

Unit 7

Reading and Writing

- Over evolutionary time, our brain have adapted to the needs of processing spoken language, but natural selection hadn't had time to meet the demands of reading.
- We recycle brain systems originally designed to serve other functions, training them instead to take visual inputs and hook them up with the language system.

Writing systems

- Because the brain has evolved dedicated systems for processing speech, we all learn spoken language effortlessly as we grow up.
 - a) However, reading is a recent invention that requires years of effortful training with varying degrees of success.
- There are three types of writing systems:
 - a) Logographic systems use symbols to represent words or morphemes. *Chinese still mainly writes logographic symbols are logograms*
 - b) Syllabaries represent each possible syllable of a language with a different symbol. *- Japanese syllabary evolved from the use of Chinese logograms for phonetic values.*
 - c) Alphabets represent language at the phoneme level. *English (Roman) & Cyrillic (Russia)*
- Orthography is the set of rules for writing the words of a language.
 - a) The orthography of a language is said to be shallow when there is a close match between spelling and pronunciation (as in Spanish), and is said to be deep when spelling and pronunciation are poorly matched (as in English). *French*
- Homophones are words with the same pronunciation but different meanings and often with different spellings (as in to, too and two).
 - a) Homographs are words with different pronunciations and meanings but the same spelling (as in read and lead rhyme with either head or head depending on their meaning). *both occipital & temporal lobes*
- The visual word area is a region at the boundary between the left inferior temporal and parietal lobes that processes the shapes of written words regardless of the language or type of script. *stores*
- The observation that all writing systems are produced the same way in the brain is explained in terms of the neuronal recycling hypothesis.
 - a) The hypothesis proposes that brain areas designed for one function can be recruited to perform another, somewhat similar function.

Cognitive processes in reading : Eye Movements (I) & (II)

- The eyes move across the page in a series of saccades and fixations.
 - (a) Skilled readers saccade from one content word to the next, but novice readers tend to fixate on every word.
 - (b) Most saccades are forward, but some saccades are regressive, reviewing previously fixated words.
- Visual acuity is limited to a small region of the retina directly behind the pupil known as the fovea.
 - a) The area surrounding the fovea, known as parafovea, provides only a blurred image.
- The range of letters that can be taken in during one fixation is known as the perceptual span. Skilled readers of English have a greater perceptual span to the right than to the left.
 - a) The perceptual span is measured by the gaze contingency paradigm, which uses eye-tracking technology to restrict the amount of readable text around the fixation point.
- Fixation duration is influenced by characteristics of the currently fixated word, such as frequency and predictability, but similar characteristics of the previous and following words, which appear in the parafovea, can also affect the fixation duration of the current word. *2nd method*
- The dual route model proposes that the lexical access in reading can occur through a direct route linking the written word to its meaning or –
 - a) Else through an indirect route in which the words phonology is accessed firsts.
 - b) Clinical data from acquired dyslexia and from the neuroimaging of skilled reading support the dual route model.
- As we read, we hear an inner voice that reconstitutes the pronunciation of the words and the intentions of the phrase, thus
 - a) Processing written text is similar to processing spoken narrative, in that it proceeds through cycles of memory retrieval and integration that operate at the level of the prosodic phase.

Development of reading skills

Vide 3
(1) Novice readers → flat intonation, pauses at inappropriate boundaries
(2) Skilled readers → natural intonation, pauses at prosodic phrase boundaries

Locatto

- Reading skills involves not only quickly accessing the meaning and pronunciation of visual word forms, it also includes the ability to move quickly through a text while maintaining good comprehension.
- Reading skills are normally distributed among the population with most people being average readers while some excel and others struggle.

Skilled Readers have two ways of accessing meaning of written word.
(1) Direct Route : Written word → meaning

(2) Indirect Route : Written word → Spoken form → meaning

(3) Exclusive Model : Irregular & familiar words → direct route ("sight reading")
→ less familiar words → indirect route ("sound out")

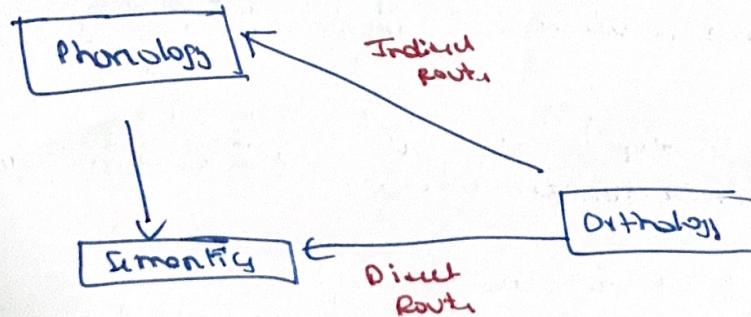
(4) Parallel Models : Both routes process each word ("holistic")

Dual Route Model (II)

- (1) Acquired dyslexia → reading impairment due to brain damage in previously skilled reader.
 - provides evidence for dual route model.
- (2) Surface dyslexia → can read regularly spelled words (pseudowords) but not irregular words.
 - suggest direct route disrupted.
 - Damage to temporal lobe (ventral "what" stream)
- (3) Phonological Dyslexia → can read familiar words, can't sound out unfamiliar words.
 - Indirect route disrupted
 - Damage to parietal-frontal region (dorsal "how" stream)

[The direct route goes straight from spelling (orthography) to meaning (semantics).]

- The indirect route passes through pronunciation first (phonology)
- If the direct route is disrupted, the patient can still read regularly spelled words because they can sound them out (surface dyslexia).
- If the indirect route is disrupted, the patient can still read familiar words but can't sound out unfamiliar words (phonological dyslexia).



② Phonemic Alphabetic Principle → Process of associating written symbols with speech sounds.

→ Phonics based Approach → Method of teaching reading.

→ Explicitly trains children to recognise consistent relationships between letters & sound.

Screening for Dyslexia

Susceptibility for Dyslexia can be assessed in preschool.

Various measures of phonological awareness available.

(1) Rapid Automated Naming ↗

→ Diagnostic for dyslexia

→ Name written letters, numbers, or other familiar symbols as quickly as possible.

(2) Early interventions

→ Explicit training in phonological awareness, alphabetic principle can help with early reading skills.

• Development Dyslexia of the Brain (I)

• Development Dyslexia → Disorder of the brain

• Leads to variety of problems not obviously related to reading.

Dyslexia readers use different brain areas while reading, compared with normal readers.

Reading becomes automatic for most readers, seems effortful for those with dyslexia.

→ Auditory processing deficit hypothesis → Dyslexia stems from underlying difficulty detecting & remembering rapid sound changes.

→ Auditory processing deficit → Predictor for both specific language impairment & development dyslexia.

Letter position dyslexia → Raw form of reading disorder, order of letters is mixed up.

- a) The cutoff for diagnosing a reading disorder depends on what society considers an acceptable level of reading ability.
- **Developmental dyslexia** is a reading disability in children that is not due to lack of intelligence, motivation or educational opportunity.
 - a) It affects about 5%-17% of school children, and those with a family history of dyslexia are at elevated risk.
- **Phonological awareness** → ^{understanding that words can be broken down into smaller sound structures.} or sensitivity to the sound structure of words, is an essential prerequisite to learning to read.
 - a) The deep orthography of English poses special problems for a child with reading impairment but rates of dyslexia are similar worldwide.
- Brain imaging studies show structural differences in the brains of dyslexic individuals compared with skilled readers, and even in the brain of preliterate children with a family history of reading impairment.
 - a) Both the grey matter of functional regions involved in reading and the white matter tracts connecting those regions are affected.
- The personal and social cost of developmental dyslexia are considerable. Behavioral tests that screen preschoolers for risk of reading disorder are now available though not yet widely used.
 - a) Techniques for improving phonological awareness are generally effective but we still lack adequate methods for helping dyslexic children become fluent readers.

Cognitive processes in writing

→ P.T.O Content first

- Learning to write the letters of a writing system involves changes in two areas of the brain.
 - a) The visual word form area at the occipital-temporal junction stores visual features of the letters.
 - b) The Exner's area in the frontal lobe stores motor plans for handwriting those letters.
- **Learning to spell** requires integrating three types of information:
 - a) The **phonological structure of words**. → *Analyse spoken words into smaller units*
 - b) The **orthographic rules** for converting spoken words into written forms
 - c) **Morphological** information about how word forms can change when prefixes or suffixes are added.
- As schoolchildren progress through primary and secondary school, the texts they write show a developmental trajectory from a loose structure with no unifying topics towards hierarchically organized texts built on a set of subtopics arranged under a common theme.

→ Translate phonemes or other phonological units into letters or letter combinations.

→ It requires alphabetic principle.

(c) **Isolated spelling disorders** → specific (significant impairment in spelling skills even though reading ability is normal range).

Development Dyslexia & the Brain (II)

- ① Gray matter → Brain tissue mainly composed of neuron cell bodies
 - Function is to process info.
- ② White matter tracts → Bundles of fibers connecting various regions of the brain.
 - Function is to transmit info.
- ③ Diffusion tensor imaging (DTI)
 - fMRI technique, traces pathways of white matter tracts.
- ④ Size and distribution of arcuate fasciculus & other white matter tracts → Correlated with reading ability in adults, phonological awareness in preliterate children.

- Three stages of learning to write:
 - (1) Learning the symbols of the writing system
 - (2) Learning how to combine letters to form words
 - (3) Learning how to compose texts.

Exner's Areas Brain region in left frontal premotor cortex just above Broca's area.

→ Stores motor programs for hand writing gestures

→ Learning to write letters imp part of learning to read them

Development Trajectory of Writing

- (1) Flexible focus text → No global topic, sentences glued together by loose association
- (2) Fixed focus text → Each statement relates to core ~~topic~~ topic, but little elaboration of them statements.
- (3) Topic elaboration text → Set of subtopics arranged about a common theme.

- The Hayes model is a theory of the cognitive processes involved in the writing task, and it has guided writing research for more than three decades.
 - It is designed to explain how writing processes are dependent on more general cognitive processes and on support from the environment.
- Individuals with dyslexia or specific language impairments perform much worse on writing tasks than do their peers.
 - Although they put as much effort into the task and produce similar content compared with normally developing writers, they write less, have more spelling and grammatical errors and use more limited vocabulary.
- The visuo-spatial aspects of the text are important to skilled writers, who organize paragraphs based on how they are laid out on the page and use spatial memory to locate information during revisions., detecting errors during revision.

Text - produced surfaces provides auxiliary during writing & revision process

Composing text

- Burst → Period of active text composition bounded by pauses at both ends.
- Pause → Believed to reflect cognitive effort.
 - Increase in length with size of linguistic unit they divide.
 - Pause lasting 2 sec or more

Hayes Model

- Influential theory of writing process
- Four core writing processes
- Three levels of interacting cognitive processes.

Four Core -

- Proposer → generate ideas
- Translator → convert proposed ideas into Spoken lang strings
- Transcriber → convert spoken lang strings to motor plan for typing or handwriting
- Evaluator → Scans for errors, initiates revision.

Three levels -

- Control level → motivation, goals, plans, writing schema extent top down control over writing process
- Processing level → writing process & text environment
- Resource level → supports writing process, includes short & long term memory, attention, feedback.

Unbalanced → A person who has limited ability in a second language
Incomplete first lang acquisition → Failure to attain full native speaker proficiency of first language

BILINGUALISM

Week 8

THE BILINGUAL EXPERIENCE

Monolingual → Able to speak only one language

Balanced bilinguals → A person who grows up speaking two languages and can communicate equally in either one

- Most people in the world are bilingual, meaning that they speak two or more languages; however, they rarely speak all of their languages with equal proficiency, and typically one language is preferred or dominant.

- The distinction between language and dialect is based more on political than linguistic considerations. Two languages or dialects are said to be **mutually intelligible** when their speakers can understand each other.

- Language shift among immigrants to the United States follows a predictable three-generation pattern; the first generation speaks the **heritage language** and some English, the second generation speaks the heritage language but prefers English, and members of the third generation grow up as monolingual English speakers.

Spoken in immigrants Country of origin

Dominant lang

- In multilingual societies, one of the languages is often dominant and is used for communication in government, education, and business; in some cases, communication between ethnic groups proceeds through a **lingua franca**, which is a second language that members of different ethnic groups can also speak.

- Bilinguals engage in **codeswitching** to select the language that best suits the pragmatics of the situation; codeswitching can occur between or within turns of conversation.

- Bilinguals will also engage in language negotiation, tentatively trying different languages until the best fit for the current situation is mutually agreed upon.

- Language is a vital component of a person's identity, and bilinguals modify their language use to assert their membership in various social groups; language also influences the emotional recall of memories, with those memories being more vivid and arousing when recalled in the language in which the events were first experienced.

Heritage langs may be used at home for daily life topics
Second langs may be more relevant for issues outside home.

ORGANIZATION OF THE BILINGUAL MIND

- Both languages are activated in the brains of bilinguals every time they speak, regardless of which language they are currently using; evidence for this assertion comes from cross-language priming, eye-tracking, and electrophysiological studies.
- Translation equivalents are words in two languages that refer to the same concept. Closely related languages share **cognates**, which are words that have similar forms and

Word in L1 aids retrieval of word with related meaning in L2

→ Visual memory contains both marker & postag stamp