

PSYC 3320/5597: Psycholinguistics

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Unit 2 – Foundations of language

Guiding questions

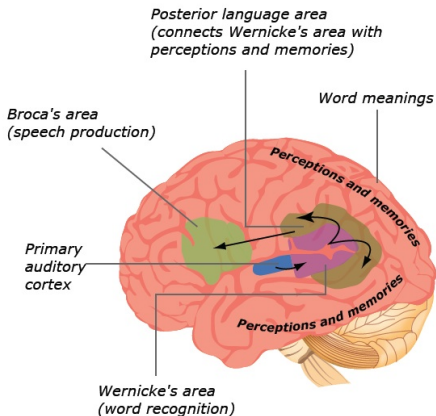
- ▶ Where is language processed in the brain?
- ▶ Is language development subject to a **critical period**?
- ▶ What is the relationship between language and thought?

Where is language processed in the brain?

For most people, language functions are handled in left hemisphere

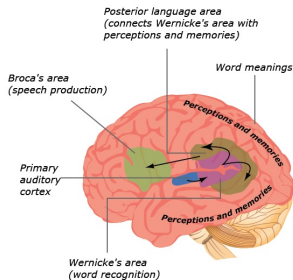
- ▶ first evidence came from work by Broca and Wernicke

Where is language processed in the brain?



A lot of what we know about these areas comes from lesions resulting in particular **aphasias** that have different effects on speech and comprehension!

Aphasias



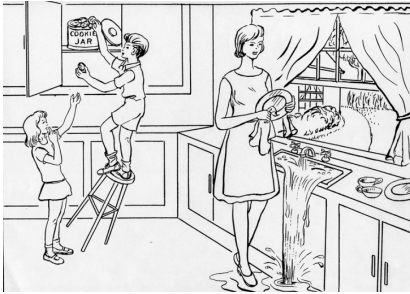
	Broca's	Wernicke's
Lesion	frontal	temporal
Speech	nonfluent	fluent
Comprehension	good	poor

How aphasia presents

The cookie-theft picture



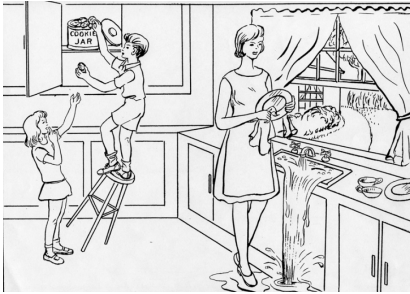
How aphasia presents



Broca's aphasia

*Cookie jar ... fall over
... chair ... water ...
empty*

How aphasia presents



Broca's aphasia

- ▶ slow, laborious speech
- ▶ dysprosody (little intonation)
- ▶ apraxia (difficulty with articulation)
- ▶ few grammatical elements

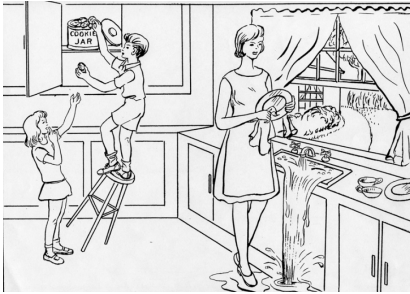
How aphasia presents

Wernickes's aphasia

Well this is ... mother is away here working her work out o' here to get her better, but when she's looking, the two boys looking in the other part. One their small tile into here time here. She's working another time because she's getting to. So two boys work together and one is sneakin' around here, making his work an' his further funnas his time he had.



How aphasia presents



Wernicke's aphasia

- ▶ fluent, grammatical speech
- ▶ nonsensical!
- ▶ normal prosody (intonation)
- ▶ poor comprehension

Is there a critical period for language development?

- ▶ folk observation: it **seems** harder to learn a new language later in life
- ▶ formal theory: **critical period hypothesis** (Lenneberg, 1967)
 - ▶ certain biological events (e.g., left hemisphere specialization) can **ONLY** happen during critical period
 - ▶ certain linguistic events **MUST** happen during this period for development to proceed normally

Critical Period Hypothesis

Critical period for lateralization

- ▶ **equipotentiality hypothesis** (Lenneberg, 1967) - at birth, both hemispheres are “equipotential” at birth (either hemisphere could take over). As child matures between ages 2 and 5, left hemisphere takes over
 - ▶ evidence: left hemisphere damage has small effect on language on young children, but large effect on adults
- ▶ **invariance hypothesis** (Rasmussen & Milner, 1975) - left hemisphere is specialized for language at birth, and right takes over ONLY if there is damage to left (also called **irreversible determinism**)
 - ▶ evidence: Dennis and Whitaker (1976) found that left hemisphere removal results in difficulty with complex syntax (i.e., right hemisphere cannot completely accommodate all language functions of left hemisphere)

Critical Period Hypothesis

Critical period for **second language acquisition** (Johnson & Newport, 1989)

- ▶ **maturational state hypothesis** - capacity for language acquisition decreases with age (as you get older, your ability to learn language diminishes)
- ▶ **exercise hypothesis** - unless capacity for learning language is used ("exercised") early, it is lost
 - ▶ but, as long as first language is learned, ability to learn other languages persists into adulthood

Critical Period Hypothesis

Critical period for **second language acquisition** (Johnson & Newport, 1989)

Differences?

- ▶ maturational state hypothesis - predicts that children will ALWAYS outperform adults in second language acquisition
- ▶ exercise hypothesis - adults may be better at acquiring second language (e.g., individual differences in learning skills)

Critical Period Hypothesis

Critical period for **second language acquisition** (Johnson & Newport, 1989)

Evidence?

- ▶ Snow (1983) - adults no worse than children at learning second language
 - ▶ in one experiment (Snow & Hoefnagel-Holhe, 1978), young children (3-4 years) performed WORST in learning second language
- ▶ “advantage” for young children may result from available stimuli (e.g., simple story books, etc.)
- ▶ adult language learners usually speak with accent - evidence for critical period in phonological development
- ▶ in all, **mixed evidence** for critical period in second language acquisition

Critical Period Hypothesis

Overall evaluation of critical period hypothesis

- ▶ **reject** strong version of critical period hypothesis
- ▶ Reason 1: second language acquisition can occur **outside critical period**
- ▶ Reason 2: lateralization can occur **outside critical period** (some present at birth or before)
- ▶ some have proposed a weakened version – **“sensitive” period hypothesis**

What is the relationship between language and thought?

Competing views:

- ▶ Chomsky - language acquisition is a “special faculty”
([language acquisition device](#))
- ▶ Piaget - language acquisition is “just another cognitive process”

Review of Piaget

Piaget

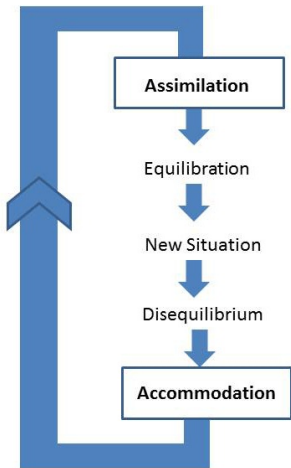


Key terms in Piaget's
constructivist theory are:

- ▶ Assimilation
 - ▶ incorporate new knowledge into existing cognitive structure

- ▶ Accommodation
 - ▶ change cognitive structures to accommodate new evidence

Equilibration



Three phases:

- ▶ **Equilibrium:** no discrepancies between learner's understanding and their experience
- ▶ **Disequilibrium:** learner perceives a discrepancy between **prior** understanding and immediate experience
- ▶ **Renewed equilibrium:** learner modifies "explanation" (forms new schema/category) that includes and explains the new experience

Piaget's stages of cognitive development

1. Sensorimotor (birth - 2 years)
2. Preoperational (2-7)
3. Concrete operational (7-12)
4. Formal operational (12 - adulthood)

Object permanence



Object permanence (A) A six-month-old looks intently at a toy. **(B)** But when the toy is hidden from view, the infant does not search for it. According to Piaget, this is because the infant does not as yet have the concept of object permanence.

According to Piaget, object permanence should be achieved by 18 months

Piaget and language

So what does this have to do with language?

- ▶ Piaget: cognition drives language development
- ▶ language development requires certain cognitive prerequisites (stages)
 - ▶ Example: child must have object permanence (evidence: “explosion” in vocabulary at 18 months)

Alternative to Piaget



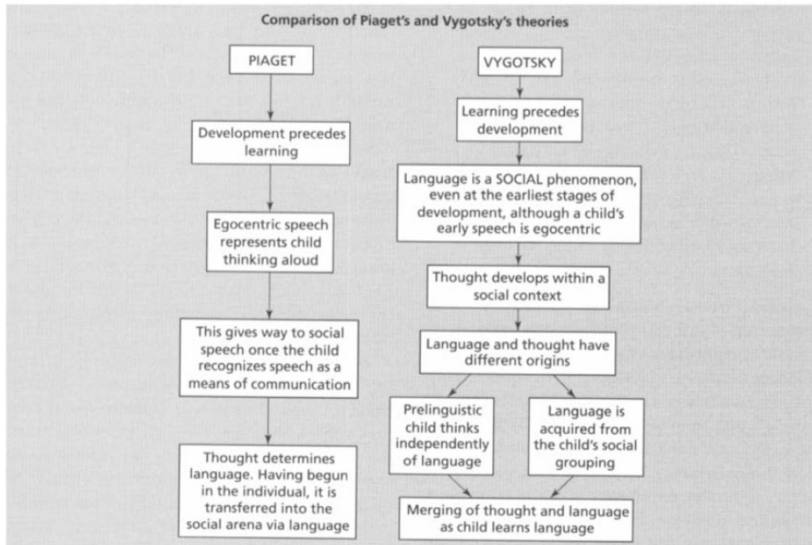
Lev Vygotsky (1896-1934)

- ▶ language is **essential** for cognitive development
- ▶ Evidence: private speech (children talk to themselves)

Vygotsky's model

- ▶ adults give instructions to children (social speech)
- ▶ children start to use parent's instructions to direct their own behavior (private speech)
- ▶ private speech becomes internalized as thought processes (subvocal statements)
- ▶ children use this “internalized” speech to plan and organize behavior → cognitive development

Comparing Piaget and Vygotsky



Influence of language on thought

Sapir-Whorf Hypothesis

- ▶ **linguistic determinism** – the form of our language determines the structure of our thought processes
- ▶ **linguistic relativism** – as different languages map onto the world in different ways, different languages will generate different cognitive structures

Influence of language on thought

Hunt & Agnoli (1991) - structure of number system affects arithmetical ability

- ▶ English: 11 and 12 are **linguistic primitives**
- ▶ Chinese: 11 and 12 are literally said as “10 and 1” and “10 and 2”
 - ▶ e.g., Chinese language directly reflects base-10 number structure
- ▶ many documented differences in arithmetical ability between English speakers and Chinese speakers

Influence of language on thought

Hoffman, Lau, & Johnson (1986) - Chinese-English bilinguals read descriptions of people – later asked to describe people they'd read about

- ▶ descriptions conformed to Chinese or English personality stereotypes
- ▶ Bilinguals thinking in Chinese tended to use Chinese stereotype in their descriptions
- ▶ Bilinguals thinking in English tended to use English stereotype
- ▶ Conclusion: language affected the stereotypes that were used (language influences thought)

Summary

- ▶ Where is language processed in the brain?
 - ▶ evidence points to **left hemisphere** (at least for most people)
- ▶ Is language development subject to a **critical period**?
 - ▶ evidence from lateralization studies and second language acquisition suggests **maybe** – probably more support for a **"sensitive" period**
- ▶ What is the relationship between language and thought?
 - ▶ Chomsky: none (language is a "special faculty")
 - ▶ Piaget: cognition precedes language
 - ▶ Vygotsky: language precedes cognition
 - ▶ Sapir-Whorf hypothesis: language determines cognitive processes