Quiz 2 - true/false questions

1. According to Ullman et al., the basal ganglia are involved in declarative memory and the processing of irregular verbs

2. Laiacona & Caramazza reported that their patient who demonstrated poor production of verbs relative to nouns had a selective morphological deficit for verbs

3. Temple and colleagues found improvement in reading for dyslexic children after training on visual/spatial processing
Lexical Organization

• Lexical vs. semantic levels
• Multiple semantic systems?
• Input vs. output lexicons or one lexicon?
Dictionary entry

- Spelling
- Pronunciation
- Word class (N, V, adj, etc)
- Meaning(s)
Separate modules for semantics and lexical information?
Anomic Patient MS

Age 29. Herpes encephalitis mainly affecting left temporal lobe
Poor production of content words in spontaneous speech

Naming difficulties:
10/60 Boston Naming Test (control µ = 56)
PNT: 75% HF, 28% LF

Example of naming attempt:

Turkey: It’s like a bird but doesn’t fly... It’s a good eating bird... You can eat it for Christmas. Thanksgiving is usually the time to eat this one.

90% of naming errors were circumlocutions
Source of Deficit?

Semantics?
Source of Deficit?

Semantics?
  Comprehension good on various tasks
  picture-word matching
  property judgments
  which is more related?
Source of Deficit?

Semantics?

Comprehension good on various tasks
picture-word matching
property judgments
which is more related?

Phonetics? Articulation?
Excellent repetition of words, nonwords
Phonological lexicon?

Storage or access deficit?
Reverse dissociation? Damage to semantics but not phonological lexicon?

- Errors on all word processing tasks due to same source
  - KE (Hillis, Rapp, Romani, & Caramzzza, 1990)
    - Same proportion of errors and predominance of semantic errors in oral and written naming to pictures or tactually presented objects, picture/word matching, oral reading, written naming
    - Correspondence of items across tasks
    - Explained in terms of semantic deficit without other deficits in lexical representations
Multiple Semantic Systems?

- Optic aphasia (Lhermitte & Beauvois, 1973; Coslett & Saffran, 1989)
  - Naming errors to visual input (pictures, objects)
  - Accurate naming to other input modalities (tactile, spoken definition)
  - Just difficulty accessing semantics from visual?
    - accurate gestures
    - accurate picture-picture matching
    - Thus, not visual agnosia
Distributed semantic system - localized in regions near related perceptual/motor systems??
Visual input  Verbal input  Tactile input

Unitary Semantics

Output modalities

Abstract representation of semantics, not tied to perceptual/motor
Patient DHY showed this pattern

However, when tested on difficult picture-picture matching, made errors

- Light switch, match to lightbulb or pear: does well
- Light switch, match to lightbulb or traffic light: does poorly
But… Coltheart et al. (1998)

• Patient AC, left MCA stroke
• Could not answer questions about perceptual features of animals and objects (how many legs, color, shape, tail)
• Could answer other questions - Australian? Do people eat it?
Separate Input-Output Lexicons?

- Semantics
  - Phonological Input Lexicon
  - Phonological Output Lexicon
How to distinguish?

• Ruling out peripheral deficits
• Patient MS (anomic case)?
• Deep dysphasia:
  – Patients make semantic errors in single word repetition
    • Can a one lexicon account work?
Grammatical Aspects of Word Organization

• Morphological processes
• Word Class effects
Morphological Processes

Regular: Walk, walks, walking, walked

Irregular: [Go, goes, going] went, gone

[regular]
How is knowledge of inflected word represented?

• All forms are stored, accessed directly
• Decomposition in comprehension, composition in production
  – Comp: Walked - > walk + past tense
  – Production: Walk + past tense - > walked
Psycholinguistic Studies

• Word recognition (lexical decision, naming)
  – Compare times for words matched in whole word frequency, differing in stem frequency
    • Taft (1979) - sized vs. raked
    • But same pattern for broke vs. hung, even though irregular
    • Indicates some decomposition, but unclear locus of effect

• Priming studies
  – Car primes cars, doesn’t prime card in lexical decision.
  – Is this semantic priming? More long-lasting
Patient Studies

• Many patients make morphological errors -
  – Phonological, semantic basis?
• SJD (Badecker & Caramazza, 1991)
  – Morphological errors in spontaneous speech, reading, repetition
    • Teas vs. tease, links vs. lynx
    • Errors substituted other morphemes on complex words
    • Produced illegal combination: youthly, poorless
  – Argues against whole word similarity as causing errors
  – Consistent with composition in production
Patient studies (cont.)

• Reverse dissociation - jargon aphasia
  – Correct morphemes with incorrect stems
    “This guy’s really knawling over me”
    “If you get dabbed up”
    “a pair of loisies”

Grammatically appropriate inflections with nonsense stem.
Ullman et al. (1997)

• Regular vs. irregular verbs
  – Irregular stored, produced as whole word
  – Regular computed on the basis of a rule
    • Past tense: stem + “d”

• Related to declarative vs. procedural memory
  – Declarative: stored memory representations, posterior
  – Procedural: procedures used to construct various outputs (motor, language), anterior

• Patient data from different groups
  – How strong is it?
Single Route Model - Ellman and McClelland

Present tense

hidden units

Past tense
Joanisse & Seidenberg, 1998
Connectionist Account

• Posterior - semantic deficit
  – Semantics needed most for irregular verbs
  – Semantic deficit could be source of posterior pattern

• Anterior - output phonological deficit
  – Regular forms tend to be more complex phonologically
    - walked, pushed, wagged vs. gone, were, ran

• Patterson et al. (2001)
  – Semantic dementia cases have difficulty with irregular past tense for verbs. Correlation between degree of semantic deficit and degree of irregular verb deficit
Problems for both sides

- Ullman et al. account:
  - Several case studies of patients with frontal lesions with equal difficulty with regular and irregular, or better on regular, or inflection problems only for one word class (including Laiacona & Caramazza)
  - Agrammatic patients do well on grammaticality judgments that involve detection of regular morphology (Linebarger, Schartz, & Saffran, 1983)
• Joanisse & Seidenberg
  – Patients without phonological deficits who show problems with regular verb inflections (Tyler & Marslen-Wilson)
  – Patient with phonological deficit and no semantic deficit who does better on regular than irregular (Miozzo)
• Complete story more complicated than either position
Grammatical class effects

Noun vs. Verb double dissociations
  picture naming
  naming to definition
  producing sentence to noun or verb cue
(Berndt & colleagues)

Noun deficits associated with posterior damage and verb deficits associated with anterior (typically, though exceptions)
Sources of N/V effects

• Semantic
  – Sensory/motor differences (relates to posterior/anterior distinction)
    • Nouns defined by sensory features
    • Verbs defined by motor features
    • Related to imageability
  – Object vs. action (Damasio)

• Syntactic
  –Grammatical information relevant to lexical organization

• Not mutually exclusive accounts - different sources could result in similar outcomes
Semantic Cause

Noun-verb differences go away when control for imageability for some patients (Bird, Howard & Franklin, 2000)

[But not for others (Berndt, Haendiges, Burton & Mitchum, 2002)]
Clear non-semantic cases

• Noun-verb dissociation in only one output modality:
  – One patient produces nouns and verbs correctly in speech, but has a verb deficit in writing (Caramazza & Hillis, 1991)
  – Another accurate for both in writing, but lost ability to produce verbs in speaking (progressive aphasia) (Hillis et al., 2002)

• How to explain?
Laiacona & Caramazza (2004)

- EA - temporal lobe lesion, nouns < verbs
  - Not due to loss of visual features
- MR - includes frontal regions, but also parietal, temporal, verbs < nouns
  - Verb deficit not due to agentivity

- MR has problem with verb morphology (regular and irregular) not noun
- EA good with morphology for regular nouns and verbs, some problem with irregular nouns