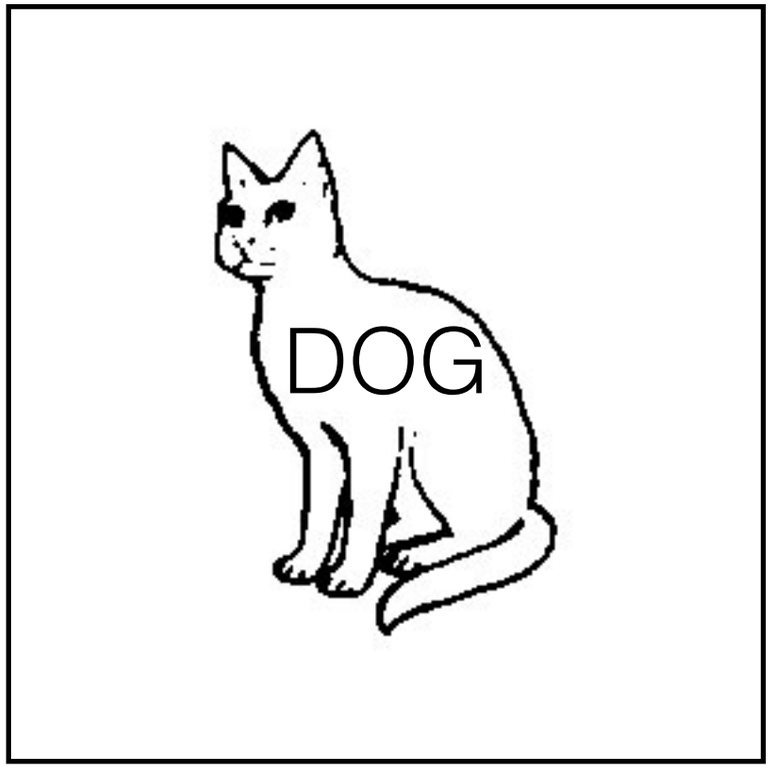
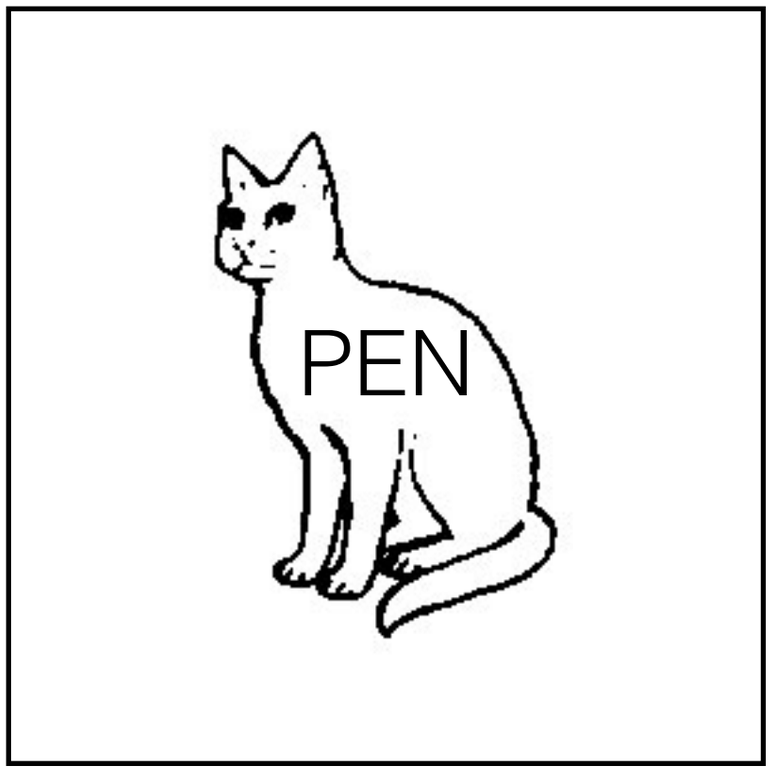
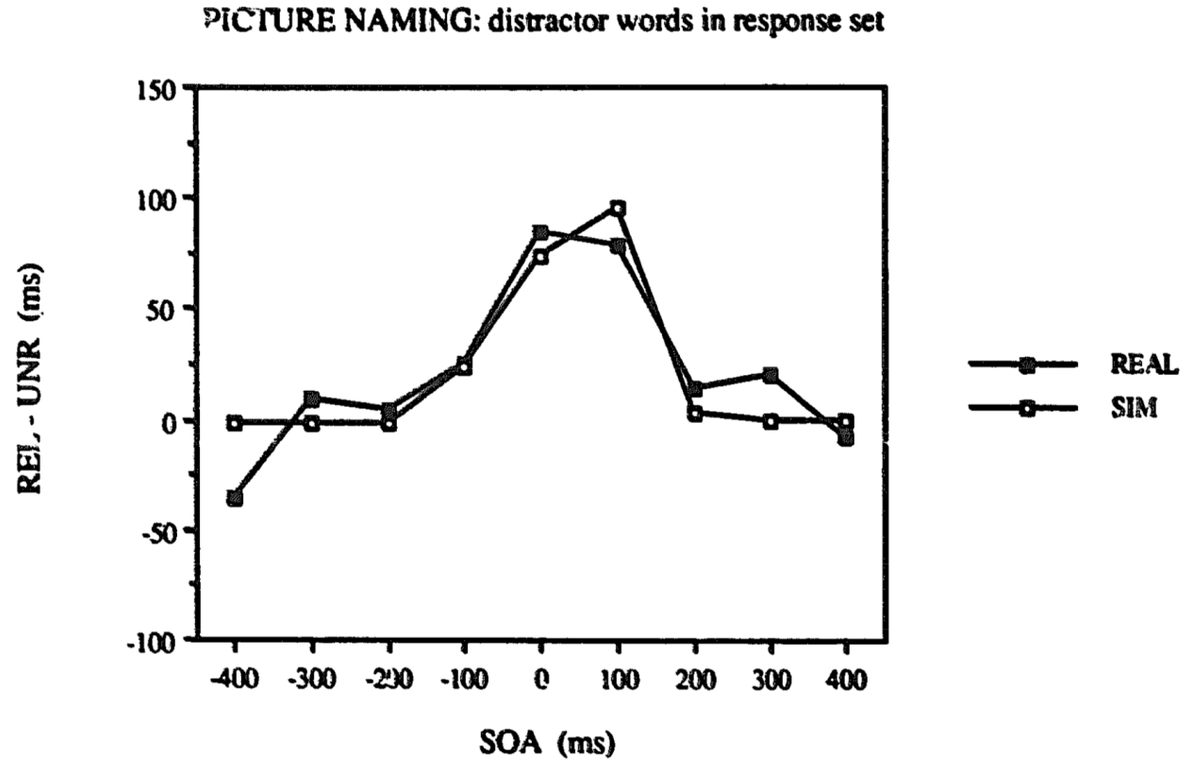
Meaning-based competition in production





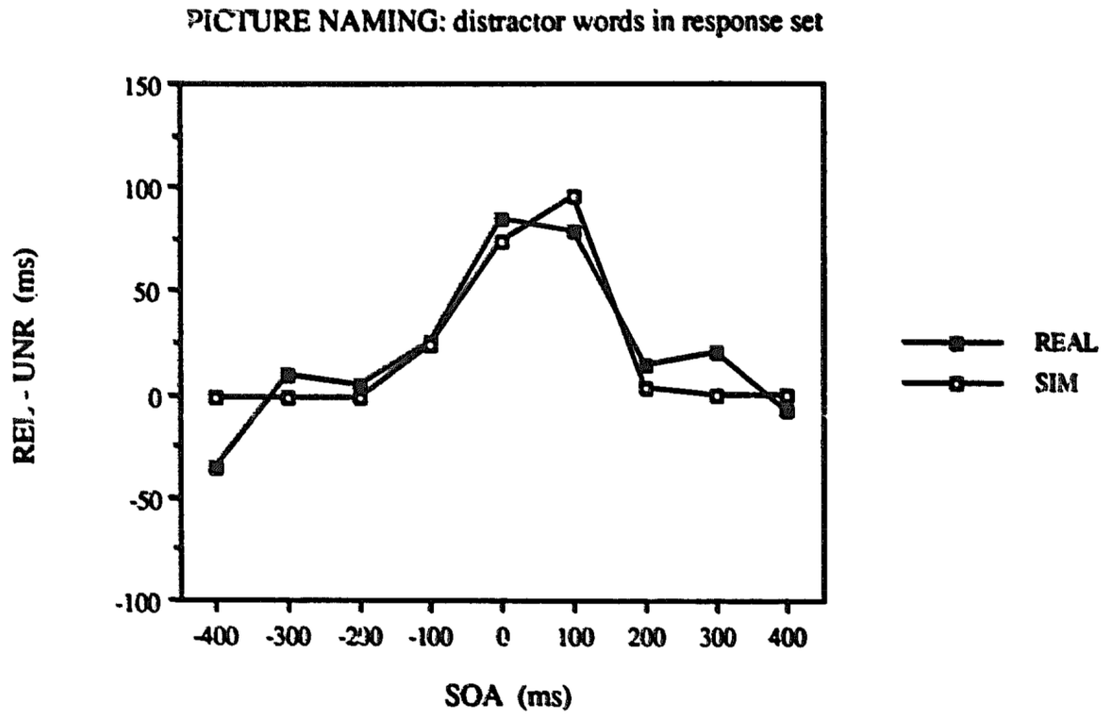


Mean latency difference (in ms) between REL and UNR per SOA: real and simulated data (real data are from Glaser & Düngelhoff, 1984, Experiment 1). A positive difference denotes semantic inhibition.

Meaning-based competition in production

Distractor effective only when it is in the response set?

Discuss: Is it right to capture the semantic Interference effect using lateral inhibition?



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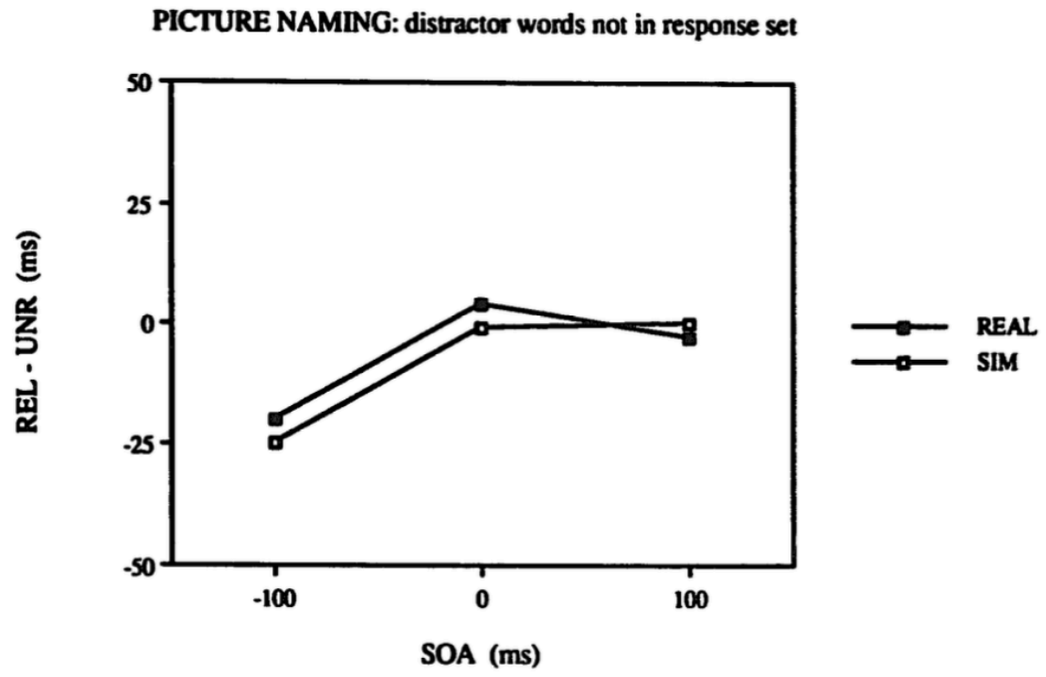
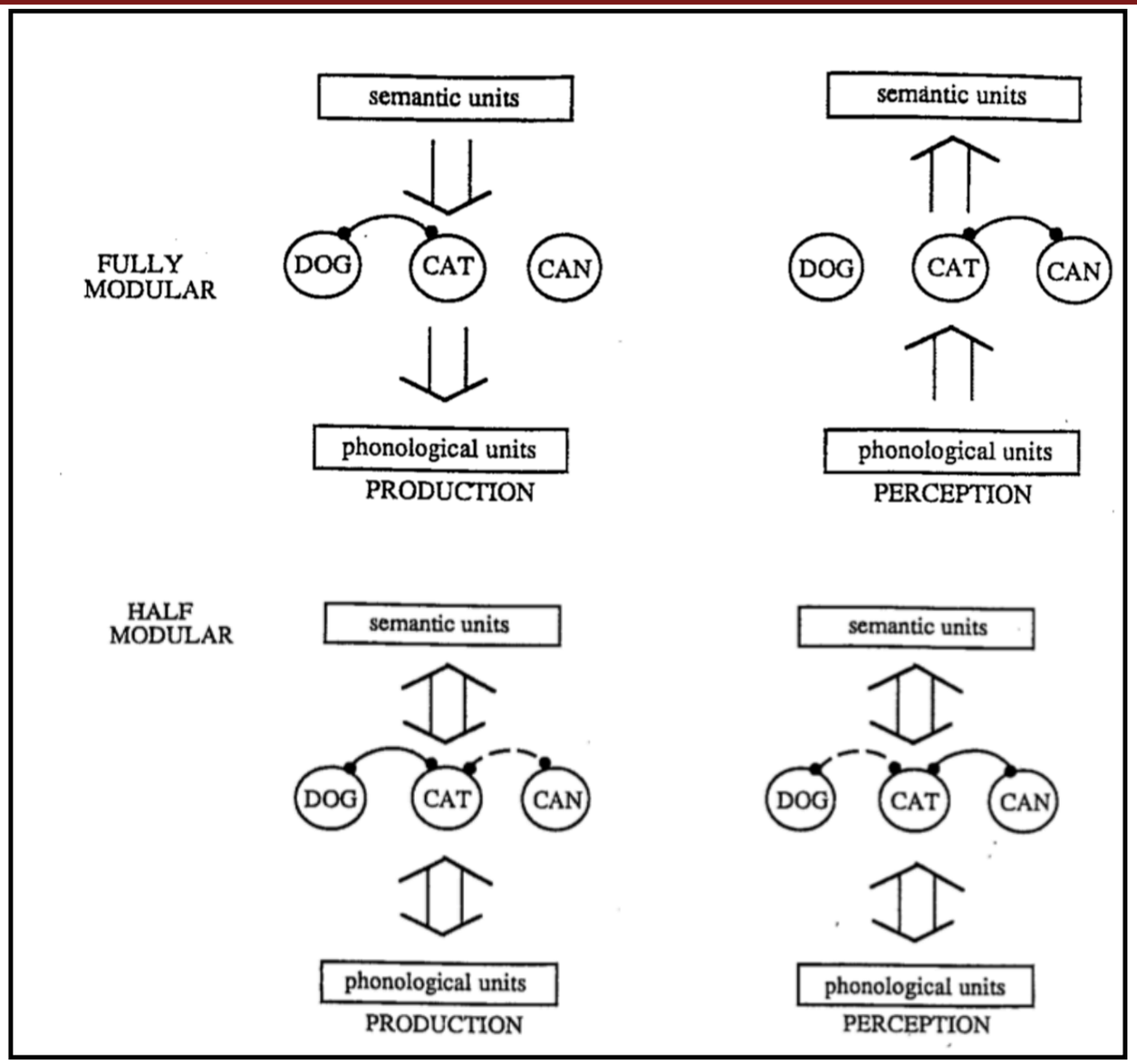
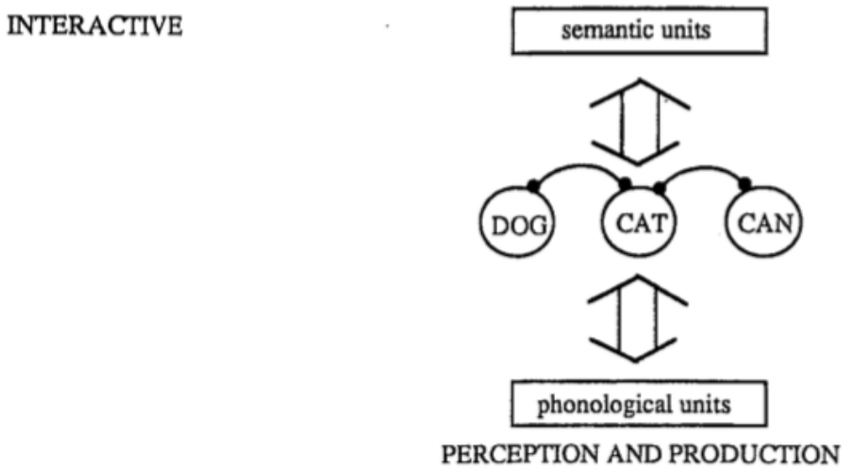


Separate lexical network for recognition and production?

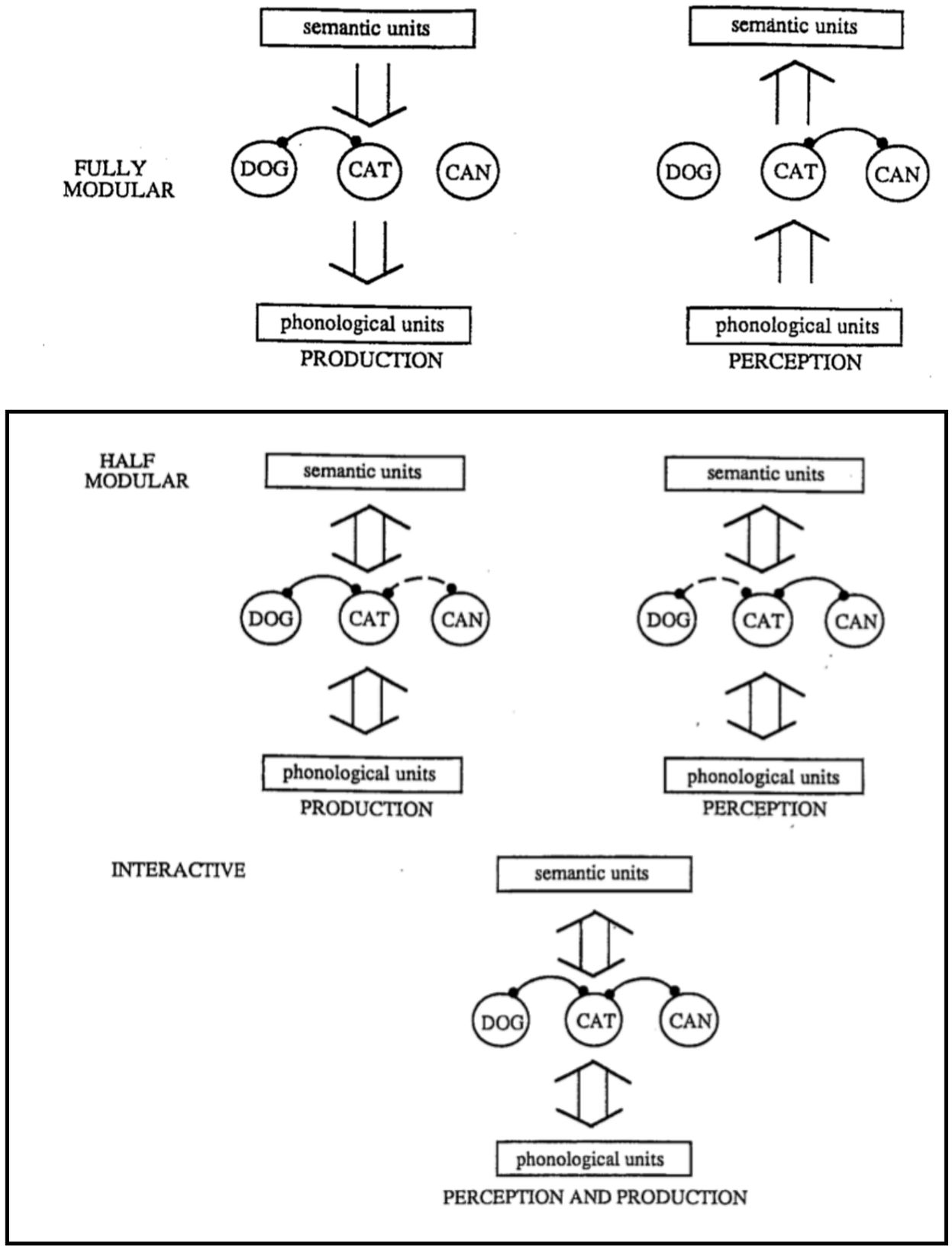


Separate
(lateral connections not shared)



Integrated

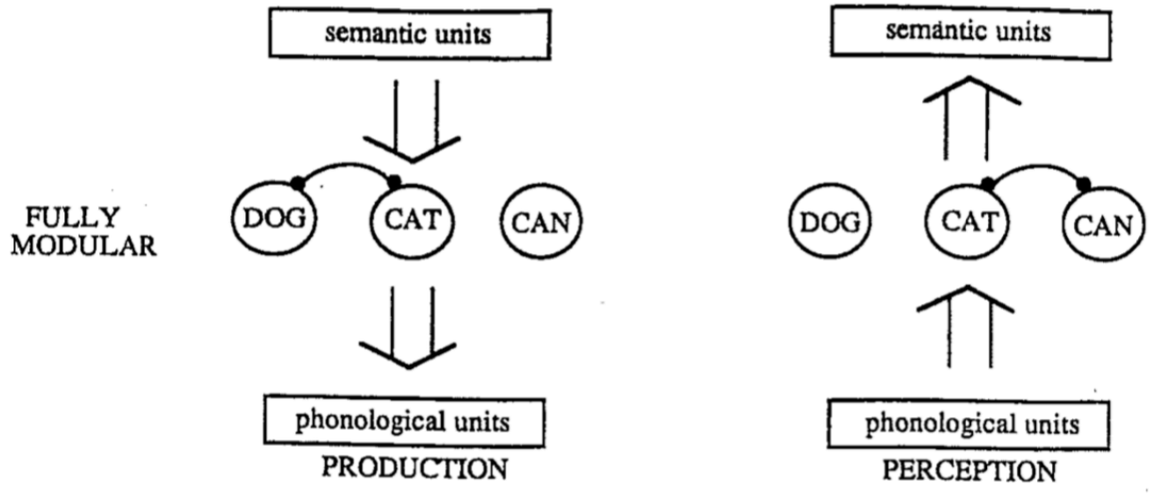
Separate lexical network for recognition and production?

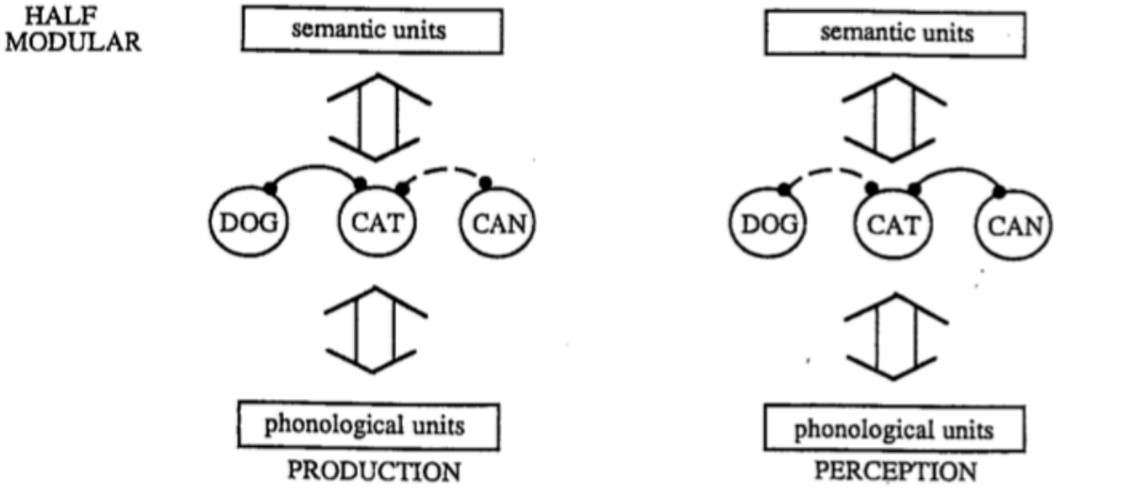


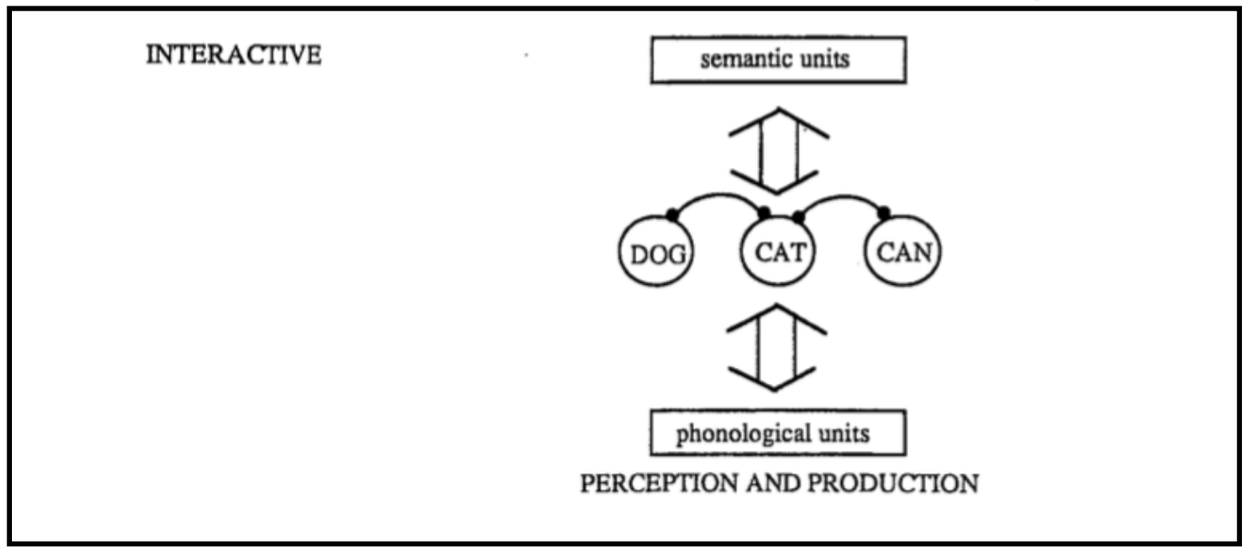
Feedforward

Feedback

Separate lexical network for recognition and production?





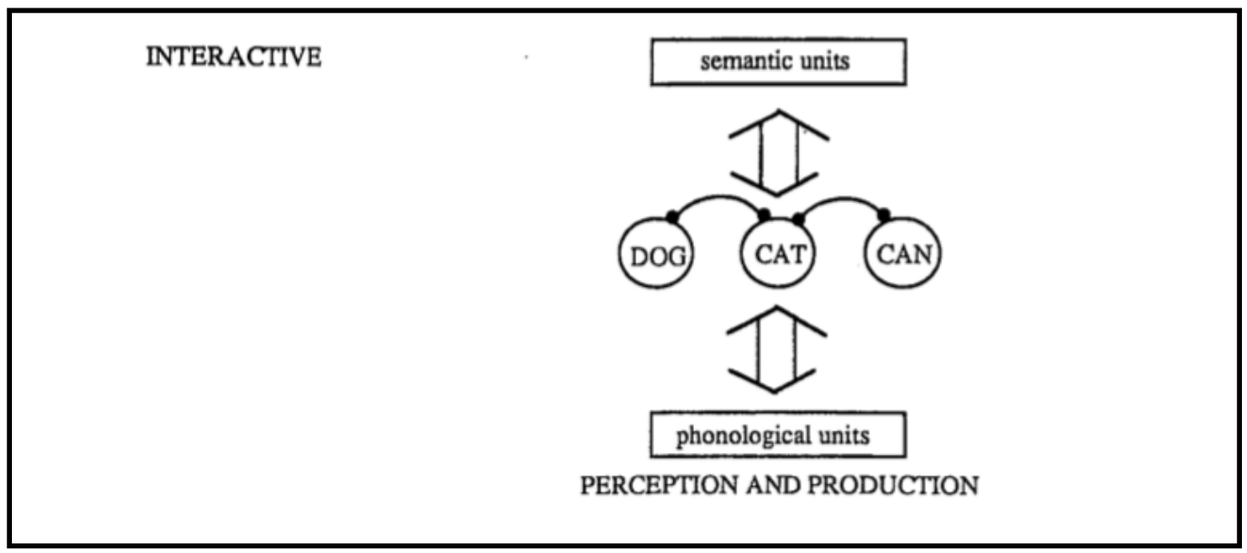


Prediction of this model?

Separate lexical network for recognition and production?

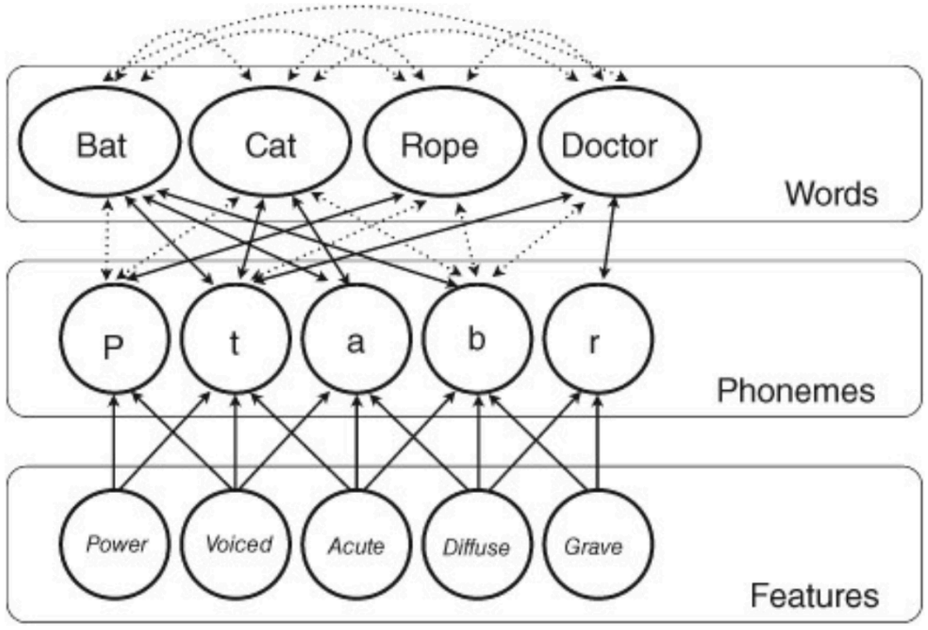
Form-based inhibition in production?

Meaning-based inhibition in production?

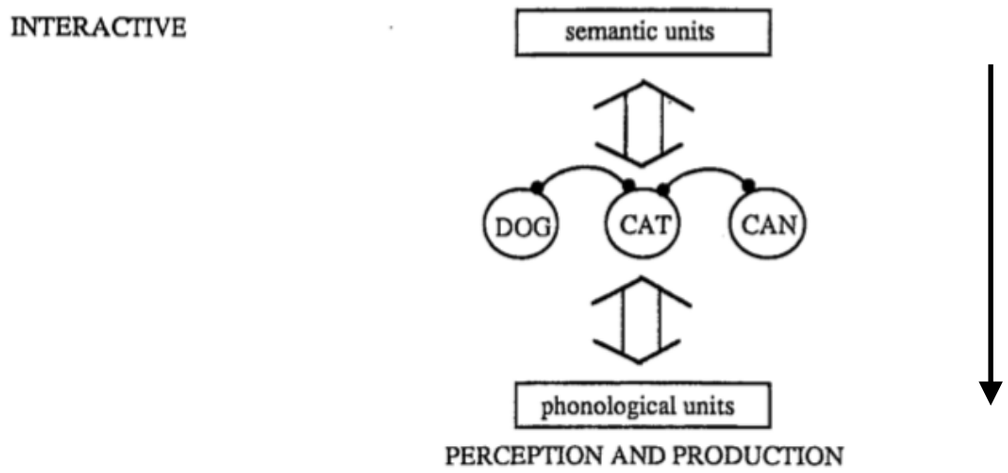


Prediction of this model?

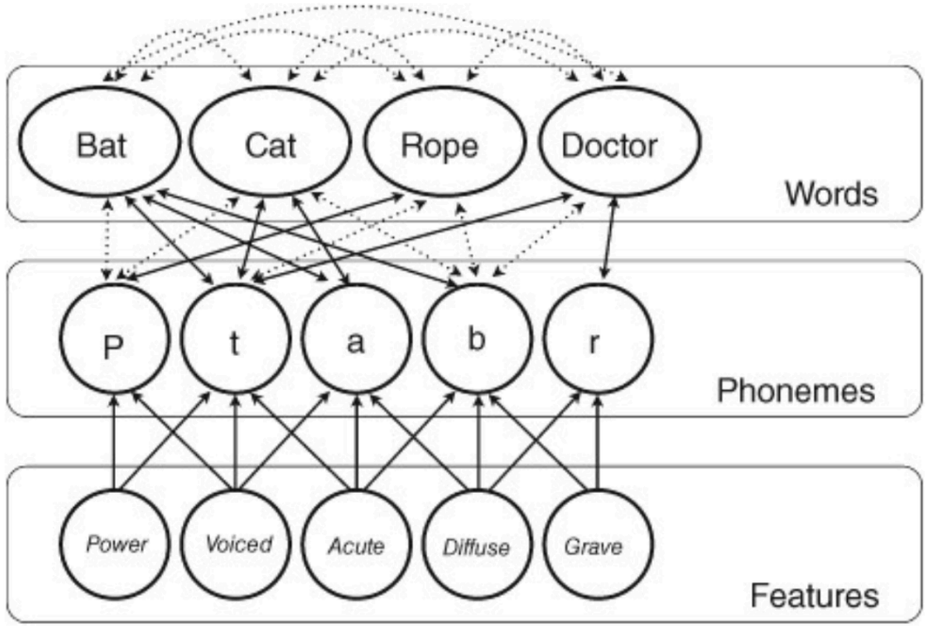
Interactivity and competition



Top-down connection (excitatory)

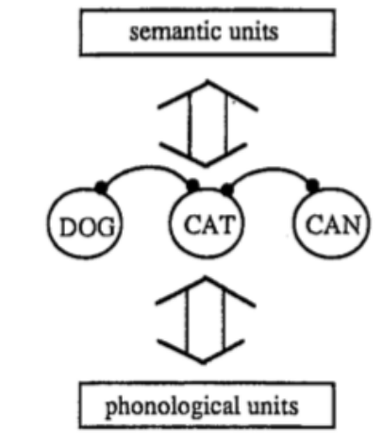


Interactivity and competition



Top-down connection (excitatory)

INTERACTIVE



PERCEPTION AND PRODUCTION

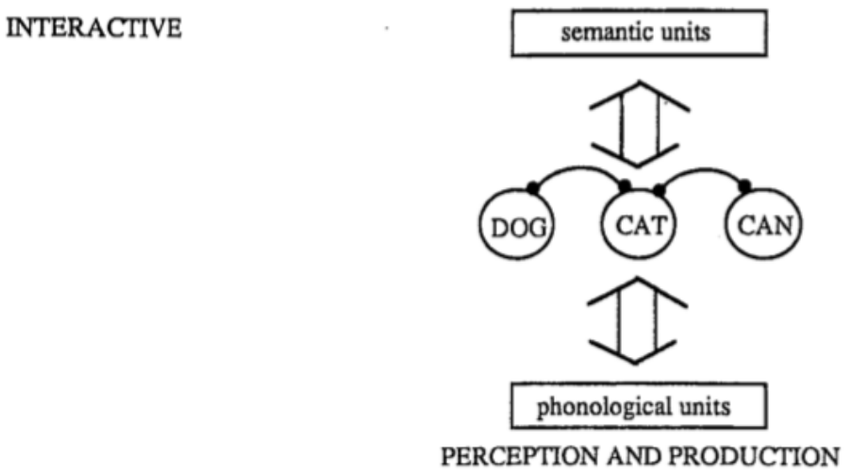
Activation **feeds back** to the higher level to lower level (or lower level to higher level in production)

Interactivity and competition

Two components of interactivity (in production)

- **Cascading**
  - Stages are overlapping (i.e., NOT **discrete**)

- **Feedback**
  - Lower level affects higher level stages



Evidence for cascading

Background picture whose name is phonologically related to the target facilitate target naming (Morsella & Miozzo, 2003).

- Target: bed
- Related: bell
- Unrelated: hat

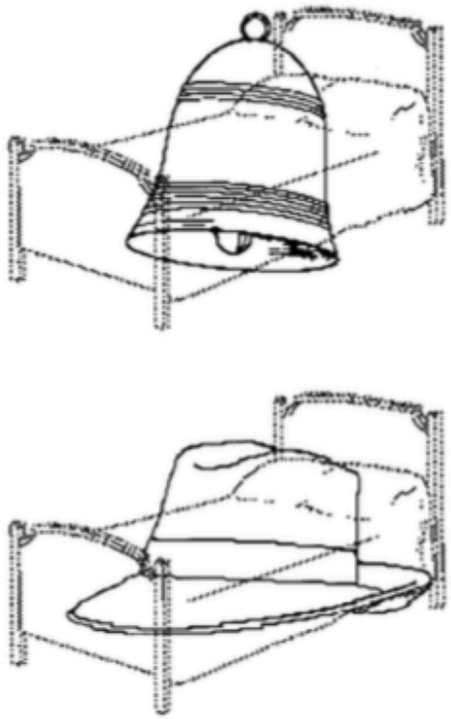


Figure 1. Sample stimulus of a phonologically related composite, *BED–bell* (with the lighter drawing [BED] being the green target and the darker drawing [BELL] being the red distractor), and an unrelated composite (BED–hat).

Table 1
Picture Naming Latencies (M and SEM) and Percentage Errors Observed in English and Italian

	Related pairs			Unrelated pairs		
	Response lat.			Response lat.		
Language	*M*	*SEM*	% errors	*M*	*SEM*	% errors
English	672	11	1.50	694	12	0.70
Italian	700	12	0.18	707	12	0.54

Note. lat. = latencies.

Evidence for cascading

Speaker hears → 150 ms → Speaker sees → Speaker names picture

Homophone Pictures:

appropriate: game
inappropriate: dance
unrelated: hammer

"ball"

Non-homophone Pictures:

phonological: frost
semantic: turtle
unrelated: piano

"frost"

Homophone targets (round *ball*)		
Appropriate (*game*)	925	−11
Inappropriate (*dance*)	881	+33*/†
Unrelated (*hammer*)	914	—
Nonhomophone targets (*frog*)		
Phonological (*frost*)	834	+4
Semantic (*turtle*)	902	−64*/*
Unrelated (*piano*)	838	—

Cutting & Ferreira 1999

Evidence for feedback

Mixed errors as the evidence for feedback from sound-level to word-level

stop and *start* are both semantically AND phonologically similar. When they substitute/exchange, the resulting error can be classified as **mixed errors**.

Mixed errors are even more likely than errors involving just semantically similar words or just phonologically similar words.

Dell & Reich (1981)

Interactivity and competition