Chapter Ten: Language and Brain

1. NEUROLINGUISTICS AND PSYCHOLINGUISTICS

Neurolinguistics → the study of language processing and representation of language in the *brain*
Psycholinguistics → concerned with linguistic performance—how we use our linguistic competence—in speech production and comprehension

2. LOCALIZATION OF THE BRAIN

different human cognitive abilities and behaviors are localized in specific parts of the brain

2.1. Aphasia

impairment of language function due to localized cerebral damage

Broca's Aphasia

- **Agrammatic speech:** patients typically omit function words
- Patients have word-finding pauses and disturbed word order
- Patients have difficulty understanding complex sentences

Wernicke's Aphasia

- **Anomia:** difficulty in finding the correct word and lexical morphemes
- **Paragrammatism:** speech is fluent, with normal intonation, yet it is incomprehensible
- **Paraphasia:** mispronunciation of words, or the production of inappropriate words
  - **Phonemic jargon:** substituting phonemic segments, e.g. *table* → *sable*
  - **Neologistic jargon:** production of content words that have been fabricated, e.g. *splix*
  - **Semantic verbal paraphasia:** replacing the desired word with a related one, e.g. *paper* → *pencil*
  - **Jargon aphasia:** substituting words unrelated semantically, e.g. *chair* → *engine*

Conduction Aphasia

- disrupted rhythm because of pauses and hesitations
- the task of repeating a word or phrase is difficult for them

2.2. Event-Related Potentials (ERPs)

electroencephalogram (EEG)

magnetic resonance imaging (MRI)
positron emission tomography (PET)
functional magnetic resonance imaging (fMRI)
magnetoencephalography (MEG)

2.3. Specific Language Impairment (SLI)
2.4. Language Savants

3. LATERALIZATION OF THE BRAIN

development of control over different functions that are localized primarily on one side of the brain or the other:

Left hemisphere → **analytic activities**, e.g., mathematics, jigsaw-type puzzles, music in musicians, alphabet reading
Right hemisphere → **holistic activities**, e.g., recognizing faces, guessing games, music in non-musicians, logographic reading

lateralization coincides with **critical period**
brain has **contralateral** function

3.1. Dichotic listening
3.2. Split Brains
3.3. Childhood Brain Lesions

Children may suffer less severe or long-lasting aphasia. Rough generalizations concerning childhood aphasia are that:

a) Up to about 4: an injury to either the left or right brain is unlikely to result in long-lasting aphasia;
b) From about 4 to 11: aphasias resulting from injury to either hemisphere can be overcome with time and practice
c) After about 11: some permanent effects may often result from injury to the language-dominant hemisphere

Such results have been interpreted as showing three stages of development of language-hemisphere dominance:

a) Birth to about 4: both hemispheres are equally engaged in language learning;
b) 4 to about 11: left hemisphere becomes progressively dominant;
c) After 11: non-dominant hemisphere loses full capability for language learning.

4. TONGUE TIPS AND SLIPS

Tip of the tongue → we feel that some word is just eluding us, that we know the word, but it just won't come to the surface

Slip of the tongue:

- **Metathesis**→ exchange in the normal sequence of elements in a sentence, e.g.
  dear old queen → queer old dean
  you have missed my history class → you have hissed my mystery class
- **Perseveration:** e.g., black box → black blox
- **Anticipation:** e.g., reading list → leading list
- **Shift**→ one speech segment disappears from its appropriate location and appears somewhere else, e.g., she decides to hit it → she decide to hits it

- **Deletion:** e.g., his immortal soul → his immoral soul
- **Addition:** e.g., spic and span → spic and splan
- **Substitution:** e.g., Where is my tennis racquet? → Where is my tennis bat?

5. EXTRA POINTS TO REMEMBER

 # Agraphia and **alexia**
Right-hemisphere injury, are *intonation* (which carries emotional overtones) and *non-literal language*
The aphasias of left-handers are often not so severe or long-lasting as those of right-handers → As a negative effect of bilateral distribution of language functions in left-handers, however, they are more likely to suffer aphasia from either right- or left-brain injury.