PSYC 3290
Psycholinguistics

Alternative Language Processing (Bilingualism and Sign Language)

March 31, 2008

Outline
• Research paper (due Apr 3 – last lecture) include abstract. But it won’t be evaluated
• Last lecture
• Final Exam: Apr 11 (Friday) 9-12 a.m. VH-B
• Bilingualism
• Sign language
• Bimodal bilingualism (speech + sign)

Nature of Bilingualism
• Are you a bilingual?
• Affected by environmental factors: education system, immigration, social pressure, political environment...etc.
• Bilingualism is not categorical.
Types of Bilinguals

- Romaine (1995)
  Type 1: one person, one language
  Type 2: nondominant home language/one language, one environment
  Type 3: nondominant home language without community support
  Type 4: double nondominant home language without community support
  Type 5: nonnative parents
  Type 6: mixed languages


End Product of these Subtypes

Bilingual children growing up in different linguistic and social environment would differ in:

- (Relative) usage of language
  - Overcoming the urge to speak the stronger language
  - Finding a matching item in the weaker semantic network
- Proficiency of each language
  - Formal structures of language produced
  - Levels of comprehension in different contexts, e.g., speaking to grandparents on the phone vs. watching the news

Nature of Bilingualism
Linguistic Consequences of Bilingualism

- Delay in acquisition of speech sounds to word learning: Effect of two phonetic representations
- Concepts of print: Effect of two references to the same referent
- Limited transfer between languages: Effect of writing system
- Lower receptive vocabulary: Effect of two semantic network
- Lower performance in lexical retrieval: Effect of two semantic network

Speech Perception and Word Learning

- Fennell, Byers-Heinlein & Werker (2007)
- Habituated to one syllable with an object
- Switch to a different syllable with that same object
- Monolingual infants showed dishabituation at 17 months, bilingual infants delayed to 20 months.
- Results replicated in heterogeneous bilinguals and homogeneous bilinguals (Chinese-English & French-English)


Concepts of Print: Moving word task

(Apperly, Williams & Williams, 2004; Bialystok & Martin, 2003; Bialystok & Senman, 2004; Bialystok, Shenfield & Codd, 2000; Bialystok & Luk, 2007; Collins & Robinson, 2005)
Limited Transfer between Languages
• Depends on writing system \(\rightarrow\) written representations of language
• Phonological awareness \(\rightarrow\) Writing system effect is weaker (Luk & Bialystok, in press)
• Nonword decoding \(\rightarrow\) writing system effect is greatest (Bialystok, Luk & Kwan, 2005)

Receptive Vocabulary
(Bialystok, 2007; Oller, Pearson & Cobo-Lewis, 2007)
• Canadian context (\(N = 963\))

Word Retrieval
• Verbal fluency is an important screening measure for degenerative disease.

Letter fluency: \(B = M\)
Category fluency: \(B < M\)
But we will come back to this findings later...
Cognitive Consequences of Bilingualism

- Cognitive flexibility
- Inhibitory control
- Selective attention

Executive Functions

Cognitive Flexibility
(Bialystok & Martin, 2004)
- Dimensional change card-sorting task (DCCS)

Inhibitory Control
(Bialystok & Senman, 2004; Bialystok & Sheparo, 2005)
Simon Task
(Bialystok, et al., 2004; Martin-Rhee & Bialystok, 2008)

Control

Congruent

Incongruent

Simon Task across Lifespan

Red \rightarrow Left
Green \rightarrow Right

Middle-aged (Bialystok et al., 2004)

Older adults (Bialystok et al., 2004)

Bilingual mind
Handling two languages...

The verbal fluency task requires both executive functions and proficiency, we know:

(1) bilinguals are better at EF
(2) bilinguals are worse in proficiency

Is \text{ in VF} really due to bilingualism?

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Partial results: Bialystok, Craik & Luk, in press
Bilingualism and the Brain
(Michelli et al., 2004)

- Grey matter density in inferior parietal lobe (BA 40) significantly correlate with proficiency in L2
- Italian-English bilinguals of all levels of proficiency
- Experience changes the anatomical brain structures

Summary for Bilingualism

- Bilingualism is a multidimensional construct that includes functional usage (how much) and proficiency (how well).
- The cognitive consequences of bilingualism is positive, but limited to nonverbal tasks.
- The linguistic consequences of bilingualism is mixed. Results can be influenced by:
  - Writing system
  - Phonetic representation
  - Semantic network
- Bilingualism also affects brain structure.

Sign Language

- Natural human language
- Different modalities compare to speech:
  - Speech: auditory in, verbal out
  - Sign: visual in, manual out
- Similarity:
  - Linguistic structures ("phonology", syntax, word)
  - Diversity in languages (ASL, BSL, MSL, SSL...)
- Difference:
  - Sound → meaning vs. movement → meaning
  - Speech organ vs. bodily parts (arm, hand, facial expression, gesture)
  - No tense marker
Nicaraguan Sign Language Project

• Children began to sign to each other regardless of the oral approach in education.
• They were kept at own homes prior to the educational reform.
• Birth of a sign language purely based on usage.
• Language does not arise from one person or two people… you need a community.
• Home signs converge to give birth to a language system

Nicaraguan Sign Language Project

• First vs. Second generation of NSL
  Fluency: 2nd > 1st
  Efficiency: 2nd > 1st
  Complexity: 2nd > 1st
• Development of NSL was driven by younger individuals than older ones → Critical period
• Process is similar to cerolization (how pidgin language evolves to a native-like language) in spoken language (the Hawaiian example)

Expression of ASL

• Fingerspelling
• Numbers and alphabets
• Noun
• Verb
• Adjective
Sign Language and the Brain
(Neville et al., 1998; Newman et al., 2002)

Bimodal Bilingualism

- Bimodal (speech-sign) bilinguals do not have the modality constraint as unimodal (speech-speech) bilinguals.
- Would the positive cognitive consequences of unimodal bilingualism extend to bimodal bilingualism?