

# Code-switching “without switching” and its cognitive demand

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## BACKGROUND

Bilingualism is suggested to be a protective factor against cognitive decline in ageing, especially in inhibitory control ability. It has been suggested that bilinguals have to suppress the unwanted language all the time, and such practice of linguistic inhibition leads to the improvement in general cognitive control abilities.

In line with this assumption, **code-switching involves the switch and suppression of languages**, which is found to be cognitively costly. Frequent code-switching should therefore improve inhibition control. However, code-switching might also mean the bilingual is responding in any languages that come to mind first and no inhibition is needed.

To understand the cognitive demand of code-switching, we must first investigate the **nature of code-switching**.

仲有嘢要 discuss，等我下晝 present 完再搵你

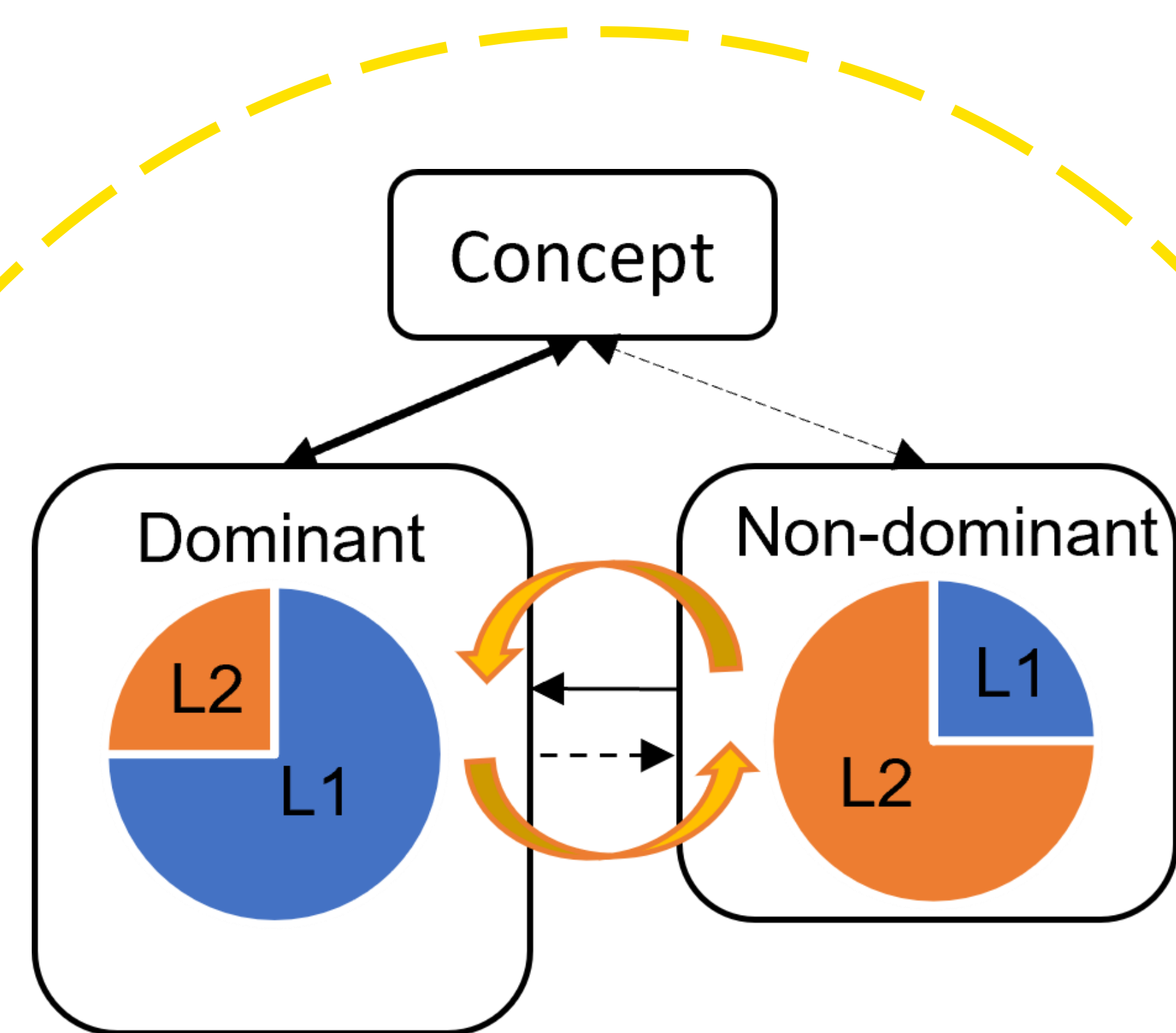
Why is THIS ok, but THIS is not?

仲有 things 要討論，等我 afternoon 匯報完再 find 你

## HABITUAL CODE-SWITCHING

An eye-tracking study (Hui et al., 2022) conducted with young adults in Hong Kong found that **habitual code-switching** (i.e., code-switching that follows the community's norm) was processed similarly to their first language (L1), whereas the non-habitual use of L1 was processed with greater effort. The result was in line with previous studies that emphasized the naturalness of code-switching in experimental studies (e.g., Chan, Chau, & Hoosain, 1983; Zhu et al., 2022).

This may be because the habitual code-switching from daily exposure resulted in the **integration of the code-switched words into the dominant lexicon** (see the Experience-based Bilingual Lexicon Model for more; Hui, 2023), eliminating the need for a switch in lexicons during both production and comprehension.



Experience-based Bilingual Lexicon Model (Hui, 2023)



## What's next?

If the cognitive benefit is from the daily practice of inhibition control, and if the frequent code-switching in Hong Kong does not involve actual switching in lexicon, then no cognitive benefit should be associated with the frequency of code-switching.

紅 RED

Stroop Colour-word condition  
Read the font colour (blue) instead of the word (red)

## DISCUSSION

### CODE-SWITCHING WITHOUT REALLY SWITCHING

The daily exposure of using the L2 words for certain items made them **integrated into the dominant lexicon, regardless of its language origin**. Therefore, the use of habitual code-switching items did not involve any switching in the mental lexicons in either production or comprehension.

### INHIBITION IS NOT PREDICTED BY FREQUENCY OF CODE-SWITCHING

In the linear regression analysis, the frequency of CS is not a significant predictor of the inhibitory control ability. As **no switching into the non-dominant lexicon was needed** when retrieving the “L2” items of the habitual code-switching, no practice of inhibition is induced from the daily code-switching.

### SIGNIFICANCE & LIMITATION

These findings highlight the importance of considering **language experience** and the **interaction** between languages when studying bilingualism and avoid treating the two languages as separate entities. However, it should be noted that the frequency of code-switching was based on self-report and might not be the most ideal way to measure this language experience.

## PARTICIPANTS

63 cognitively normal older adults ( $M = 67.42$ ,  $SD = 4.31$ ) in Hong Kong

## PARADIGM

Stroop task, Language History Questionnaire (including the frequency of code-switching), Shipley Vocabulary Test

## Linear Regression Analysis

Variables known to be likely affecting Stroop were included in the analysis.

Only the **Shipley score** (a proxy of L2 proficiency) was found to be the significant predictor of Stroop CW.

Dependent variable = Stroop CW

Method = Enter

$F(4, 58) = 6.91$ ,  $p < .001$ , Adjusted  $R^2 = .28$

	Coefficients <i>B</i>	<i>t</i>	<i>p</i>	
(Constant)	47.85	2.91	.005	**
Shipley	0.29	2.19	.033	*
Education	-0.11	-0.42	.673	n.s.
Age	-0.39	-1.68	.099	n.s.
Frequency of CS	1.43	2.19	.103	n.s.

## REFERENCES

- Chan, M.-C., Chau, H. L., & Hoosain, R. (1983). Input/output switch in bilingual code switching. *Journal of Psycholinguistic Research*, 12(4), 407-416.
- Zhu, J. D., Blanco-Elorrieta, E., Sun, Y., Szakay, A., & Sowman, P. F. (2022). Natural vs forced language switching: Free selection and consistent language use eliminate significant performance costs and cognitive demands in the brain. *Neuroimage*, 247, 118797
- Hui, N.-Y. (2023). *Experience and Bilingual Advantage: An Exploration of Individual Variation* The Hong Kong Polytechnic University.
- Hui, N.-Y., Fong, M. C.-M., & Wang, W. S.-Y. (2022). Bilingual prefabs: No switching cost was found for Hong Kong Cantonese-English code-switching. *Languages*, 7(3), 198.

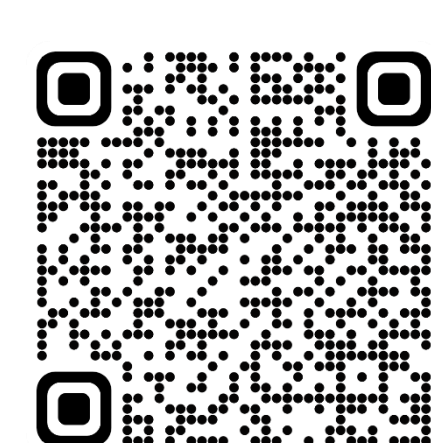
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