

A Literature Review: The Comparison Between Bilingualism and Trilingualism in Inhibitory Control

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Inhibitory control is a core component of individuals' executive function. The relationship between language acquisition and inhibitory control has been a focus of interest in researches. Still, whether the trilingual have stronger inhibitory control over the bilingual just as bilingualists outperform monolinguals in inhibitory control is a controversial issue in cognitive linguistics and psychology. After searching for the existed researches both in Chinese and English concerning this topic, the authors summarize the consensus reached nowadays. This paper also points out three reasons explaining the existed divergences, namely task differences, a subject-enrolling paradox, and definition inconsistencies.

Keywords: inhibitory control, trilingualism, bilingualism, monolingualism, executive function

Introduction

Even before trilingualism became well-known against the backdrop of accelerating globalization, the inhibitory control for bilingualism had been an intriguing research topic for both linguistics and psychologists. Inhibitory control, as a core component of individuals' executive function, refers to the ability to focus on relevant information while suppressing the temptation to divert the attention to other irrelevant one (Schroeder & Marian, 2017). Piles of researches have proved that both bilinguals and trilinguals reported stronger inhibitory control over monolinguals since they have to deal with the interference brought by different languages. However, whether trilinguals have even stronger inhibitory control compared with bilinguals is still controversial (Poarch & Bialystok, 2015; Madrazo & Bernardo, 2018; Li & Zeng, 2021).

By searching through key words "the third language", "L3", "inhibitory control", "trilingualism", etc., in CNKI and Google Scholar, 11 relevant papers (five in Chinese and six in English) were obtained, among which three are master's graduation theses and three are literature reviews.

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This literature review aims at (1) summarizing the consensuses and controversies of existed researches regarding the comparison between bilingualism and trilingualism in terms of inhibition control and (2) explaining the reasons for different conclusions to pave way for further studies in this domain.

Consensuses and Controversies

Merely judging from various conclusions reached by these papers, consensuses are very limited. Since different researchers' ways of evaluating the subjects' inhibitory control differ, the existed findings concern more of the performance in various tasks than the inhibitory control itself between bilingualists and trilingualists. Thus, the consensuses of the existed researches are reached when classifying the papers in terms of tasks applied. Tests commonly used to investigate one's inhibitory control include Stroop task, Simon task, Go/No-go task, etc. (Gu, 2013).

Simon task requires the subjects to react according to Stimulus A or Stimulus B, which randomly appear on the right or left side of the screen. A means the subjects should press the left button, and B right. The subjects' inhibitory control is calculated through reaction time and error rate (Li, 2015). Quite a few papers implied Simon task since it is easy to conduct for researchers and easy to understand for subjects. For researches using Simon task performances to represent the subjects' inhibitory control, some chose children, others teenagers, and adults. Regardless of the differences in subjects' ages, a consensus was reached that trilinguists did not report obvious advantages in Simon task compared with bilingualists (Ma, Wang, & Gao, 2021; Antoniou, Grohmann, Kambanaros, & Katsos, 2016; Poarch & Van, 2012; Madrazo & Bernardo, 2012).

Other researches implying Simon tasks implemented Bunge's theory and classified one's inhibitory control into response inhibition and interference suppression (Bunge et al., 2002). Response inhibition refers to "the suppression of actions that are no longer required or that are inappropriate, which supports flexible and goal-directed behavior in ever-changing environments" (Frederick & Gordon, 2008, p. 418). Interference suppression refers to the active prevention of interference rises from stimulus competition (Brydges et al., 2012). It turned out that compared with bilingualists, trilinguists who have medium-or higher-level command of their third languages have stronger capability in interference suppression. However, an additional L3 failed to add to the subjects' stronger response inhibition (Wang, 2020; Madrazo & Bernardo, 2018). Such detailed researches compensated the relatively general conclusion from those researches that did not further classify inhibitory control.

Go/No-go task requires the subjects to press the button as rapidly as possible when facing stimulations of large probability (Go) or not to press the button when facing stimulations of small probability (No-go) on the screen. Again, subjects' inhibitory control is calculated with the help of reaction time and error rate (Li, 2015). Researches using nonlinguistic Go/No-go task showed that apparent differences in performance between bilingualists and trilinguists were not observed (Madrazo & Bernardo, 2012), while those using linguistic Go/No-go task indicated that inhibitory control in speech recognition was stronger in trilinguists compared with that in bilingualists, even though the advantage only manifested itself in processing speed (Li, 2015).

Stroop task requires the subject to ignore the meaning of words and only report the words' colors. Reaction time and error rate are calculated to indicate the subjects' inhibitory control (Li, 2015). Researches under this category showed that trilinguists perform better than bilingualists and the advantage is especially apparent when it comes to inconsistency text (Fang, 2020).

Explanations for Controversaries

From the previous chapter, it is self-evident that the first reason for controversies is different tasks various papers implied to indicate inhibitory control. Even though several researches use more than one task, the results of various tasks are discussed separately. In other words, there lacks a quantitative indicator to blend results from different tasks together to represent the subjects' overall inhibitory control. To achieve this, deeper mechanism of various tasks can be tapped into, which may help putting the results from different tasks together.

The second reason is that there exists a paradox when enrolling subjects. Admittedly, more subjects always mean greater credibility, but they also mean greater individual differences, which could hamper the discovery of clear rules. However, when setting strict limitations apart from subjects' income level, age, language proficiency, etc., the subject scale could shrink drastically, leading to smaller credibility, or less-widely-adoptable conclusions. The overall trend of researches in this domain is putting more detailed individual differences into considerations, which also increases the difficulty to employ subjects large enough in number to prove convincing hypotheses. Fortunately, cultural diversity helps a lot. Several Chinese researchers employed trilinguists by taking full advantage of China's ethnic diversity, including Wa-Chinese-English trilinguists and Dai-Chinese-English trilinguists (Fang, 2020) as well as Bai-Chinese-English trilinguists (Li, 2015). Similarly, subjects with Cypriot Greek (CG) as L1, Standard Modern Greek (SMG) as L2, and English or another language as L3 were employed in Antoniou et al.'s research because CG and SMG "differ from each other on all levels of language analysis (vocabulary, pronunciation, grammar)" (Antoniou, Grohmann, Kambanaros, & Katsos, 2016, p. 18). However, for subjects in even larger scales, cross-regional cooperation between countries may be necessary. For example, countries in the Greater China where Chinese is widely spoken can cooperate with each other to employ bunches of subjects identical in personal conditions, especially in their language acquisition, which leads to the third explanation.

The third reason is that the subjects vary from each other in terms of their bilingual or trilingual circumstances. The L1, L2, and L3 of the subjects were not identical even in the same task of the same paper. In other researches, where the subjects share the same three languages, their language proficiency varies. To be more specific, subjects in some researches are balanced bilinguals before becoming trilinguals while in others, non-balanced bilinguals. Balanced bilinguals have an equal proficiency in L1 and L2, while non-balanced ones, unequal (Gong, Fang, & Chen, 2002). Apart from L1 and L2, L3 proficiency also differs. Some researches chose those third-language learners, while others balanced trilinguals. Understandably, employing trilingual subjects is by no means an easy task, but the divergences in the definition of bilinguals and trilinguals add to the difficulties in researchers' engaging with each other.

Conclusions

To conclude, most present consensuses are reached when classifying the papers through task types, including Simon task, Go/No-go task, and Stroop task, etc. And the controversies not only result from different tasks assessing individual's inhibitory control, but also the difficulty in balancing between subject scale and subject consistency. The third explanation lies in the divergences in defining bilinguals and trilinguals in terms of their proficiency in L1, L2, and L3.

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