Critical Periods in Language Acquisition

Critical Period Hypothesis

- "Normal" language acquisition must occur in (early) childhood
- There is a circumscribed developmental period before adulthood during which either first or second language acquisition is essentially guaranteed, and after which mastery of a language is not attainable.

Lenneberg (1967)

- Acquisition of language is a biological process involving brain plasticity and lateralization.
- As the brain becomes lateralized, it loses plasticity.
- This limits language acquisition to a period from roughly 2 years until puberty.

Other types of C.P. hypotheses

- Loss of (access to) parameter setting
- "Less is more"
- "Use it then lose it"
- "Use it or lose it"
- Prior learning inhibits later learning.

Other examples in nature

- Mating song learning in several species of birds (ex: finches & sparrows)
- Imprinting in ducks and birds
- Spatial tuning of auditory localization system in barn owls

First language evidence

- Results from childhood aphasia
- Results from individual children
  - Victor of Aveyron
  - Genie
  - Chelsea

- The small a the hat.
- The boat sits water on.
- The woman is bus the going.
- The girl is cone the ice cream shopping buying the man.

Image from http://www.ric.edu/dcousins/europsych/victor.html

First language evidence, cont.

- Late learning of ASL
  - Newport & Supalla (1987)
- Some aspects of language affected more than others.

Second language evidence

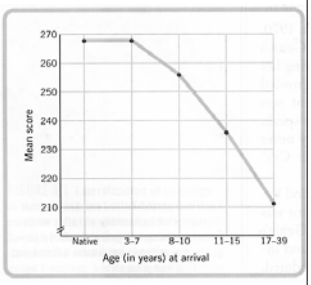
- Strongest predictor of L2 end-state performance is Age of Arrival (AOA)
- Johnson & Newport (1989)
  - 46 native Chinese or Korean learners of English
    - In the US for at least 5 years
    - Age of arrival (AOA): 3-29 years of age
    - Students or faculty at the University of Illinois
  - Divided into
    - Early arrivals: came to US before age 15
    - Late arrivals: came to US after age 17, but had formal English instruction beforehand
  - Grammaticality Judgment Task

Example items

- Yesterday the hunter shoots a deer.
- A bat flewed into our attic last night.
- Tom is reading book in the bathtub.
- Kevin called Nancy for a date up.
- Every Friday our neighbor wash her car.
- Two mouses ran into the house this morning.
- The horse jumped the fence over yesterday.

Johnson & Newport results

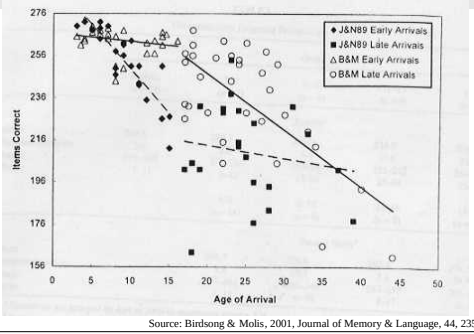
- Earlier AOA = better proficiency
- AOA between 3 & 7 years resulted in native-like performance
- Drop in performance beginning at 8 years



Follow-up work

- Syntax: Birdsong & Molis (2001)
- L2 achievement is not necessarily limited when L2 is learned after puberty.
- Similarities between L1 and L2 may influence how well L2 is learned.

Comparison of results



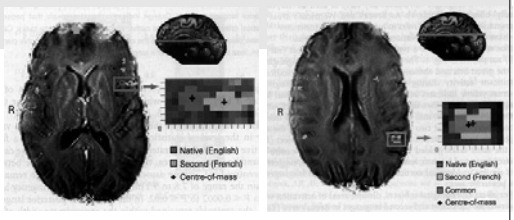
Source: Birdsong & Molis, 2001, Journal of Memory & Language, 44, 235-249

Pronunciation

- Typically, native-likeness among late learners is observed even less frequently in the area of pronunciation than in morphosyntax.
  - Flege, Munro, and MacKay (1995): 6% incidence of unaccented pronunciation among late learners.
- But depends on the language

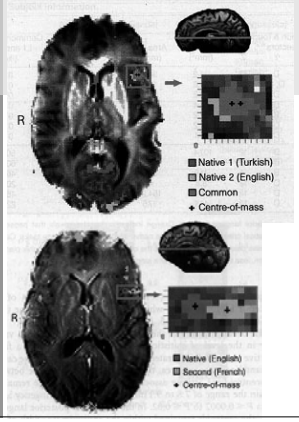
Brain differences

- fMRI study with early vs. late bilinguals
- Use of Wernicke's area was the same
- Use of Broca's area differed
  - Early learners used the same part of Broca's area for L1 & L2
  - Late learners used a part of Broca's area next to the L1 processing area for L2



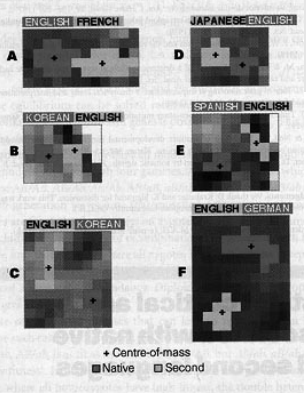
From a late bilingual, showing distinct areas on the left image (Broca's), but overlapping on the right (Wernicke's)

Kim, Relkin, Lee &Hirsch (1997) Distinct cortical areas associated with native and second languages. *Nature, 388*, 171-4.



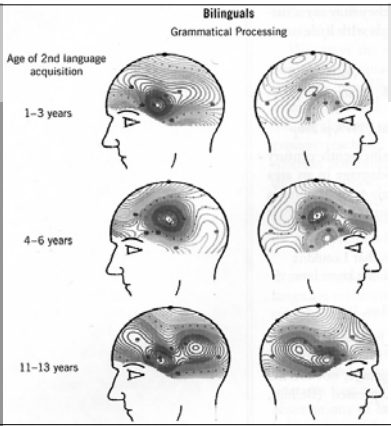
Comparison of an early bilingual (top) and a late bilingual (bottom), Broca's area

Kim, Relkin, Lee &Hirsch (1997) Distinct cortical areas associated with native and second languages. *Nature, 388*, 171-4.



Broca's area for all 6 late learners

Kim, Relkin, Lee &Hirsch (1997) Distinct cortical areas associated with native and second languages. *Nature, 388*, 171-4.

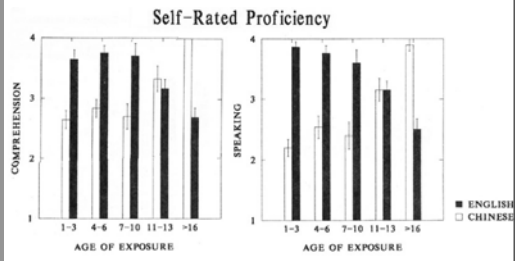


From Neville & Bavelier, 1999; image from Siegler, Deloache & Eisenberg, 2003

Other possible explanations

- Differences in how items learned
- Interference between languages
  - Loss of L1 if L2 learned early
    - Yeni-Komshian, Flege & Liu (2000)

Language proficiency



From Weber-Fox & Neville, 1996