Word count: 1484 words

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Note: Please refer to Video References on Page 6 for URLs to the corresponding YouTube sites.

Gesture Project

We set out to examine how abstract concepts are realised through gestures across languages. In this process, we looked at the differences between our own gestures (gesticulations) in our first and second languages to observe for correlations to known relativistic phenomena. In addition to superficial differences in type between the gestures observed, we also tried to observe for influence from our first language on the second. Our data collection involved video recordings of ourselves explaining concepts. In each recording, our prompt was simply to explain an abstract technical concept that we understood, in different languages.

Yuwei grew up in Langfang, northern China speaking Mandarin both at home and school, so she considers Mandarin her first language. She acquired English later in school and her immersion in an English environment only occurred when she came to Singapore at age 16. Similarly, Zechu acquired Mandarin and Cantonese from his hometown in Nanning, southern China. He grew up speaking Mandarin mixed with Cantonese slang with family and friends, and was educated in Mandarin in school. He started learning English at age 7, and started speaking English daily when he came to Singapore at 14. On the other hand, Ryan, who grew up in Singapore, considers English his first language and Mandarin his second but acquired both at

home. Thus, the histories of our linguistic acquisition differ, enabling us to examine various sides of bilingualism.

Possible differences in object concepts between English and Chinese were manifested in our gesturing. Ryan used his right and left hands with cupped fingers sequentially to introduce two concepts of equal weights in an English explanation (R1E 00:07 – 00:09). However, in Mandarin, he tossed only his right hand forward twice, without cupping his fingers, when making the same distinction (R1M 00:17 – 00:20). This phenomenon could be attributed to his conceptualisation of ideas as concrete objects in English whereas in Chinese, the ideas are just abstract and formless discourse to be put forward for discussion.

Moreover, when describing number counting, in Mandarin, Ryan simply laid his hands flat to represent the result of the calculated number (R1M 04:43 – 04:47), while in English, he explicitly said "how much added in my hands" while cupping his fingers (R1E 04:13 – 04:16), as if numbers were individual objects. Similarly, Zechu's video data demonstrated differences in his conceptual gestures. Overall, it appeared he also perceived abstract concepts in English as concrete objects. In English, names of concepts were typically synchronous with forming one hand into a claw and lowering it into the palm of the other (ZE 00:18 and 00:33), creating a "container" structure; while in Mandarin, names of concepts were typically synchronous with lowering two palms with open hands to the side of the body (ZM 00:20). Concepts in Zechu's Cantonese example displayed greater variations in gestures used when named, but were typically accompanied by both hands clasped together (ZC 00:25). Perhaps to Zechu, in English, concepts can be visualised as concrete objects, whereas in Chinese they are abstract, formless ideas that can only be visualised relative to each other. This might provide some support for a weak Whorfian hypothesis that Chinese, a classifier language, views concepts as unindividuated shapeless aggregates, whereas

in English, “concepts” or “ideas”, both count nouns, are more likely to be categorised as discrete and concrete objects (Kuo & Sera, 2009).

When attempting to visualise the difference between the two concepts, Ryan used a concrete example of a theatre. Throughout the entire Mandarin narration on recursion[1], Ryan used exclusively his right hand to gesture with the left hand in rest position (R1M 03:02 – 04:01), while in English both hands were employed (R1E 02:32 – 04:17). Similarly, in R2E/M, Ryan used both hands in both languages but in Mandarin the right hand was used to mime actions (R2M 02:26 – 02:34). A related point is that Ryan generally preferred a left-to-right sequence when describing processes (R2E 01:03 – 01:30), in line with the way Zechu and Yuwei described causal relationships, yet he chose a right-to-left direction for enumerating concepts in both languages. In another case, Ryan was explaining the concept of iteration[2] by referring to a “condition[3]”. In Mandarin, he held his right hand up statically (R1M 02:41 – 02:45), while in English, he traced his right hand leftward as if reading a line from right to left (R1E 01:46 – 01:52). It is difficult to account for these phenomena; perhaps the unexpected direction is down to Ryan’s left-handedness, yet the right hand is preferred in Chinese gesturing due to its connections with the computer mouse or driving in right-hand drive Singapore. All this evidence may suggest that handedness is a component deeply ingrained in our cognition and a confounder. Hence, gestures under such habitual influences are observed even when Ryan uses different languages.

Ryan demonstrated a vertical concept of time in English, where he described the typical working hours of a bus driver. “From 7am to 8pm” was described with a gesture from above to below (R2E 00:33 – 00:35). While vertical concepts of time are generally associated with Chinese speakers (Boroditsky, 2001), interestingly his Mandarin explanation featured *no* spatiality when

[1] Recursion is a functional programming concept in computer science.
[2] Iteration is a functional programming concept in computer science.
[3] A condition is often a line of code in a programme.

discussing time. There was marginally more use of gestures to simulate a visual concept when Ryan used English. On the contrary, Mandarin appeared to use rather monotonous gestures of emphasis involving rotating and pausing the arm with a palm-up open hand. Perhaps, this was because the Chinese words used themselves carried more specific visual associations, so the gesture to indicate spatio-temporal relation was not as necessary. For example, when Ryan spoke of "layers" (R1E 01:56 – 02:00), he made a palm-down horizontal movement of his hand to represent vertically-stacked layers, while in Mandarin, the gesture corresponding to "*céngcì*" was a typical gesture of concept or emphasis, involving an arm rotation (R1M 02:33 – 02:37), with no significant difference from other sentences where non-visual concepts were explained. The word "*céng*" typically also describes vertically-stacked levels or floors of a building.

Interestingly, our gesturing may have betrayed our subconscious impressions of our imagined interlocutors. When Ryan referred to a group of Chinese bus drivers living in Singapore, he gestured to his left in English to represent "here" (R2E 01:10 – 01:15), while in Mandarin he did not make such a proximal gesture (R2M 01:10 – 01:13) — according to Ryan, presumably Mandarin explanation was associated less with a local Singaporean audience and more with a global audience including Malaysians and Chinese nationals. Differences in gesture such as these may highlight how speaking different languages can make a bicultural subconsciously tailors his explanations to different crowds.

The concept of linear horizontal time featured very prominently in Zechu's Chinese explanations, as he made many sweeping gestures of long durations from his left to right to indicate temporality in the Mandarin (ZM 02:44 – 02:54) and Cantonese (ZC 01:17 – 01:19) versions. In English, most gesturing did not indicate timeframes, but moments in time were directional, such as momentary tossing of the arm to the left for "start of the universe" (ZE 02:26 – 02:29), "two years ago" (ZE 05:30) and to the right as he says "future" (ZE 01:20). This apparent difference in

durations may be attributed to different aspectual views. Zechu used "*zài*" to indicate time, which is imperfective-progressive in Chinese (Duncan, 2002), hence the relatively longer gesture durations.

The concept of "*méiyǒu*" featured in all our Chinese explanations. This phrase means "to lack" but is widely used across contexts for negation. As such, we observed that each person used a particular gesture for "*méiyǒu*", which did *not* manifest in the English explanations. Zechu's gesture for "*méiyǒu*" involved a palm-down rightward slicing of the right hand (ZM 04:23 – 04:26), Yuwei explicitly shook her hands, (Y2M 00:07 – 00:10), and Ryan moved both hands in a circular motion and slightly pressed down (R2M 02:49 – 02:53).

We also noticed that when Yuwei said "broke this crime's vicious cycle" in Mandarin (Y2M 02:13 – 02:18), the circular motion of Yuwei's arm was not synchronous with "cycle" but had begun earlier at "broke". If we see gestures and linguistic expressions as a whole generated simultaneously, the observation in Yuwei could be because the particular expression was generated in Mandarin, which is topic-prominent and often has gestures asynchronous with phrases. A similar example came from Zechu when he used an analogy about "chains" in Mandarin; he first segmented the space in front of him with his hands into a chain-like structure before the word "chain" was uttered (ZM 01:19 – 01:27). Ryan did not demonstrate such asynchronicity.

When Yuwei listed different points in Mandarin, she curled her fingers sequentially after each point (Y1M 00:28 – 00:36). In English, she vertically "sliced" her palm down from left to right as various points were made (Y1E 00:19 – 00:23). Burns (2012) suggests that that brain regions associated with fingers are activated when we perform numerical tasks. As Yuwei constructed her mathematical foundation in Mandarin during her childhood, she may be more likely to engage in finger-counting in Chinese when performing mental arithmetics.

Overall, we observed differences in gestures across languages for each of us. The differences observed were not consistently radical; this was expected due to our bilingual nature, as well as our tendency for complicated thoughts to originate in the language we learnt the concept in. However, there were some key differences. The most striking difference between our gestures across different languages was our object concepts; the gestures used in Mandarin revealed a more abstract understanding of concepts, while in English we all perceived concepts and entities are significantly more concrete than in Chinese.

Works Cited

Boroditsky, L. (2001). Does Language Shape Thought?: Mandarin and English Speakers Conceptions of Time. *Cognitive Psychology*, 43(1), 1–22. doi: 10.1006/cogp.2001.0748

Burns, C. (2012, June 26). What does the way you count on your fingers say about your brain? | Corrinne Burns. Retrieved November 15, 2019, from https://www.theguardian.com/science/blog/2012/jun/26/count-fingers-brain.

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Kuo, J. Y.-C., & Sera, M. D. (2009). Classifier effects on human categorization: the role of shape classifiers in Mandarin Chinese. *Journal of East Asian Linguistics*, 18(1), 1–19. doi: 10.1007/s10831-008-9036-6

Video References

Video naming rules:

R – Ryan, Y – Yuwei, Z – Zechu; E – English, M – Mandarin, C – Cantonese

- R1E: Ryan explaining Recursion and Iteration in English

  https://youtu.be/JtADrJ2HWJw

- R1M: Ryan explaining Recursion and Iteration in Mandarin

https://youtu.be/CYQtIRcv7Wk

- R2E: Ryan explaining NUS bus drivers in English

  https://youtu.be/ml6S4SeDrwM

- R2M: Ryan explaining NUS bus drivers in Mandarin

  https://youtu.be/g2j1fCzxbjM

- ZE: Zechu explaining Determinism and Free Will in English

  https://youtu.be/wK3fZC9W260

- ZM: Zechu explaining Determinism and Free Will in Mandarin

  https://youtu.be/mR7aJnRc7sk

- ZC: Zechu explaining Determinism and Free Will in Cantonese

  https://youtu.be/OaWluYJY-Aw

- Y1E: Yuwei explaining the Robbers Cave Experiment in English

  https://youtu.be/IFNMJGd-KV0

- Y1M: Yuwei explaining the Robbers Cave Experiment in Mandarin

  https://youtu.be/9SWvIDjMg8c

- Y2E: Yuwei explaining the Broken Window Effect in English

  https://youtu.be/Gh-K8Khss5c

- Y2M: Yuwei explaining the Broken Window Effect in Mandarin

  https://youtu.be/eJkYWGh3Frw

- Y3E: Yuwei explaining the Smoke Room Experiment in English

  https://youtu.be/MOB706LM1HI

- Y3M: Yuwei explaining the Smoke Room Experiment in Mandarin

  https://youtu.be/DDtgFYdwjWw