The Case of Different Scripts: Cross-Linguistic Effects in Japanese-English Bilingual Word Recognition

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BIA+ Model
Dijkstra & van Heuven (2002)
The Case of Different Scripts

Can BIA+ Model be generalized to bilinguals’ recognition of L2 words for languages with different scripts?

English  coffee

Japanese  コーヒー
Identification System

Task/Decision System

BIA+ Model
Dijkstra & van Heuven (2002)

Orthography

Phonology

Input coffee
The goals of this study

- Do Japanese words become co-activated without cross-linguistic orthographic similarity?

- Does competition between English target words and Japanese words occur at a later stage? (Diagnostic: English Word Frequency * Japanese Word Frequency)

- Does a cross-language phonological similarity effect arise early? (Diagnostic: Phonological Similarity rating)

- Does a cross-language translation (semantic) equivalence matter? (Diagnostic: Translation Equivalence rating)
Method: LDT with eye-tracking

Participants

- 19 Japanese-English late-bilingual readers
- 19 native English monolingual readers (control group)

Materials

- 250 English simplex words
- 200 English-derived nonwords
Predictors

Bilingual-specific predictors

• **Japanese Word Frequency**
  Loanword word frequency in Japanese

• **Phonological Similarity**
  rated cross-language phonological similarity

• **Translation Equivalence**
  based on rated translation similarity in meaning

Predictors of the English target words

• **English Word Frequency**

Control predictors

• **Trial** and **Previous RT**
Distributions of Fixations

- Single fixations were rare, and the majority of words were scanned by two fixations by English monolingual readers.
- Mode was 3 fixations for Japanese-English bilinguals.
The competition between L1 and L2 frequencies did not appear at the 1st fixation but appeared at the 2nd fixation, as predicted.
L1*L2 Word Frequency Effect

- Response latencies, too, reflected the competition between L2 target word frequency and L1 Japanese word frequency.
Phonological Similarity Effect

- Very early **Phonological Similarity** effect, as predicted.
- **Phonological Similarity** effects were modulated by **Japanese Word Frequency** at both 1\textsuperscript{st} and 2\textsuperscript{nd} fixations.
Phonological Similarity Effect

- Overall, larger cross-language Phonological Similarity led to shorter response latencies.
Translation Equivalence Effect

- Cross-language **Translation Equivalence** did not contribute to the 1st fixation but shortened the 2nd fixation duration.

\[
\begin{array}{c|c|c}
\text{Translation Equivalence} & \text{Equivalent} & \text{Not Equivalent} \\
\hline
1st Fixation Duration (ms) & \ns & \ns \\
\hline
2nd Fixation Duration (ms) & 11 ms & 11 ms \\
\end{array}
\]
Translation Equivalence Effect

- Cross-language **Translation Equivalence** facilitated responses (particularly noticeable when **Previous RT** was long).
BIA+ Model
Dijkstra & van Heuven (2002)
Summary

• Japanese words become co-activated without cross-linguistic orthographic similarity:

• Competition between English target words and Japanese words occurs late. (English word frequency * Japanese word frequency at 2nd fixation)

• A cross-language Phonological Similarity effect arises early.

• A cross-language Translation Equivalence effect arises late.
Phonological Similarity Effect

- Overall, larger cross-language Phonological Similarity led to shorter response latencies.
Consideration of Response Criteria: Phonological Similarity Effect

- **Phonological Similarity** facilitated responses as the experiment went by (a more important as a response criterion).
L1*L2 Word Frequency Effect

• The competition between L1 and L2 frequencies did not appear at the 1st fixation but appeared at the 2nd fixation, as predicted.
Consideration of Response Criteria

L1*L2 Word Frequency Effect

- The magnitude of the late English Word Frequency * Japanese Word Frequency became smaller, as the experiment went by (Japanese words as a response criterion).
Phonological Similarity Effect in Detail

- Very early **Phonological Similarity** effect, as predicted.
- **Phonological Similarity** effects were modulated by **Japanese Word Frequency** at both 1\textsuperscript{st} and 2\textsuperscript{nd} fixations.
Fixation Counts

- Fixation Counts vs. Trial
- Fixation Counts vs. Length
- Fixation Counts vs. Freq_HAL
- Fixation Counts vs. LogLengthOfStayCanada