Sociolinguistic Diversity Can Boost Cognitive Functions

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INTRODUCTION

- Luk & Bialystok (2013): Bilingualism is a multidimensional construct that involves many factors and thus cannot be treated as a categorical variable.
- Major problem in the field: variation in multilingual population is often oversimplified or simply ignored.
- Linguistic diversity is unavoidable when multiple languages exist and interact.
- Bice & Kroll (2019): monolinguals in a diverse linguistic context showed distinct brain activations from monolinguals in a unilingual context.
- Tsimpli et al. (2020): sociolinguistic diversity can enhance cognitive performance for disadvantaged school children.

METHODS & MATERIALS

- PARTICIPANTS
  - 127 healthy adults from Malaysia
  - 86% self-rated as multilingual, 13% bilingual, 1% monolingual
  - 23 languages and dialects reported
  - 51% reported English as their most proficient language, 39% Mandarin Chinese

- PROCEDURE
  - Online experiment via Gorilla:
    - Contextual Linguistic Profile Questionnaire (CLP-Q, Wigdorowitz et al., 2020) includes CILD (contextual and individual linguistic diversity) measure for sociolinguistic diversity.
    - Flanker task (inhibitory control)
    - Set-shifting task (colour-shape task switch)
    - 2-back task (updating skills and working memory)

- DATA ANALYSIS
  - Multiple linear regression models
    - IV: CILD score, SES, age
    - DV: Flanker – interference effect (accuracy and reaction times)
      - Set-shifting – mixing cost and shifting cost (accuracy and reaction times)
      - N-back – A-prime score (accuracy/hit rate and false alarm rate)

RESULTS

- SOCIOLINGUISTIC DIVERSITY CONTEXT
  - Mean CILD score = 4.14 (SD = 0.40)
  - Relatively high sociolinguistic diversity context in Malaysia (compared to 3.86 for South Africa and 2.59 for the UK; Wigdorowitz et al., 2020)
  - The population varied in CILD scores, although almost all of them were bi/multilingual.
  - Multilingual experience is not homogeneous.

- FLANKER TASK
  - Marginally significant effect of CILD (β = 0.17, p = 0.069) for overall task accuracy.
  - Significant negative correlation (β = -15.15, p < 0.05) between CILD and interference effect.

- SET-SHIFTING TASK
  - No significant effects for switching costs, only significant effects for mixing costs.
  - Main effect of CILD (β = -0.16, p < 0.05), SES (β = -0.09, p < 0.05), and significant interaction between CILD and SES (β = 0.18, p < 0.05).
  - Low SES group: significant negative correlation between CILD and mixing cost (β = -0.43, p < 0.05).
  - High SES group: significant positive correlation between CILD and mixing cost (β = 0.75, p < 0.01).

- N-BACK TASK
  - Main effect of CILD (β = 0.25, p < 0.01) for A-prime score.

CONCLUSIONS

- Sociolinguistic diversity improved cognitive performance in the Flanker and 2-back tasks, reflecting exceptional interference suppression and updating skills.
- Low SES participants who are typically disadvantaged in cognitive control also benefited from a more diverse linguistic context displayed by reduced mixing cost and better accuracy in the set-shifting task.
- According to Miyake & Friedman (2012)’s model: linguistic diversity advantage for inhibitory control and common EF, and updating-specific ability.
- Being exposed to diverse languages across social contexts requires the need to inhibit non-target language information and maintain different linguistic representations in memory.

REFERENCES:


RESEARCH QUESTIONS

1) Is there a variation in sociolinguistic diversity context within a multilingual population?
2) Is sociolinguistic diversity associated with executive functions?