Languages Vary in Which Aspects of Spatial Locational Information Must be Obligatorily Encoded

Eng: Ball above table
Kor/Jap: Ball table top-of [floating]

Eng: Ball on table
Kor/Jap: Ball table top-of [sticking]

Whorfian Question

- Does the difference in obligatory encoding of ‘contact’ in spatial prepositions in English vs. Japanese/Korean influence non-linguistic memory of spatial relations between objects?
What type of Whorfian Question is this?
Does the difference in obligatory encoding of ‘contact’ in spatial prepositions in English vs. Japanese/Korean influence non-linguistic memory for spatial relations between objects?

Language as a Lens. Do grammatical characteristics of a language shape speakers’ perception of the world?

Language as a Toolkit. Does language augment our capacity for representation and reasoning?

Language as a Category Maker. Does the language we acquire influence where we make our category distinctions?

Their Study
- 20 Native English speakers
- 20 Native Korean speakers
- Give one half of each group a naming (language) task
- Give other half of each group a memory (non-language) task
- Nobody gets both

Naming Task
Eng: The ball is _______ the table.
Kor: Ball table ________.

Eng: Ball above table
Kor/Jap: Ball table top-of [floating]

25 different positions tested

Naming Results: Proportion of responses that encoded ‘contact’

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<tr>
<th>Reference object</th>
<th>Korean Speakers</th>
<th>English Speakers</th>
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What do the naming test results tell us?

- The difference in obligatoriness of mentioning contact in the two languages does result in different linguistic behavior by speakers of the two languages.

Memory Task

View 500 msec → Visual mask 500 msec → View 500 msec → Same or Different?

Memory Results: Proportion correct

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<th>Korean Speakers</th>
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| Reference object |

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<th>English Speakers</th>
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| Reference object |

What do the memory test results tell us?

- Contact does aid spatial memory.

- But no Whorfian effect: The difference in obligatoriness of mentioning contact in the two languages does NOT result in different non-linguistic memory for contact relationships by speakers of the two languages.
Motion Events in Language and Cognition

(Gennari, Sloman, Malt & Fitch, 2002)

- Motion Event Components (Talmy)
  - Figure object (moving object)
  - Ground object (locational anchor for the figure object)
  - Motion (move/go)
  - Manner of motion (what type of movement)
  - Path: (what direction the figure moves along w.r.t. the ground object)

- Motion—manner—path may be encoded in various ways
  - Motion+path (exit, enter, climb)
  - Motion+manner (run, skip, slide)

Languages Vary in How Various Features of Motion Events are Encoded

| English: Boy ran [into the house] | Spanish, Hindi: Boy entered the house [running] |

Whorfian Question

- Does the difference in tendency to include manner vs. path in the expression of motion events in different languages influence non-linguistic memory for those features of motion events?

What type of Whorfian Question is this?

Does the difference in tendency to include manner vs. path in the expression of motion events in different languages influence non-linguistic memory for those features of motion events?

Language as a Lens. Do grammatical characteristics of a language shape speakers’ perception of the world?

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Their Study

- 47 Native Spanish speakers
- 46 Native English speakers
- All students at Brown University

Design, Phase 1

- Everybody watches a series of movie clips that depict motion events
  - 1/3 of each language group describes movies while watching (“naming first” group)
  - Another 1/3 not given any instructions about speech (“free encoding” group)
  - Another 1/3 made to repeat nonsense syllables while watching, which prevents linguistic encoding of the events (“shadow” group)

Design, Phase 2: Recognition Memory Task

- Everybody asked “Which one did you see before?”
  - Original
  - Changed path

Design, Phase 3: Similarity Judgment Task

- Everybody asked “Which one is more similar to the first one?”
  - Original
  - Changed manner
  - Changed path
Design, Phase 4:
Describing the Events

- The 2/3rds of both groups who did not yet provide a description are asked to describe each event.

  - Original

Description Results:

- Spanish and English speakers did encode the events differently:
  - English speakers tended to assign the same verb to actions sharing manner
  - Spanish speakers tended to assign the same verb to actions sharing path
  - English speakers mentioned manner more often than Spanish speakers
  - Spanish speakers mentioned path more often than English speakers

Original clip viewed:
- Carried X (in)
- Entered (carrying X)

Path change:
- Carried X (out)
- Exited (carrying X)

Manner change
- Dragged X (in)
- Entered (dragging X)

What do the description results tell us?

- The difference in tendency to mention manner or path in the two languages does result in different linguistic behavior by speakers of the two languages
Recognition (Memory) Results:

• No differences between Spanish and English speakers

Similarity Judgment Results:

• No differences between Spanish and English speakers in the “free encoding” and “shadowing” conditions

• But in the “describe first” condition, Spanish speakers did tend to choose events with a shared path as being more similar to the original event

Any Whorfian Effects?

• No.

• However, once people have encoded an event linguistically, that representation of the event may be drawn upon in subsequent non-linguistic tasks

What do the memory test results tell us?

• No Whorfian effect: The difference in tendency to mention manner vs. path in the two languages does NOT result in different non-linguistic memory or similarity judgments for manner and path by speakers of the two languages
Does Language Shape Thought?: Mandarin and English Speaker’s Conceptions of Time

(Boroditsky, 2001)

How do we learn about time? Non-linguistic experience

- Experience teaches us (all) that:
  - Each moment happens only once
  - We can never go back in time
  - Events are temporally bounded (have a beginning time and an ending time)
  - In sum: We, the observer, experience continuous unidirectional change that may be marked by the appearance and disappearance of objects and events

How do we learn about time? Linguistic Experience

- Languages often use spatial metaphors in talk about time
- The spatial metaphors chosen are those that, like time itself, are one-dimensional and directional
- Appropriate spatial terms: forward, up
- Inappropriate spatial terms: narrow/wide

- Spatial metaphors for time in English:
  - We can never go back in time
  - I’m looking forward to your visit
  - He was ahead of his time
  - I’ve fallen behind schedule

- Spatial metaphors for time in Mandarin:
  - Front/back used commonly
  - But also commonly used: up/down

  Time proceeds in both a forward direction and a downward direction (both horizontal and vertical metaphors)
Whorfian question

- Does the difference in the habitual use of vertical spatial metaphors in talk about time lead to differences in how speakers *think* about time?

What type of Whorfian Question is this?

- Does the difference in the habitual use of vertical spatial metaphors in talk about time lead to differences in how speakers *think* about time?

- **Language as a Lens.** Do grammatical characteristics of a language shape speakers’ perception of the world?

- **Language as a Toolkit.** Does language augment our capacity for representation and reasoning?

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Study 1. Does the difference in the habitual use of vertical and/or horizontal spatial metaphors in talk about time lead to differences in how speakers *think* about time?

- **Subjects**
  - 26 native English speakers
  - Students at Stanford
  - 20 native Mandarin speakers
  - Students at Stanford
  - Mandarin was their only language until at least age 6
  - Mean age at onset of English = 12.8 years

Logic of the design

- Language might affect thought by setting up a kind a mental model that can be used to solve problems (to “think”)
- First you prime English or Mandarin speakers to think about spatial relationships (either horizontal or vertical)
- Then you ask them to judge a temporal relationship
- Then look to see if horizontal and/or vertical primes make you faster (or slower) at judging the temporal relationship (and whether your language background matters)
Hypothesis regarding possible Whorfian influence on short term processing

- “If horizontal spatiotemporal metaphors are processed by activating horizontal spatial knowledge, then people should be faster to understand such a metaphor if they have just seen a horizontal spatial prime than if they have just seen a vertical spatial prime”

- We expect this effect for both English and Mandarin speakers because both languages use horizontal spatiotemporal metaphors

Author’s Conclusion

- Spatial knowledge can be used in the online processing of spatiotemporal metaphors (short-term Whorfian effect)

- Do we agree? Is this really evidence for a Whorfian effect?

- Problem: Whorfian effects predict that language will influence non-linguistic behavior. But their dependent measure was speed at answering a language question.
Hypotheses regarding possible long-term Whorfian influence on thinking about time

• "If the metaphors frequently used in one’s native language have a long-term effect on how one thinks about time, then even when people are not trying to understand a metaphor (e.g., when deciding whether “Marches comes earlier than April”) they may still use spatial knowledge to think about time.”

• "If one’s native language does have a long-term effect on how one thinks about time, then Mandarin speakers should be faster to answer purely temporal target questions (e.g. “March comes earlier than April”) after solving the vertical spatial primes than after the horizontal spatial primes.”

• “English speakers, on the other hand, should be faster after horizontal primes because horizontal metaphors are predominantly used in English.”

Author’s Conclusion

• Language-encouraged mappings between space and time come to be stored in the domain of time. That is, frequently invoked mappings become habits of thought.

• In other words, she concludes that this is evidence of a long-term effect of language on thought (a long-term Whorfian effect).

• Do we agree?

Study 2. How much, and in what ways does learning new languages influence one’s way of thinking?

• Subjects
  – 25 native Mandarin speakers
  – Students at Stanford
  – Varied in age of first exposure to English from age 3 to age 13
  – Varied in how long they had been speaking English (although the minimum required for participation was 10 years)
Hypothesis

- If learning new languages does change the way one thinks, then participants who learned English early on or had more English experience should show less of a “Mandarin” bias to think about time vertically.

Results: The bias to think about time vertically was greater for Mandarin speakers who started learning English later in life. (However, no effect of length of exposure)

Vertical Bias = RT to time question after H primes minus RT after V primes.
Some remaining questions

Is it really vertical spatial metaphors for time that are responsible for the vertical effects observed in the Mandarin speakers? (maybe it’s the fact that Chinese is written top to bottom, or something else)

And is lifelong (or decades long) experience with those metaphors necessary?

Study 3. Does teaching native English speakers to use vertical spatial terms for time make them look like Mandarin speakers?

- Subjects
  - 70 native English speakers
  - Students at Stanford

- Method
  - Told they would learn a new way to talk about time.
  - Given 5 example sentences that “use this new system”:
    - Monday is above Tuesday
    - Friday is below Thursday
  - Then tested exactly as in study 1

Results: RT when the time question used horizontal spatiotemporal terms
“June comes before August” (true or false?)

Results: RT when the time question used non-spatial terms
“June comes earlier than August” (true or false?)
Answers to “remaining questions”:

Is it really vertical spatial metaphors for time that are responsible for the vertical effects observed in the Mandarin speakers? (maybe it’s the fact that Chinese is written top to bottom, or something else)

YES, it really is vertical spatial metaphors, because English speakers trained to use them showed the same effect (and nothing else about the English speakers was similar to the Mandarin speakers—e.g. they weren’t trained to write/read top to bottom)

And is lifelong (or decades long) experience with those metaphors necessary?

NO, in fact you can observe effects after 5 minutes of training

Author’s Overall Conclusion

• “One’s native language appears to exert a strong influence over how one thinks about abstract domains like time. Mandarin speakers relied on a ‘Mandarin’ way of thinking about time even when they were thinking about English sentences.”

• “When sensory information is scarce or inconclusive (as with the direction of motion of time), languages may play the most important role in shaping how their speakers think.”

One differing viewpoint on Boroditsky’s results
(from Munnich & Landau, 2003)

“Has Boroditsky shown an effect of language on nonlinguistic representations? We do not think that her results can be interpreted this strongly. Her task requires people to engage in linguistic processing in order to respond. Therefore, it could not show an effect on nonlinguistic representations.

“But what the results do show is that different kinds of mental models can be linked to different sets of lexical items (which are language dependent). Further, when these mental models are engaged for the purposes of problem solving (in this case, linguistic problem solving), they will inevitably reflect the effects of language itself.”

One differing viewpoint on Boroditsky’s results
(from Munnich & Landau, 2003)

“Boroditsky also found that the response to priming shown by Mandarin speakers could be induced in native English speakers, by brief and simple training. This kind of flexibility suggests that any changes in ‘thought’ are relatively superficial and that they constitute habitual tendencies rather than permanent changes.”