Bilingual Language Processing
Goals

• To understand how bilinguals compare to monolinguals.
• To understand how conceptual and lexical representations are organized in bilinguals.
• To understand how bilingualism affects other aspects of cognitive processing.
• Bilinguals know and use 2 languages on a regular basis.
• Most people in the world are bilingual.
• Bilinguals have two labels for many concepts.

“Those French. They have a different word for everything!” --Steve Martin
Mary Potter and the Secrets of Bilingualism

Word Association Model

First Language Labels → Second Language Labels

Concepts

Images

Concept Mediation Model

First Language Labels

Concepts

Second Language Labels

Images
• The *Word Association Model (WAM)*: Words in L2 are associated with words in L1.

• The *Concept Mediation Model (CM)*: Words in both L1 and L2 are associated with concepts; but not directly with each other.
• Picture-Naming and translation experiments (Potter et al.)

• Predictions:
  – WAM: Translation in either direction (L1-L2; L2-L1) should be faster than Picture-Naming in L2
  – CM: L1-L2 Translation should take the same amount of time as picture-naming in L2

  – Results: Translating from L1 to L2 takes the same amount of time as naming a picture in L2.
Revised Hierarchical Model
(Judy Kroll)

Fig. 3. Revised hierarchical model of lexical and conceptual representation in bilingual memory.
RHM

• Conceptual and lexical links.
• L1-concept links are stronger than L2 links.
• L2-L1 lexical links are stronger than L1-L2 lexical links.
• Explains why
  – L2-L1 translation is faster than L1-L2 translation.
  – Semantic interference is greater in L1-L2 translation.
Competition

• *Cognate advantage*: words that sound alike and mean the same thing are produced and comprehended faster than other words.
  – in bilingual and monolingual modes
  – fewer tip-of-the-tongue states

• *Interlingual homograph disadvantage*:
  – words sound and look alike, mean different things.
  – *chef* = *cook* (English) and *boss* (German)
• Listening activates conceptual representations associated with both L1 and L2 words.
  – e.g., *marker* activates *marka* (*stamp*) in Russian-English bilinguals (Marian, Spivey)
  – neighborhood effects: L1 competitors interfere with target naming in *progressive de-masking* experiments
  – *pseudohomophone* priming: *roap* (“rope”) primes *touw* (“rope”) in Dutch-English bilinguals
  – in picture-word interference experiments, phonological distractors help (*mouw, mouth, mountain*); semantic distractors hurt (*valley, dal, mountain*)
• Listening activates conceptual representations associated with both L1 and L2 words.
  • output-language semantic distractors interfere more than input-language distractors in translation task

• Possible exceptions to competition:
  – highly proficient Catalan-Spanish/Spanish-Catalan bilinguals
  – do not show interference in picture-naming or translation
  – have symmetrical switch costs
Shared Syntactic Structure Representations

– (1) The truck is chased by the taxi.
– (2) El camión es perseguido por el taxi.

• *shared syntax account*: bilinguals re-use as much of the syntax of their first language as possible when learning and using a second language.
• Sign in a hotel in the Netherlands.

bevindt zich in de lade van het bureau.

An extra set of towels you will find in the drawer of the desk.

Ein zusätzliches Set Handtücher befindet sich im Schreibtisch.
• *Syntactic priming* occurs when producing one syntactic structure for one sentence makes it more likely that you will produce the same structure for a subsequent sentence.
Shared Syntax

• Bilinguals who hear a syntactic structure in one language are more likely to produce the same syntactic structure when responding in their other language.
• Syntactic priming effects are just as large when the bilingual switches between languages as when they produce consecutive utterances in the same language.
• Syntactic priming persists across brief lags; bilinguals are likely to recall previously-studied sentences using the same syntactic form as a sentence they have recently comprehended.
Language Control in Bilinguals

- *selective access*: bilinguals possess the mental equivalent of a light switch that can be set to activate or de-activate an individual languages

- Evidence against selective access: *paradoxical switch costs.*
  - change from L2-L1 is costlier than switch from L1-L2
Models of Bilingual Word Processing

• BIA+: based on TRACE (see Chapter 3). (Dijkstra & van Heuven)

• Inhibitory Control. (Green)
“Zooming In”

• Is language control easier in some situations than in others?
• Yes: recent experience affects the way bilingual speakers access the lexicon
• When German-English bilinguals watched a 20-minute movie that was narrated in English, there was no evidence that L1 meaning (poison) affected L2 (English) lexical decisions after about 15 minutes of performing the L2 lexical decision task
• Highly constraining contexts eliminate the cognate advantage.
Bilingualism and Executive Control

• Executive control: the set of skills that allows us to manage our thought processes effectively
• Bilinguals have superior executive control
• Bilinguals outperform monolinguals in tasks that require an individual to ignore task-irrelevant information
  – interference suppression
  – response inhibition
• Bilinguals do better than monolinguals on ANT and Simon tasks
Bilingualism and Executive Control

• Bilinguals are not better at all cognitive tasks
  – phonological perception is about the same in monolinguals and bilinguals
  – bimodal bilinguals resemble monolinguals on executive control tasks
Second Language Teaching Techniques

• Adult second language learning is complicated by the *critical period/sensitive phase*
  – because of loss of plasticity in procedural memory systems and/or
  – entrenchment of L1
• Applying the RHM to L2 learning:
  – L1 labels compete with L2 labels
  – This can be reduced by providing unique visual cues to L2 labels

• Using *immersion*
  – isn’t universally superior to other techniques
  – works better for students who have achieved some degree of L2 proficiency
  – works better for students with greater working memory capacity

• *Study Abroad*
  – enhances *fluency*
  – does not seem to affect speed of lexical access
L2 outcomes and efficacy of instruction methods depends on:

- type of instruction
- individual learner characteristics
  - working memory
  - phonological memory
Neural Basis of Bilingualism

• L1 and L2 activate similar brain regions
  – but interlingual homographs lead to greater activation in inferior frontal and anterior cingulate
  – L1-L2 switches lead to greater neural activity
  – subtle differences in neural activity in response to L1 vs. L2 may reflect differences in difficulty between the two languages

• In L2 learners:
  – brain wave activity changes before overt behavior does
  – for both semantic and syntactic aspects of L2