Lexical activations in picture comparison:
A cross-linguistic approach to the relation between language and thought in the mental lexicon

Koji Miwa, Gary Libben, Sally Rice, R. Harald Baayen

University of Alberta
Edmonton, Canada

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How Similar Are These?

Research Questions

Does language influence how similar we perceive objects to be?

What lexical properties contribute to this perceived similarity?
Experiment: Picture Comparison

- Participants
  20 native Japanese speakers
  20 native English speakers

- Stimuli
  60 pairs of two pictures with compound names in Japanese
  - 20 pairs shared a head constituent
    sen-ro 線路 'railroad'       me-ro 迷路 'maze'
  - 20 pairs shared a modifier constituent
    chi-kyu 地球 'the Earth'    chi-zu 地図 'map'
  - 20 pairs shared no constituent
    shi-mon 指紋 'fingerprint'    tori-kago 鳥籠 'birdcage'
Experiment: Picture Comparison

chi-kyu 地球 ‘the Earth’  
chi-zu 地图 ‘map’
Predictions

What kinds of language effects can we expect?

- Morphological effects: Sharing constituents
- Semantic effects: Sharing aspects of meaning
- Frequency effects: Sharing similar frequency of use
- Form effects: Sharing similar length (in letters, phonemes, morae)
Results: Shared Constituency

- Shared constituents allow higher ratings (especially for shared heads)
  "sen-ro 線路 'railroad'  me-ro 迷路 'maze'"
- This effect is similar for both Japanese and English groups.
- Even though English speakers do not know Japanese.
- In this case, the head-shared objects denote the same basic category.
- What is at issue here is pre-linguistic categorization.
  (language ‘following’ thought)
Results: Similarity in Meaning

- Intuition: Similarity in meaning might enhance perceived object similarity.
- We measure semantic similarity with LSA scores (vector space semantics).
  - e.g. *beetle* – *caterpillar* (0.67)  *railroad* – *maze* (0.03)
- LSA word similarity is a strong predictor for both Japanese and English groups.
- Therefore, this predictor is likely to reflect language-general conceptual similarity.
Results: Similarity in Frequency

- Intuition: Similarity in frequency affects perceived object similarity.
  
  e.g. Similarly high in frequency: John – Peter
  
  Similarly low in frequency: Bartholomew – Ebenezer

- We measure similarity in frequency using Shannon's entropy (Shannon, 1948).

- Similarity in frequency was predictive but only for Japanese speakers.
  (language 'feeding' thought)
Results: Similarity in Orthography

- Intuition: If the names of objects are written similarly, this might increase the similarity ratings.
- If objects’ name has internal space (e.g. *apple pie*), then ratings decrease for both left and right pictures.
Results: Similarity in Orthography

- This spacing effect was present for both Japanese and English speakers.
- Moving away from the basic category is detrimental for perceived similarity:
  (de Jong et al, 2002)
  => language ‘following’ thought
- The effect is stronger for English speakers.
  => language ‘feeding’ thought.

![Graph showing mean rating for Japanese and English with 'is right name spaced in English?' on the x-axis and mean rating on the y-axis. The graph indicates a decrease in mean rating for both languages as the x-value increases from FALSE to TRUE.]
Result Summary

Language ‘following’ thought: large effects

1) Effects of shared constituency
   reflecting cross-language categorization affordance.
2) Effects of similarity in meaning (language-general conceptual similarity.
3) Effects of spacing, reflecting basic versus non-basic category status.

Language ‘feeding’ thought: small effects

4) The greater effects of complex names with spacing in the language using complex names (English).
5) The uniformity of two-kanji compound names in Japanese affords similarity effects in terms of frequency.
Conclusion

Our result suggests that language has small effects on perceived object similarity.

( but it remains to be shown that this result generalizes beyond the specifics of the picture comparison paradigm ).
Thank You

Correspondence
Koji Miwa: kmiwa@ualberta.ca

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