Investigating bilingual memory organization through proactive interference

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Theoretical background

- We aim to investigate language organization in bilingual memory
- Bilinguals encounter cross-language interference during language production and comprehension
- Different models on bilingual memory organization are disconfirmed as well as confirmed but limitations of the frequently used tasks (e.g., masked priming in a lexical decision)
- First experimental study to investigate "bilingual memory" with a memory paradigm
- Working memory is the active part of long-term memory (Cowan, 1988; Oberauer,2002,2009)

N-back paradigm

Is the item on the screen = item presented 2 positions before?

… apple – horse – apple …

… apple – ***horse*** – knife – ***apple***…

Familiarity ⟷ Recollection

« I saw the item before » = fast & automatic

« It was not in 2-back position » = slow and analytic

- Competition between 2 processes involved in recognition in memory (cfr. Dual-process models; Yonelinas, 2002)
- Semantic related words interference within a language: activation spreading in memory (Szmalec et al., 2011)

Present study

bilingual variant to investigate cross-language interference (lexical and semantical)

Match	…arbre – ***knife*** – fleur – ***knife*…**
Mismatch	…arbre – ***house*** – fleur – ***knife*…**
Lure	…knife – ***house*** – fleur –knife**…**
Translated lure	…couteau – ***house*** – fleur – ***knife***…
2-back translation	…house – ***couteau*** – fleur – ***knife***…
Semantic lure	…fork – ***house*** – fleur – ***knife*** …
Translated semantic lure	…fourchette – ***house*** – fleur – ***knife*** …

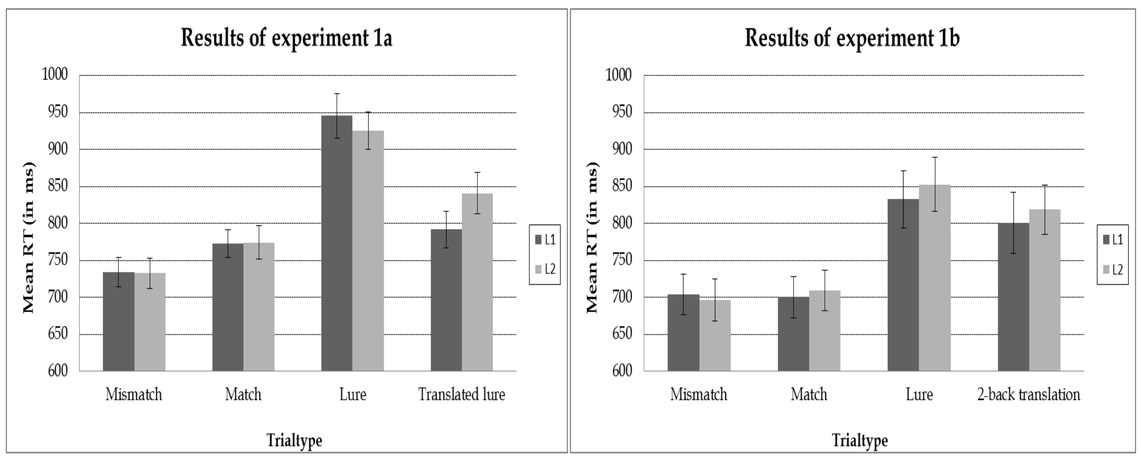
Research questions

1. Cross-language activation of translation equivalents? (Experiment 1a)
2. Is this activation-spreading a fast and automatic process? (Experiment 1b)
3. Semantic activation spreading in both languages? (Experiment 2a)
4. Cross-language activation of semantic related word forms? (Experiment 2b)
5. Cross-language activation in monolingual context? (Experiment 3)

Experiment 1: lexical cross-language activation

Design 1a: 2 (Language: L1 dominant, L2 dominant) x 4 (Trial type: mismatch, match, lure, translated lure)

Design 1b : 2 (Language: L1 dominant, L2 dominant) x 4 (Trial type: mismatch, match, lure, 2-back translation)



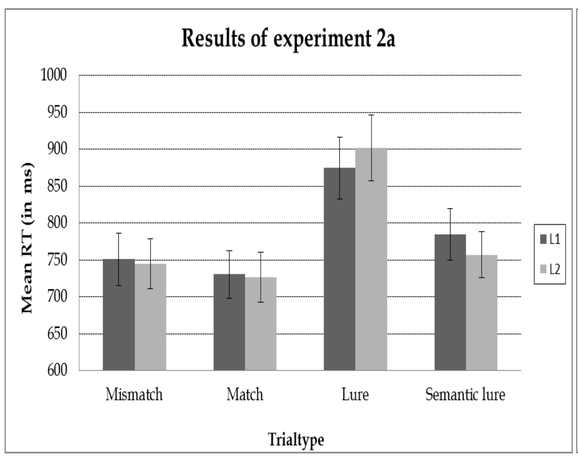
Conclusion Bilinguals showed lure effects in both languages and cross-language interference effects if the words are direct translations. Stronger activation of L2 to L1. The activation is fast and automatic.

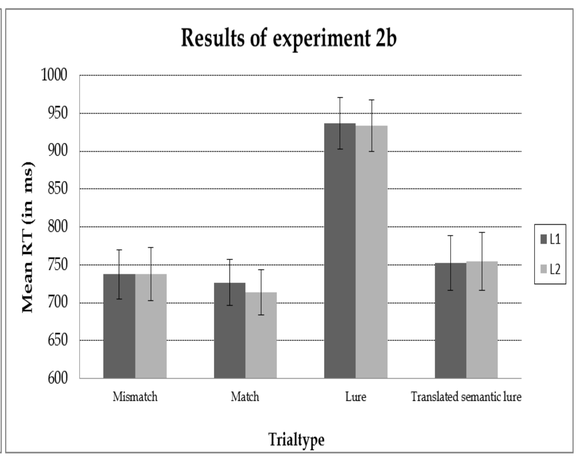
➔ **Automatic cross-language lexical activation in memory**

Experiment 2: semantic cross-language activation

Design 2a: 2 (Language: L1 dominant, L2 dominant) x 4 (Trial type: mismatch, match, lure, semantic lure)

Design 2b: 2 (Language: L1 dominant, L2 dominant) x 4 (Trial type: mismatch, match, lure, translated semantic lure)





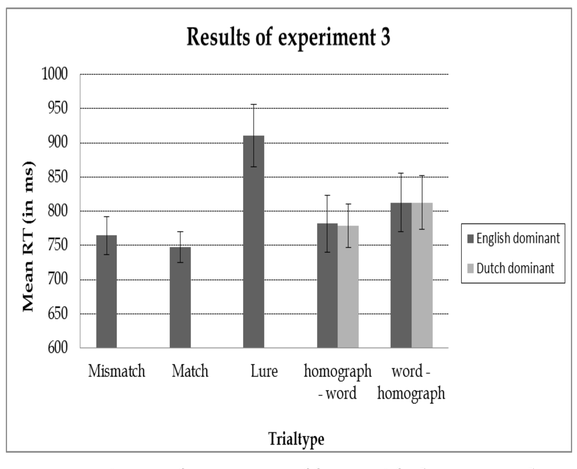
Conclusion Bilinguals showed semantic lure effects only in L1 and no cross-language effects.

➔ **Only semantic activation spreading in the dominant language**

Experiment 3: lexical activation in a unilingual context

Design: Trial type: mismatch, match, lure, homograph-word, word-homograph

Mismatch	…horse –***knife*** – house – ***apple***…
Match	…horse – ***knife*** – house – ***knife***…
Lure	…knife – ***horse*** – house – ***knife***…
Homograph - word	…brand – knife – house – fire…
Word - homograph	… fire – knife – house – brand …



Conclusion Bilinguals showed cross-language interference effects if the words on target position are homographs.

➔ **Language-independent lexical activation in memory, even in a unilingual context**

General conclusions

- Activation in lexical working memory extends automatically to both languages, even in contexts where only one language is used.
- Stronger activation of L1 lexical word form in memory, even for balanced bilinguals
- However, cross-language spread of activation is restricted to the activated concept (e.g. fourchette – *fork*) and not to semantically related concepts (e.g. fourchette – *knife*).
- Semantic activation spreading is only present in L1, providing evidence for the theory of Jiang and Forster (2001) that L2 words are stored episodically and not semantically

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