

Psyc 576
Quiz I
Sept. 8, 2005

1. The Plaut model of reading differs from that of Coltheart et al. in that the Plaut model
 - a. uses a connectionist architecture and distributed representations
 - b. uses a symbolic architecture and localist representations
 - c. uses different route for reading nonwords and high frequency irregular words
 - d. has been used to model the reading of multi-syllable words

2. The DRC model more easily accounts for phonological dyslexia

True False

3. According to the Shaywitz et al. neuroimaging study, dyslexic individuals show lower levels of activation in anterior brain regions involved in reading.

True False

Neuropsychology of Reading

Historical Background

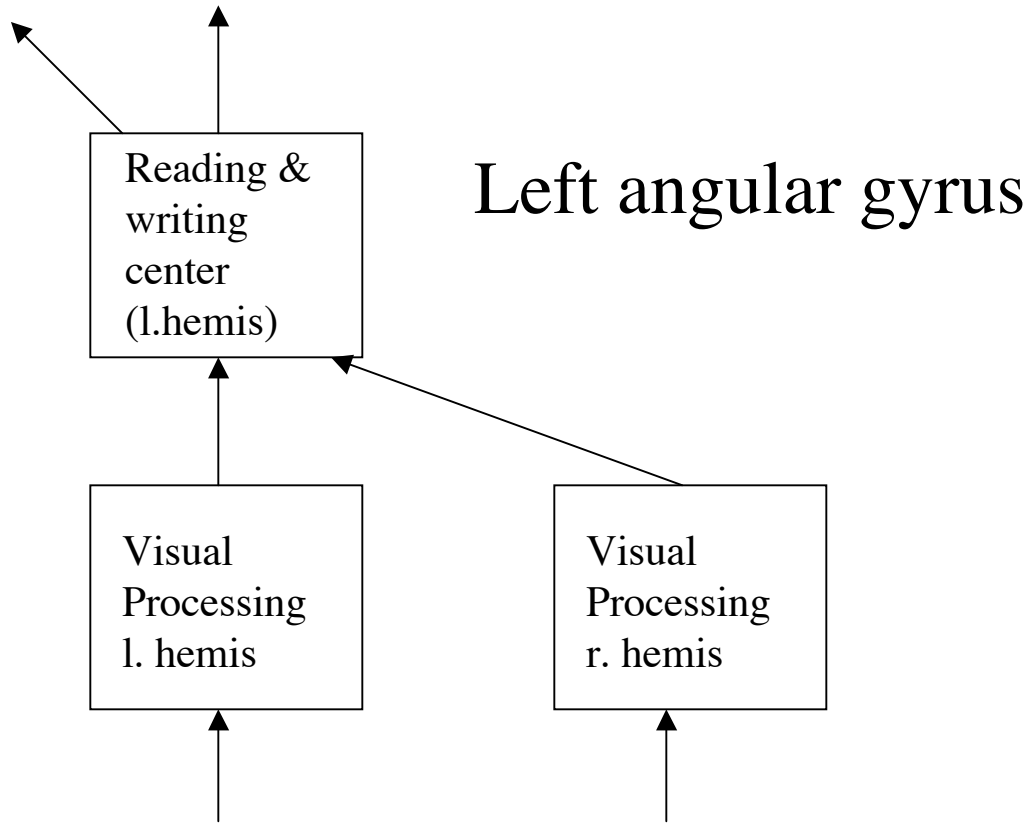
Dejerine (1892)

Separation of reading from spoken language

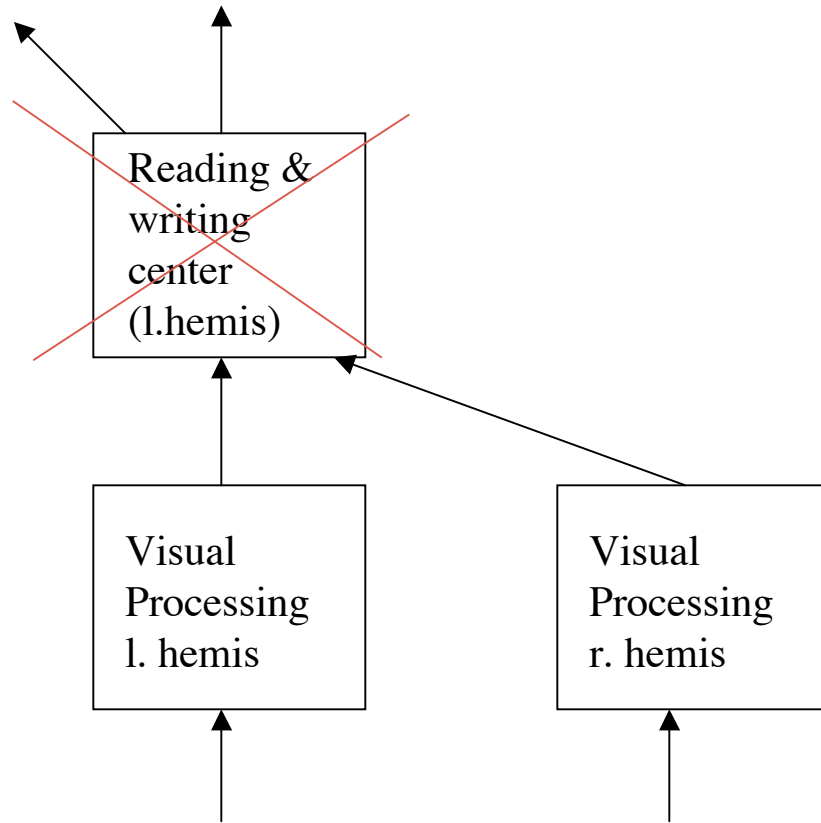
Two types of disorders of written language:

Pure alexia (alexia without agraphia)

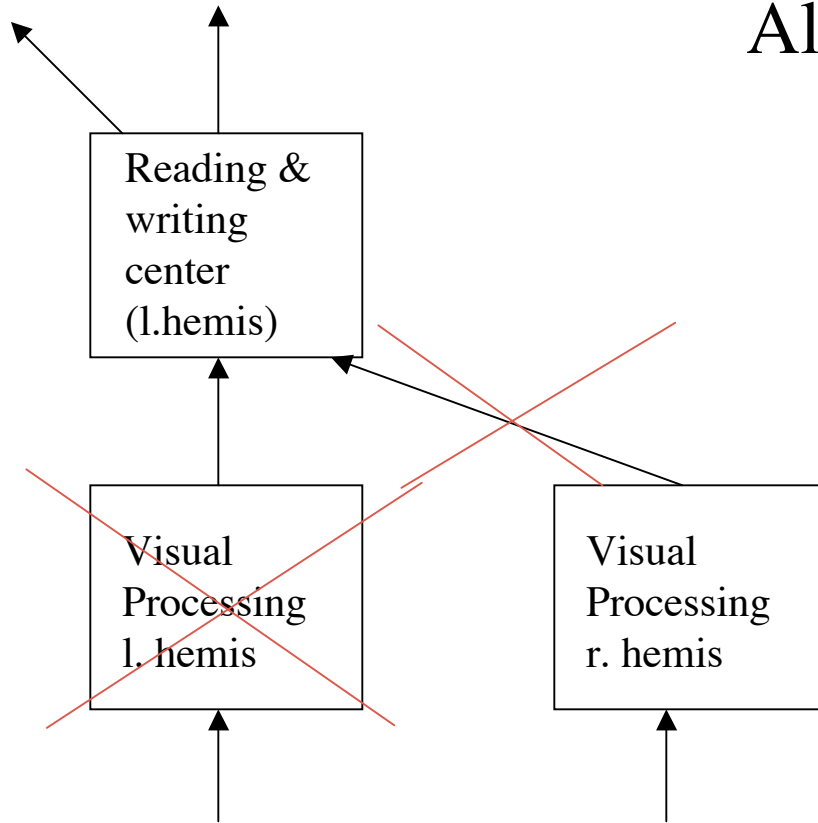
Alexia with agraphia



Alexia with agraphia



Alexia without agraphia



Marshall & Newcombe (1973)

Information processing model
first dual route model

Different types of acquired dyslexia:

Surface - “partial failures” of grapheme-phoneme conversion (incense -> increase)

Deep - mainly semantic errors

Early visual and orthographic processes

- “Visual” word forms? Abstract letter identities?
 - No disruption case change mid-saccade for normal Ss
 - Patients with poor reading, but recognize oral spelling
 - Poor at cross-case matching, good at copying, letter decision
- Orthographic lexicon - selective disruption?
 - Letter-by-letter reading?
 - Disruption in parallel processing, but
 - Effects of neighborhood size (Arguin, Fiset & Bub, 2002)
 - Semantic decision above chance with brief presentation (Coslett & Saffran, 1989)

Early orthographic processes (cont)

- Spatial position information
 - Neglect dyslexia (comb -> come, context -> concrete)
dissociates from hemianopia and from spatial neglect
Case of NG - neglect of “right side” of word
irrespective of presentation format

common

nommoc

c

o

m

m

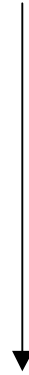
o

n

Central Reading Processes

Phonological coding, semantic access

WRITTEN WORD



?

PRONUNCIATION

English: foreign, island

Spanish: mesa, cuanto

REGULARITY:

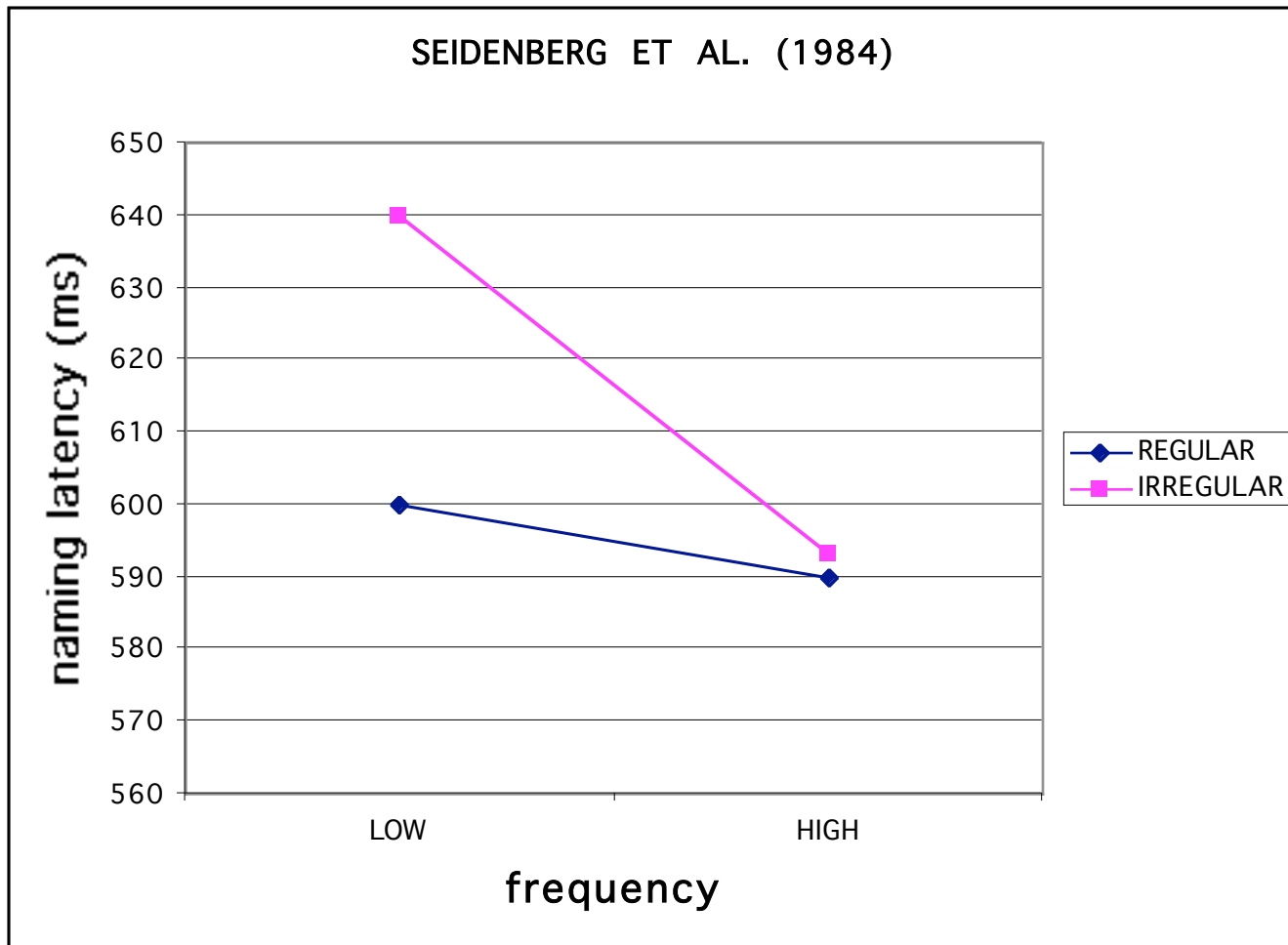
REGULAR WORDS - BED, DIVE, REST

IRREGULAR WORDS - SWORD, ISLAND, ONCE

WORD FREQUENCY:

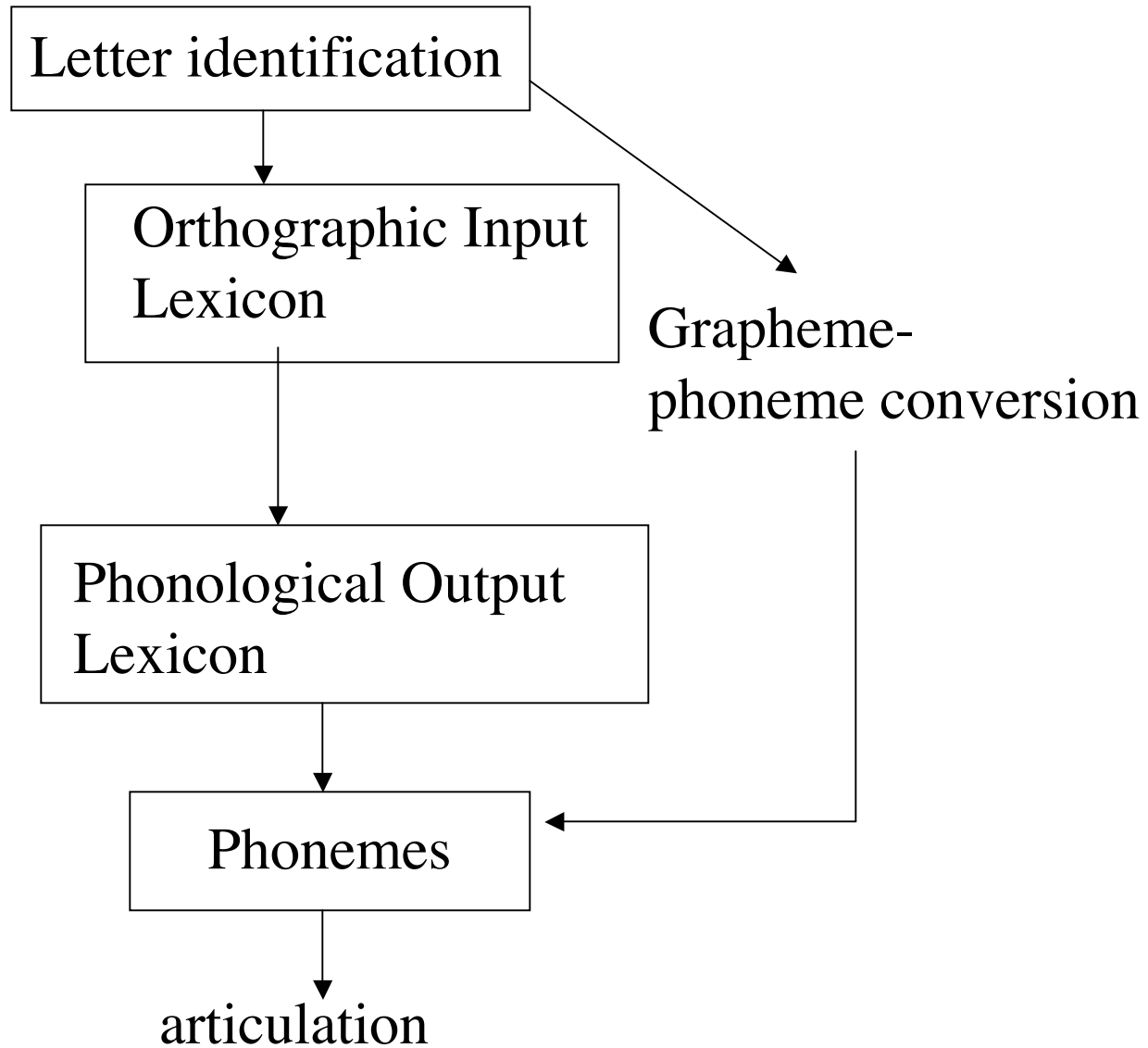
HIGH - PROGRAM, ONCE

LOW - DIGNITY, CHAOS



Frequency by regularity interaction

Dual Route Model



Consistency Effects Glushko (1979)

Importance of word body consistency on naming times:

Gaze - > g + aze “aze” pronounced consistently

Slave - > sl + ave “ave” mainly consistent except for “have”
(cave, Dave, gave, nave, save, wave)

Pint - > p + int pint only word with “int” as /aInt/
(hint, mint, lint, tint)

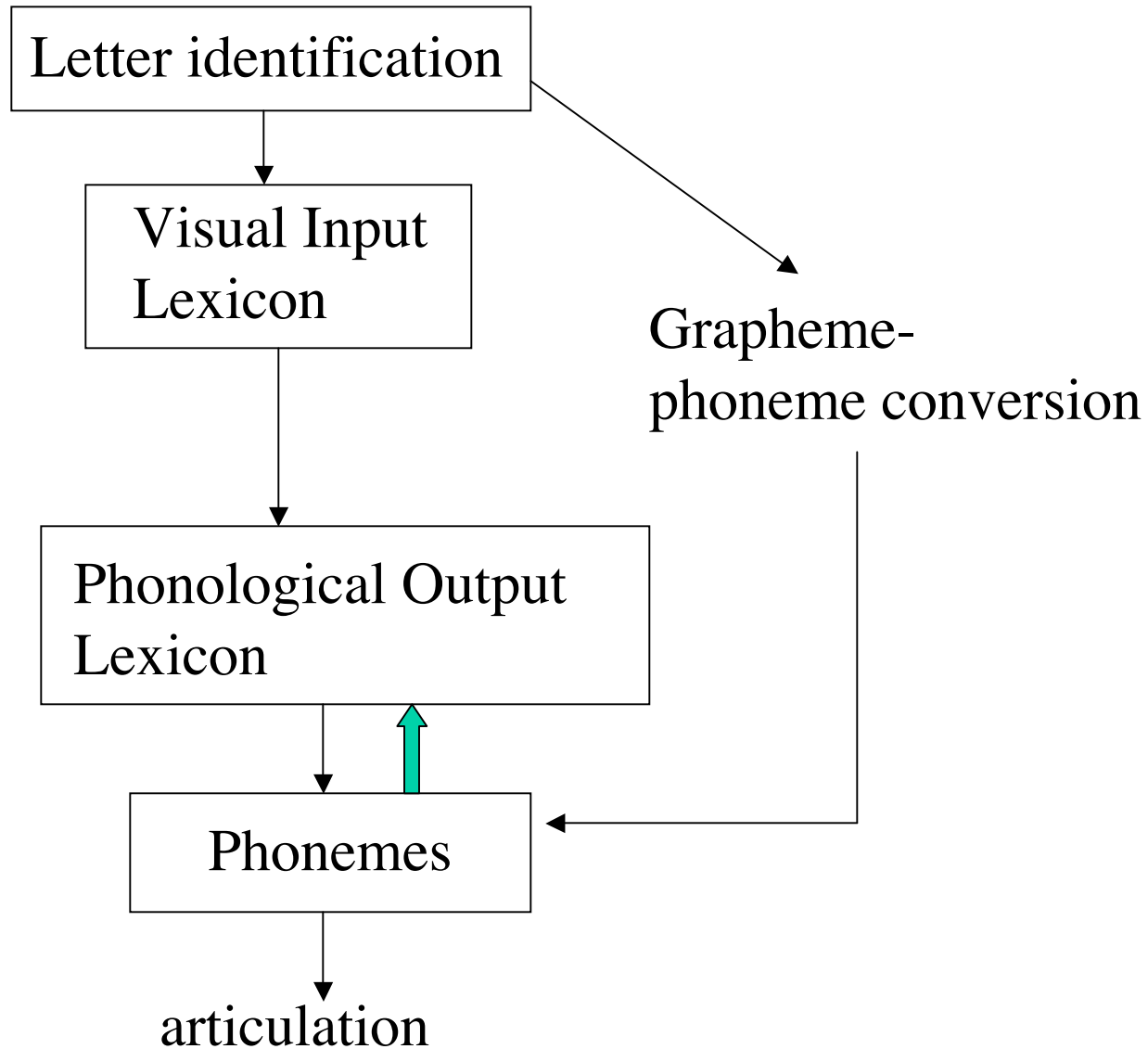
RT: consistent < inconsistent regular < inconsistent irregular

Similar finding for nonwords: tave slower than taze

Inconsistent regular problem for dual route model

Revised Dual Route Model

Coltheart, Curtis, Atkins, & Haller, 1993



Evidence from neuropsychology for dual route model:

Surface dyslexia

Phonological dyslexia

Acquired Surface Dyslexia (after stroke or other brain damage):

Marshall & Newcombe, 1973; Bub et al., 1985

Word reading: Regular words > Irregular words

Nonword reading: Good performance

Word reading errors: Regularizations (tongue -> “tonn - goo”)

Surface Dyslexia

MP (Bub, Cancellier, & Kertesz, 1985)

Nonword reading: 82/86 correct (95%)

Word reading:

regular (99%)

irregular (68%)

Regularization errors on irregular words:

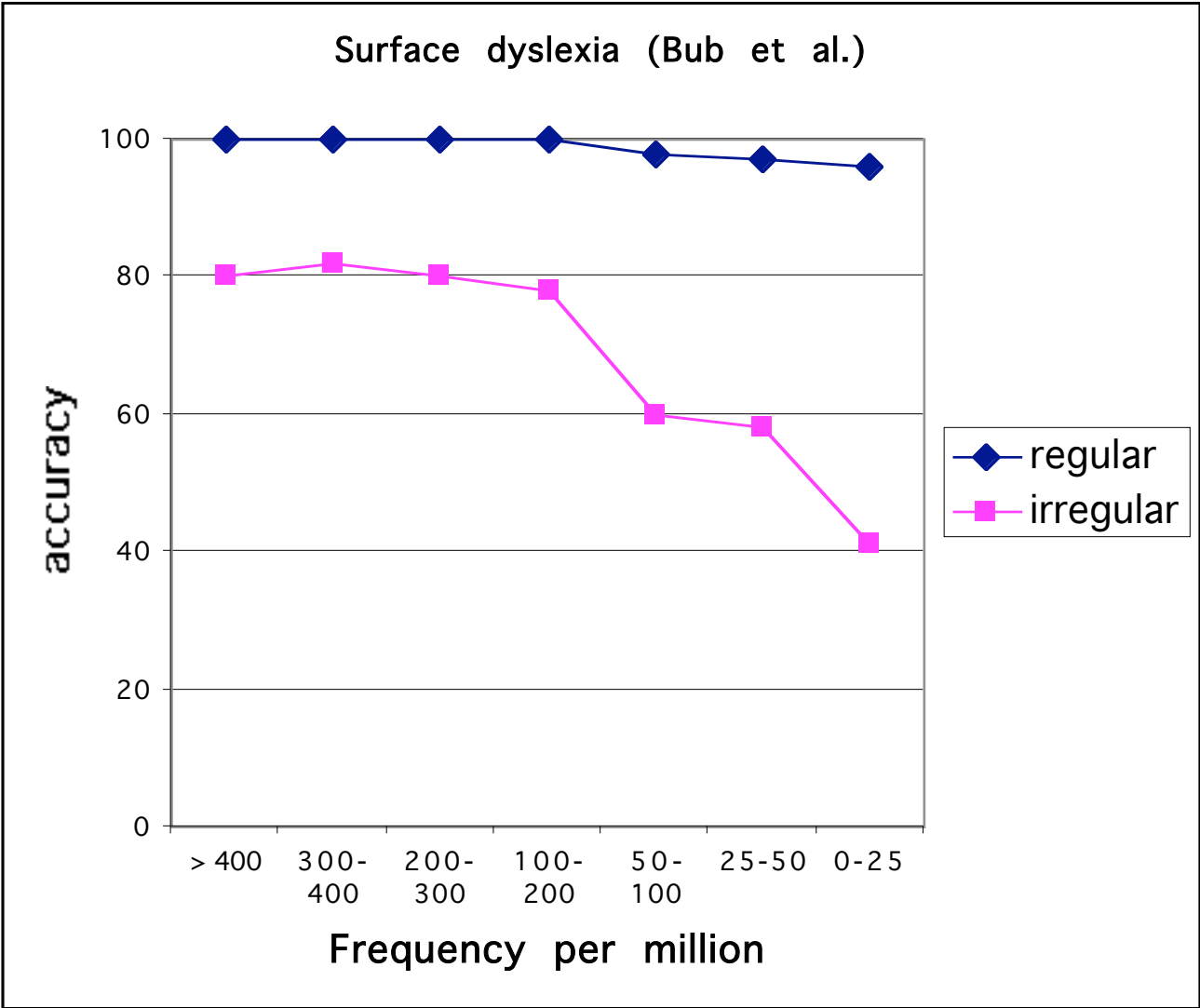
mind -> mInd

dough -> duff

bead -> bed

Where is problem in lexical route?

How to test?



Acquired Phonological Dyslexia

Complementary pattern:

Word reading good for both regular and irregular words
Nonword reading poor, errors are visually similar words

ML (tested in our lab - Lesch & Martin, 1998)

Regular words: 98% correct

Irregular words: 96% correct

Nonwords: 38% correct

Single letters: 9/26 correct

Nonword reading errors:

atch -> “attach”

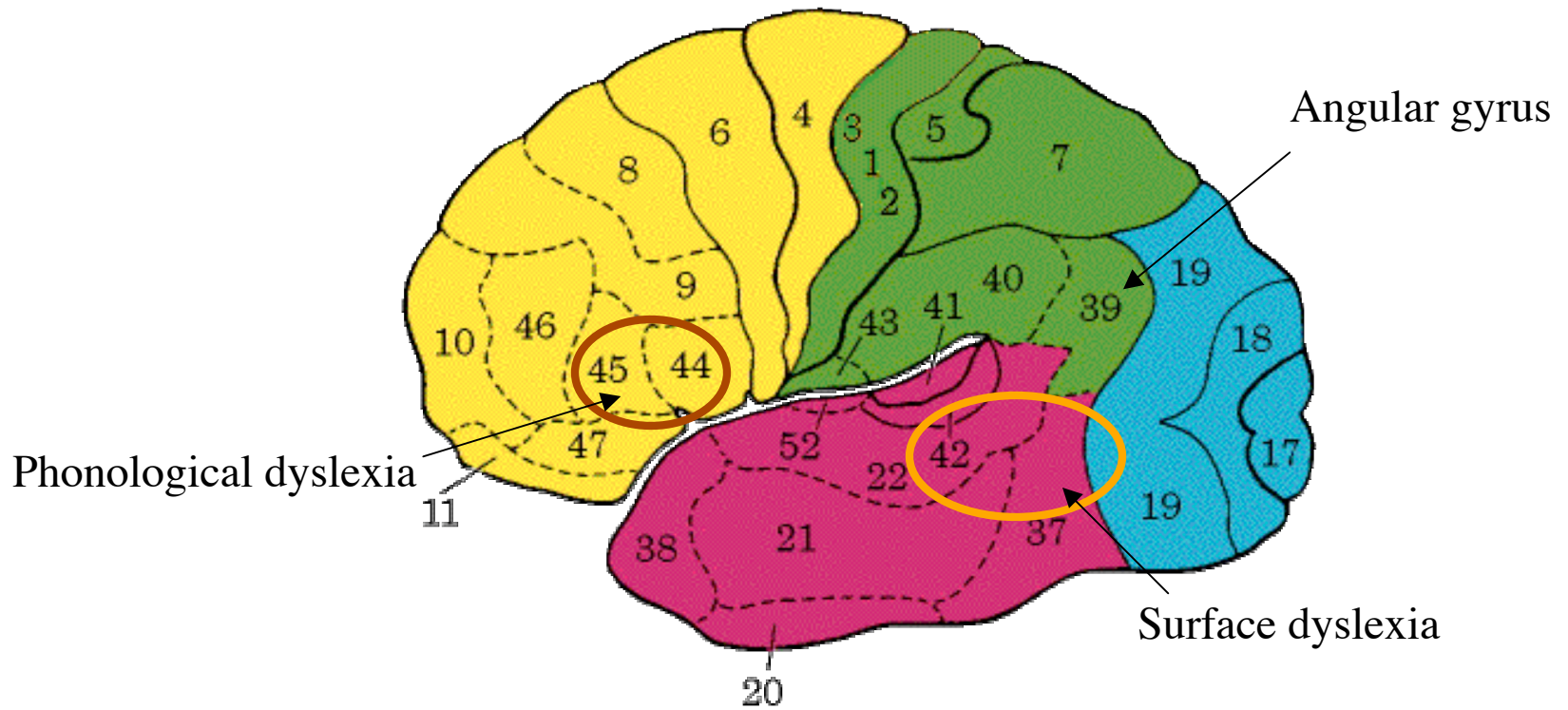
meedie -> “needle”

fank -> “flank”

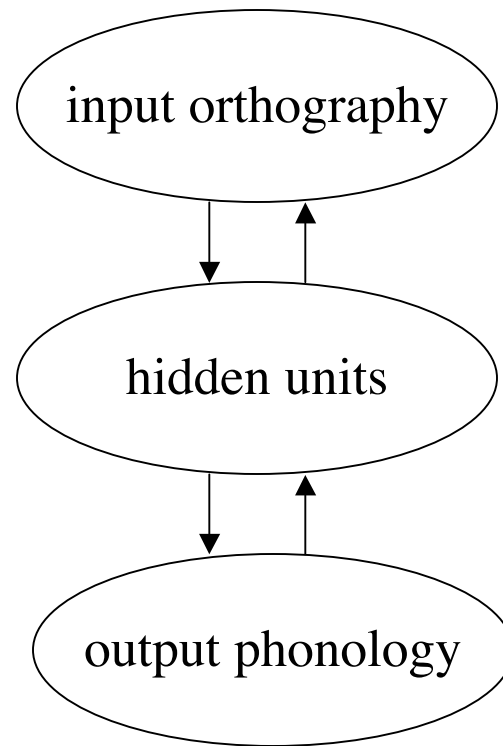
Letter sounding:

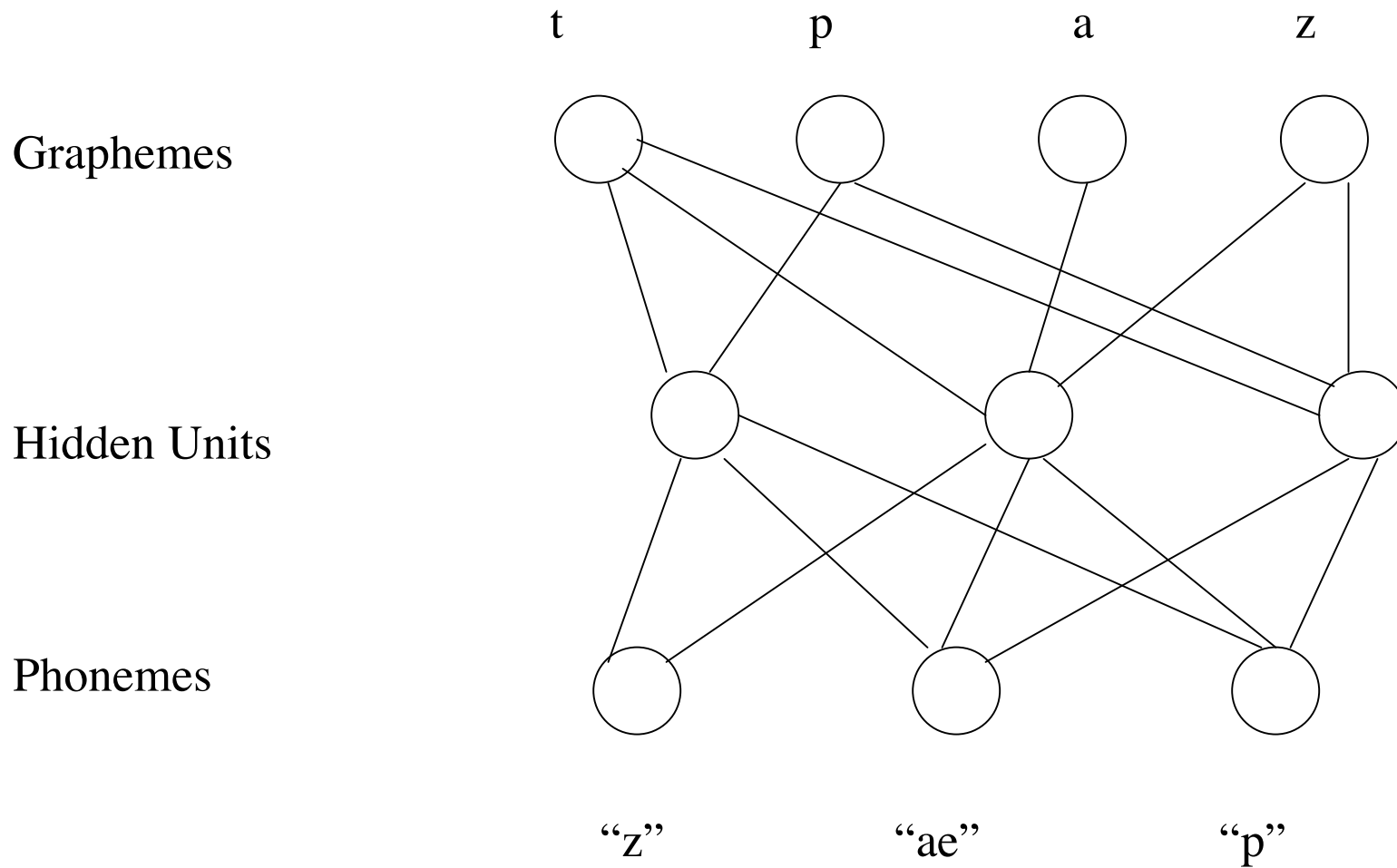
h -> “hen”, m -> “maybe”

Hypotheses about localization from lesion data



Single Route Model - Seidenberg and McClelland





Frequency x Regularity Interaction?

Acquired Dyslexia?

Surface

Phonological

Deep Dyslexia
Patient RW (from our lab)

Word reading:

HF 75% correct

LF 35% correct

Concrete 65% correct

Abstract 15% correct

Function words (is, are, his, the, below, of, for)
20% correct

Nonwords: 0% correct (also tended to lexicalize)

Error types:

Words:

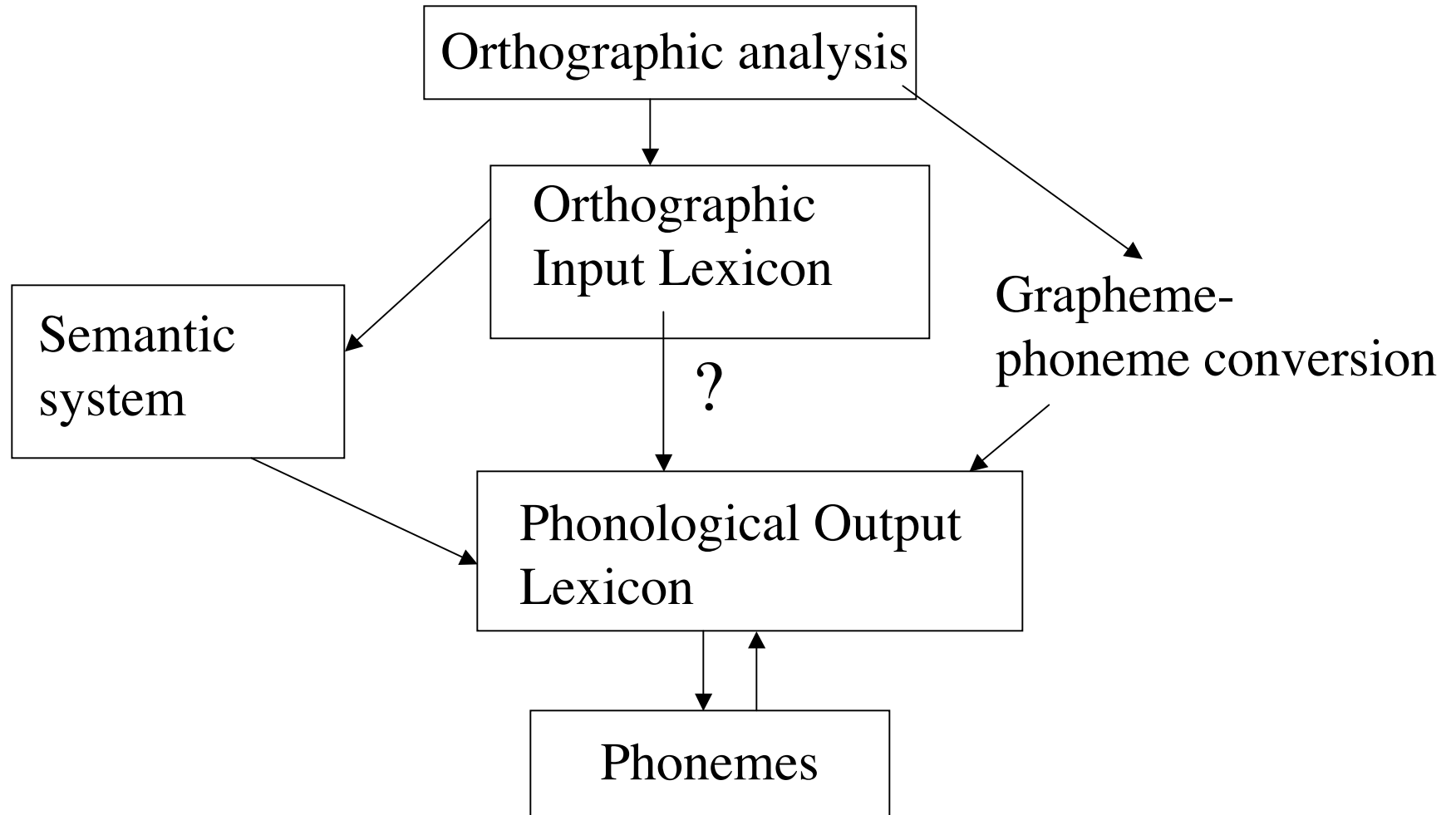
	<u>target</u>	<u>response</u>
semantic	canoe	kayak
	onion	orange
	window	shade
	paper	pencil
	nail	finger nail
	ache	Alka Seltzer
visual	wish	with
	fear	flag
	rage	race

Nonwords:

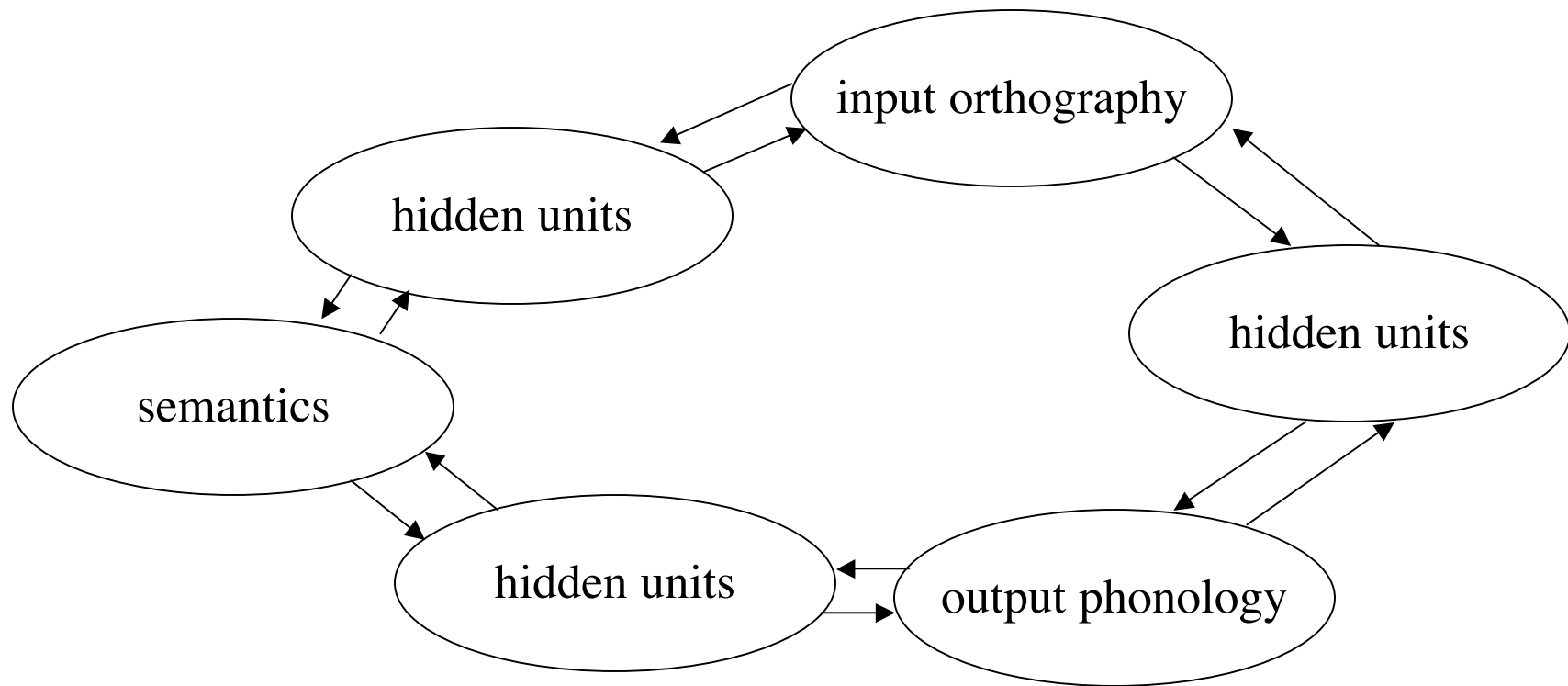
no response

substitution of visually similar word (fank -> bank)

Dual (Triple?) Route Model



Dual Route Model - Seidenberg and McClelland



Can this account for acquired dyslexia?

Original model -

- poor nonword reading
- poor account of surface dyslexia

Revised model - Plaut, McClelland, Seidenberg, Patterson (1996)

- more standard mapping of orthography to phonology
- better nonword reading

- still poor fit to surface dyslexia

- fix: rely more on semantic route, helps with irregular

Problems: turns this into a dual route model

- individual differences account depends on education level
- or some unspecified source

Positives: good account of consistency

- why are there no patient with complete loss of irregular?

Other theoretical issues

- Phonological mediation in access to meaning?
- Third route or summation hypothesis?
- Locus of deficit in deep dyslexia
 - Right hemisphere hypothesis

Developmental Dyslexia

Definition:

Reading development lags behind other academic abilities despite absence of sensory deficits. Adequate opportunity for learning to read has been provided.

Sometimes require reading level to be 2 yrs below grade level while other skills may be at grade level

“Jackie”

Typical case (Snowling,1992)

Age: 10 yrs, 10 mos

WISC IQ scale: 115, verbal 98, performance 131

Schonell Graded Word Reading Test: 8 yrs. 6 mos

Schonell Spelling test: 8 yrs. 0 mos

Subscales of WISC:

Superior performance on object assembly, block design

Impaired performance on digit span, arithmetic

Language skills

Speech halting, hesitations (describing a picture of a picnic):

“So they set out... they went...they went... I mean... and... so they had their picnic, and about an hour...no a few minutes.....they....they packed up...and... got onto their bikes”

Phonological errors in picture naming:

Escalator -> exclavator

Stethoscope -> telescopic thing, st-stesesemator

Cognitive Deficit Approach

Find out how dyslexic children differ from children without reading disorder

1. A) Visual perceptual deficit - b/p, was -> saw confusions
Rapid visual processing deficit found in some studies, not others

Problem: often the tests involve working with orthographic materials, dyslexics may be poorer because they have less exposure to print.

E.g., studies that have compared copying of English vs. Hebrew characters at short exposure durations have found deficit for English, not Hebrew

B) Eye movement deficit - difficulties with oculomotor control?

2. Verbal deficit

- A. Verbal stm deficit
- B. Slow picture naming
- C. Poor phonological skills - rhyme judgments

Phonemic awareness: Debate over the importance of this. Is deficit causal or result of reading difficulty?

Morais showed that non-literate adults had difficulty with phonemic segmentation

- D. “fast-for-word” approach (Tallal) rapid auditory processing deficit

Individual Differences

Reading a complex skill, any component of which might be impaired

Castles and Coltheart:

Some children show a phonological dyslexic pattern (word reading better than nonword reading)

Howard & Best (1996) - normal word reading

A smaller group shows surface dyslexic pattern (regular words and nonwords read relatively well, irregular words read poorly)

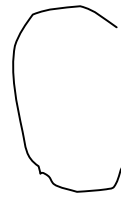
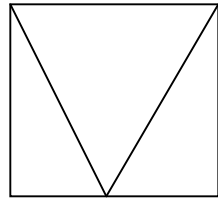
Developmental delay for second group??

Case A. H.
McCloskey & Rapp (2000)

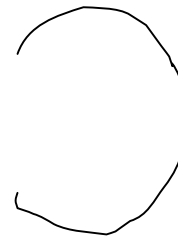
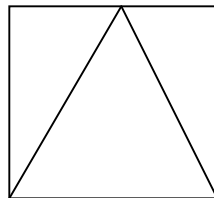
College student at prestigious university

Visual-spatial deficit:

Target



AH's copy



Reading simple words: 88% correct

Reading Errors:

dog	hog
pen	den
lamp	lamb
snail	nails
chain	cabin
hand	band
nose	noise
church	cherish
apple	appeal

Knowledge-based constraint (i.e., top-down effects in reading text)

1. reading words in context much more accurate
2. reading aloud normal text, made sequencing errors much more often than controls - but where unimportant

speed and determination -> determination and speed

3. reading sequence-altered text aloud

e.g., The horse had learned to him recognize

RH spontaneously corrects 85% of the time, controls 24% of the time

Effect of flicker on word reading:

Steady light

Flicker

23% errors

1% errors

Opposite of prediction from fast visual processing deficit hypothesis

Transient vs. steady-state visual systems

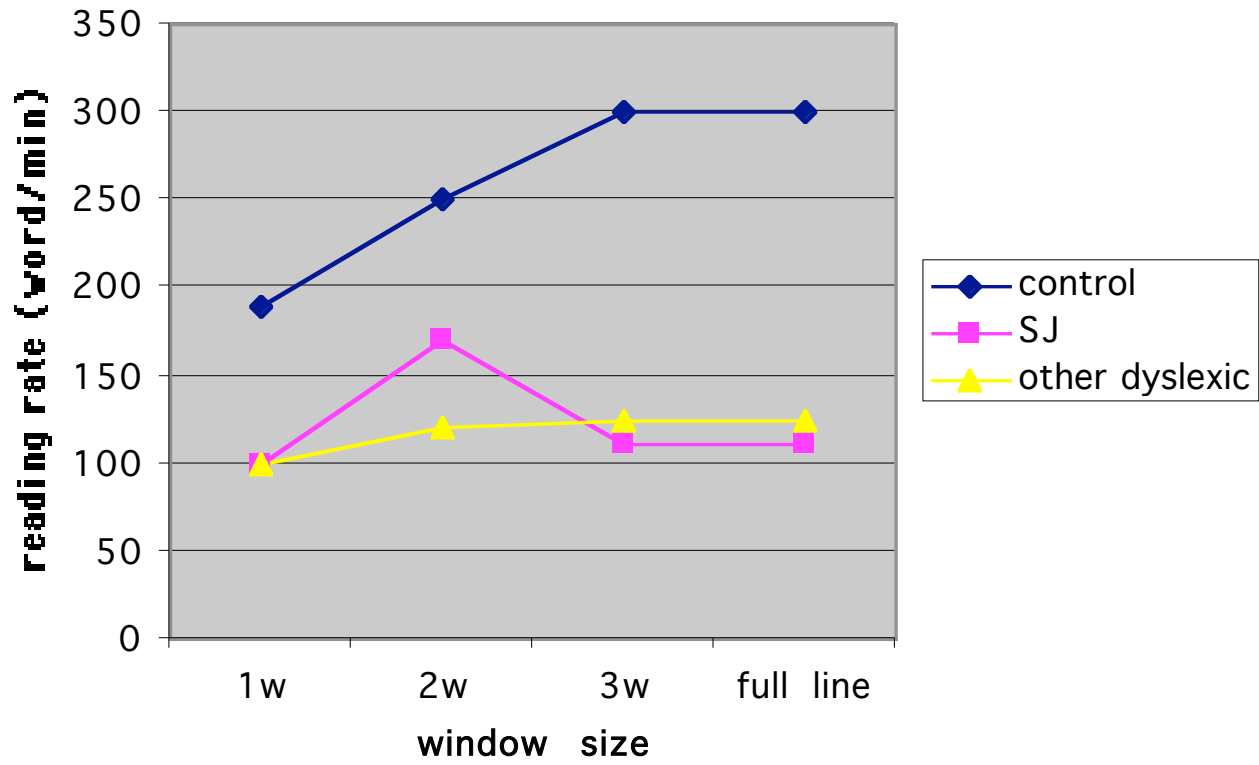
Selective Attentional Dyslexia
Rayner, Murphy, Henderson & Pollatsek

40 yr old college professor, life-long reading problems

single word reading abilities normal

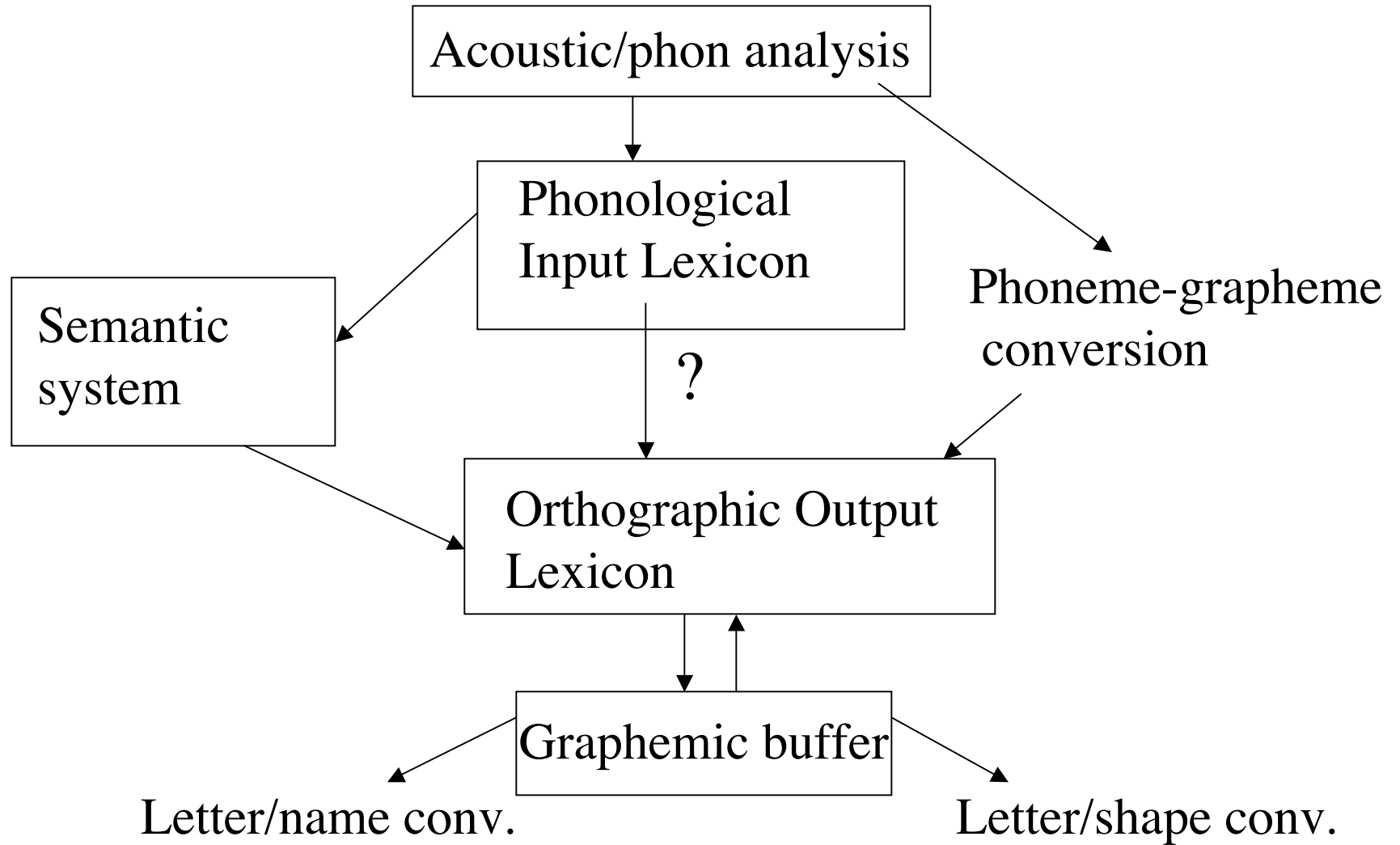
moving window paradigm

Attentional dyslexia



Spelling

Dual (Triple?) Route Model



Corresponding patterns in spelling

- Surface dysgraphia
- Phonological dysgraphia
- Deep dysgraphia

Issues in spelling

- Phonological mediation in spelling?
- One orthographic lexicon or two?

Phonological Mediation?

- Patients with semantic errors in oral naming, but not in written naming
- Different patterns of word class deficits in reading and spelling
 - Open class affected in oral production, function words affected in spelling

Phonology may be involved in spelling, but not necessary, at least at single word level

One orthographic lexicon?

- Original Dejerine position
- Dissociations between reading and spelling
 - How to test? Need to have deficit in reading at lexical level.
 - Findings of correspondence between reading and spelling
- Priming data