

Bilingual Memory and Lexical Access

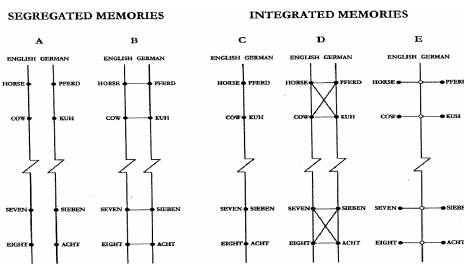
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Early Bilingual Models

(Kroll & Tokowicz, 2005)

- Didn't distinguish different levels of representation
 - Ex: phonology vs. semantics
 - Different language pairs
- Didn't distinguish between representation and process
- Didn't distinguish between different behaviors (e.g. production vs. comprehension)
- Didn't take into account learning history or development

Language representation



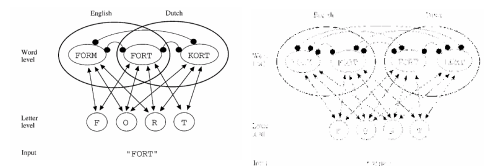
Issue 1: Representation

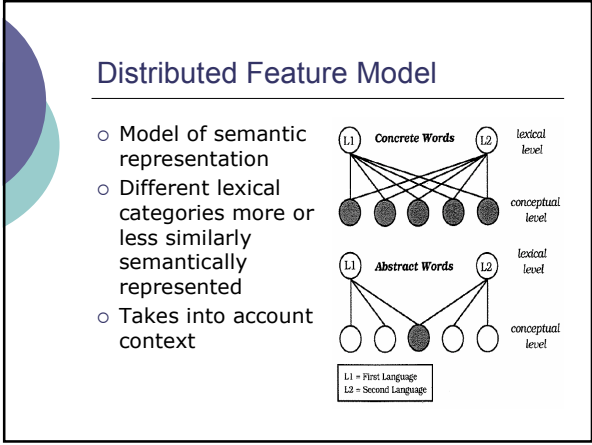
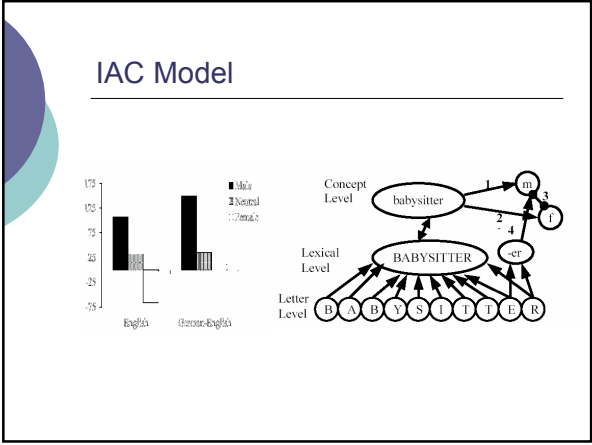
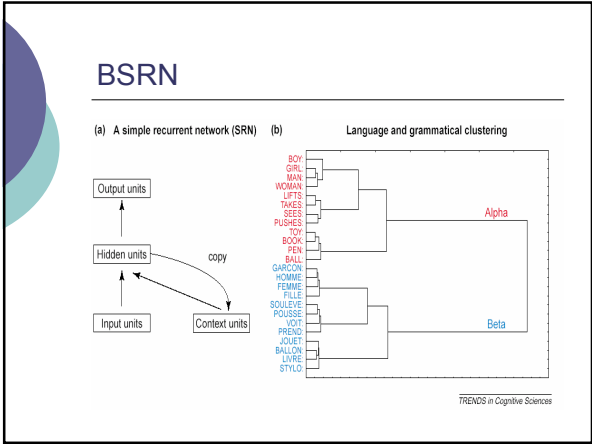
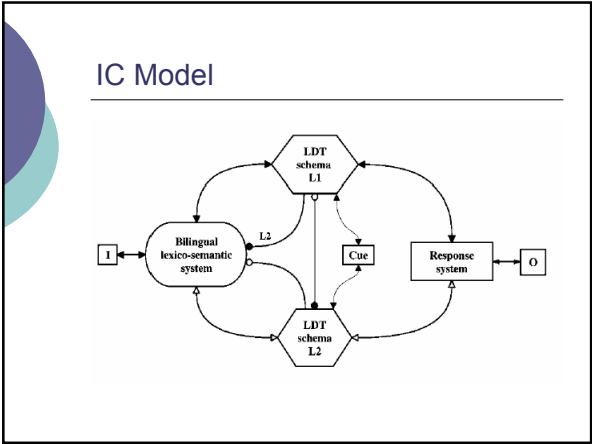
- "What aspects of representation, if any, are shared"?
- Overlaps to a great degree with the issue of selectivity, but aren't identical
- Computational Models
 - BIA model of word form
 - BSRN Model
 - Distributed Feature Model of semantic representation

BIA Model and the IC model

- One lexicon with non-selective access
- Use of language "nodes" or "tags"
 - Inhibitory and competition mechanisms
 - Top-down and bottom-up processes
- BIA+ incorporates phonetic information and tagging to explain more data
 - As well as semantic information more recently
- Can not learn over time

BIA Model





- ### Semantic Representations
- Meaning assumed to be similarly represented in same store
 - Cross-language priming
 - The Distributed Feature Model takes this into account and adds type of lexical entry and context to the mixture

- ### Issue 2: Selectivity
- "To what extent access to [the representations] is selective?"
 - The current state of the literature tends to favor non-selective access.
 - How then can we produce output in only one language?
 - May also be dependent on context, task are level of representation
 - Not all or none

Marian, Spivey, & Hirsch, 2003

- Suggesting non-selectivity at the phonetic processing level, but selectivity at the lexical level
 - Time course explanation
- Two types of methodology for converging evidence
 - Eye-tracking – processing both languages when given a word in either language
 - fMRI – Different levels of processing show different activation and support selective activity at lexical but not phonetic levels

Eye-tracking evidence – Exp 1



- Between-language effect
- Significantly more eye-saccades to control object than distracter object
- No effect of language

Eye-tracking evidence – Exp 2 & 3



- More eye-saccades to within language control than distracter
- But, no reliable interaction of within and between language effects
- Evidence for **non-selectivity** at the **phonetic** level

fMRI Evidence: Methods

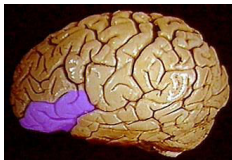
- Distance analysis within activated cortical areas
 - Lexical = word – non-word
 - Phonology = all modalities - auditory
- Passive listening and viewing of stimuli

Brain Anatomy

Superior Temporal Gyrus



Inferior Frontal Gyrus



fMRI Evidence: Results

- More activation for L2 in both phonological and lexical processing
- Phonological:
 - Different centers of activation for L1 and L2 in IFG but not in STG
- Lexical:
 - Different centers of activation within the IFG for the two languages

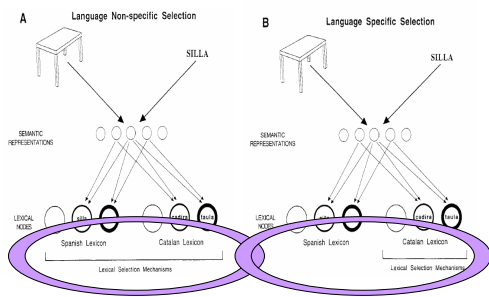
Costa, Miozzo, & Carmazza, 1999

- o Assuming that both lexicons are activated, do lexical items in both languages compete or only in one language?
- o Catalan-Spanish bilinguals perform picture-word interference task
 - Interference = semantically related word and picture (**i.e. lexical competition**)
 - Facilitation = phonologically related word and picture; identity effect

Costa, Miozzo, & Carmazza, 1999

- o Assuming that the bilingual's two lexicons are activated in parallel from the semantic system
- o Two explanations:
 - Both lexical and semantic items related to word and picture are activated; lexical items compete
 - Lexical items in one language compete through activation from the semantic and lexical processes from word and picture

Predictions



The Task

- o Identity match
 - Non-selective lexical access suggests that identical distracters (in the other language) cause interference
 - Selective lexical access suggests facilitation



Experiments

- o Exp 1: Facilitation of different-language identity pairs consistent with selective lexical access
- o Exp 2: Replicated even in a mixed-language context
- o Exp 3: Magnitude of semantic interference not effected by language of distracter

Experiments cont...

- o Exp 4: Same language identity effect partly due to phonological facilitation
- o Exp 5: No evidence of phonological facilitation through "translation".
- o Exp 6: Further support for non-lexical processes underlying phonological facilitation
- o Exp 7: This is not due to a time issue

Overall Results

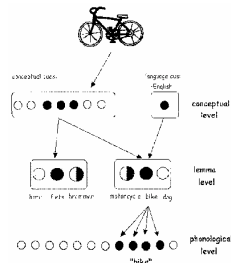
- Lexical competition between the two languages
 - Semantic representations equally activate lexical nodes of both languages
 - Lexical access is language specific
- Different levels of processing implicated in same and different-language identity effects
- Phonological affects due to non-lexical processes – consistent with the identity effect

Issue 3: Task Demands

- “How cross-language interactions change in the face of different task demands”
- Two models
 - Language production in different contexts
 - Control of intended language

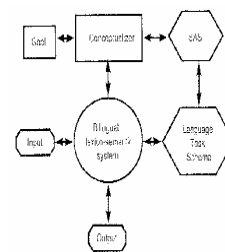
Production

- Three stages of production
 - Lemma level = syntactic constraints
- Differences between production and comprehension (BIA) models for when language node is activated



Control

- IC Model
- Amount of inhibitory control relative to lemma activation in the 2 languages
- Doesn't specify make-up of lexicon



Issue 4: Speaker history

- “How the course of L2 acquisition affects the form of representations and connections across the two languages”
 - Ex: level of proficiency may effect how easily bilinguals can restrict access to one lexicon

Development

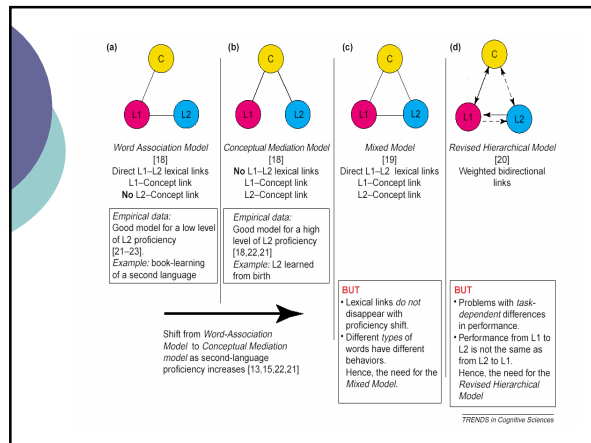
- Compound = simultaneous
- Coordinate = sequential
- Experience (context) more important than the manner of learning
- Age of acquisition may be more important than proficiency

Last Week

- Some suggest that the languages develop independently while others suggest transfer (Mishina-Mori, 2005)
- Children may or may not be able to separate their languages early on (Genesee, 1989)
- Processing may differ for single language and mixed-processing and changes over development and task (production or comprehension) (Kohnert & Bates, 2002)

Models

- Word association model
 - L1 word directly related to L2 word
- Concept mediation model
 - Words indirectly related through concepts
- May be a bit of both – translation equivalents first and then more reliance on conceptual nodes
- Revised hierarchical model



Conclusion

- Many different things affect the representation and access of lexical items in the memory of bilinguals
- But, in general the literature suggest that there is one large store with non-selective access, where this non-selective access may depend on the level of representation being studied

Big Questions – Part I

- Do we think that we can really say that the problems Kroll and Tokowicz identified have been addressed?
- What about other types of models that do not rely on boxes and arrows?
- Is bilingual memory qualitatively or quantitatively different from monolingual memory (if at all).
- Is it useful to break language up in this way at all? Why does it matter how languages are similarly (or not) represented?

Big Questions – Part II

- What about other things like age of acquisition?
- With all of these different variables that need to be taken into account, can we every possibly understand how bilinguals represent and process the lexicon?
- To what extent are the processes we are discussing language dependent and to what extent are they language independent?
- How does the development of two languages effect how they are represented and processed?