Today’s outline

• Bonus abstract (remember to put your email on the paper!)
• Finish last lecture
• Altmann Chapters 12 & 14
  – Aphasia
  – Dyslexia

Causes of Brain Damage

• Head injury
• Stroke
  – Hemorrhagic stroke
  – Ischemic stroke

Left vs. Right Hemisphere

• Damage to the LH generally impairs language
• Damage to the RH does not necessarily impair language. Patients may show emotional deficit instead.
• But recall Hickok & Poppel’s (2007) proposal on the dual-route to language processing → Language may not be processed in one hemisphere!
Symptoms ≠ Diagnosis

- Symptom is not a direct reflection of distinct disorder
- Failure to produce the word “tiger” could be because:
  - Failure to recognize the animal (conceptual)
  - Failure to utter the word (motoric)
- Classify symptoms according to components of language

Spoken vs. Written deficits

- Aphasia: deficits in spoken language
- Dyslexia: deficits in written language
  - Could affect both reception and expression
  - Often act as co-morbidity
  - Both forms are syndromes, i.e., they compose of distinct symptoms that can be formed into subtypes

Failure to understand

- Pure word deafness (spoken language)
  - Auditory perception intact
  - Failure to connect sound to meaning
- Pure word blindness (written language)
  - Visual perception intact
  - Failure to connect symbol to meaning

Aphasia: The Brain (Revisit)

(a) Pronouncing a word after hearing it

- Motor cortex
- Arcuate fasciculus
- Broca's area
- Primary auditory cortex
- Wernicke's area

https://thebrain.mcgill.ca/flash/i/i_10/i_10_cr/i_10_cr_lan/i_10_cr_lan.html
Types of Aphasia (Lichtheim, 1885)

- Broca’s aphasia
- Wernicke’s aphasia
- Transcortical motor aphasia
- Transcortical sensory aphasia
- Conduction aphasia
- Global aphasia
- Isolation of the language zone

Characteristics of Subtypes

<table>
<thead>
<tr>
<th>Subtypes</th>
<th>Fluency</th>
<th>Repetition</th>
<th>Comprehension</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Broca’s</td>
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<tr>
<td>Wernicke’s</td>
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<td>Trans. Motor</td>
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<td>Trans. Sensory</td>
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<td>Isolation</td>
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Dyslexia

- First described in British Medical Journal by Pringle-Morgan in 1896
- Current definition from National Child Health and Human Development:
  - Language-based learning disability
  - Insufficient phonological processing at word-decoding level
  - Not related to general developmental disabilities or sensory impairment
  - Show problems in spelling and writing

Types of Dyslexia

- Types
  - Deep: problems with function words, but not nouns
  - Phonological: fail GPC
  - Surface: can’t say irregular words
- Etiology
  - Acquired: Originated in the brain
  - Developmental: Originated in childhood (brain + genetics??)
Symptoms in reading

- Use small sight vocabulary
- Made visual errors
  - Read *saucer* as *supper*
  - Read *thirsty* as *twenty*
- Fail to sound out letter sounds → fail to recognize the grapheme-phoneme-correspondence (GPC)
- Successful reading relies on context, substituting semantically acceptable words

Symptoms in Spelling

<table>
<thead>
<tr>
<th>Target</th>
<th>Age 8</th>
<th>Age 10</th>
<th>Age 12</th>
</tr>
</thead>
<tbody>
<tr>
<td>Umbrella</td>
<td>Unenpnl</td>
<td>Unbrl</td>
<td>Unberler</td>
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<td>Inthder</td>
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<td>Interdie</td>
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<td>refent</td>
<td>reafrestmint</td>
<td>refreshment</td>
</tr>
</tbody>
</table>

How do they read?

- Through wholistic visual approach
- Caik → Cake
- Klown → Clown
- But cannot read kaik or kloun
- Semantic priming:
  - Tomato → sawce
  - Cough → snease
- Build up visual memory of words along with semantic context

Etiology: Genetics

- Orton (1925) first proposed language problems run in families
- 1950's Halgen found 88% of 300 learning disabled children had similar problems in the families
- Recently, heritability of dyslexia is found to be around 50% (Colorado twin studies)
- Short arm in chromosome 6 and 15
Etiology: Neurological basis

- **Planum temporale**
- Left fusiform gyrus
- Temporo-parietal junction
- Magnocellular pathway for early visual system

Planum Temporale

- Close to the Wernicke's area
- Believed to be involved in pitch processing
- Normal readers have a bigger left PT
- Dyslexic Ss have symmetrical left and right PT

Temporo-Parietal Junction

- Dyslexia as a syndrome caused by deficits in a neurological network