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Language and Cognitive Control in low and high proficient Bilinguals

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Abstract

Context: Language-exposed individuals, or "bilinguals," are able to understand and use two or more languages. On the basis of their skill in the second language, bilinguals can be categorised as either low proficient or high proficient. It is controversial whether high-proficient bilinguals have superior cognitive control versus low-proficient bilinguals, or whether the benefit is limited to language management alone.

Aim: The current study was carried out with the aim of testing the language and cognitive control

Settings and Design: Convenient sampling was followed for the recruitment of participants. Comparative group design was used to compare the performance of low and high proficient bilinguals

Methods and Material: Participants were separated into two distinct groups. There were 22 native speakers in the first group, and 18 non-native speakers in the second. Participants' self-ratings on the LEAP Q were used to categorise them as either high or low competent bilinguals. Two tests were given to the participants, one testing cognitive ability and the other testing language sophistication. The first exercise had people identify the shapes of common objects without knowing their language names. In contrast, a conditioned naming task was given as the second exercise.

Statistical analysis used: Mann Whitney U test was used to compare the performance of the two groups

Results: Statistically significant difference between the two groups was found on task 2 (task that tapped linguistic control) only.

Conclusions: Theoretically, it is assumed that bilinguals with high proficiency will have more command of both languages than those with lower proficiency. However, the current research stressed that the advantage was limited to the domain of linguistic control and not to cognitive control in general.

Key Messages: The current study made an effort to distinguish between linguistic and cognitive control by developing tasks (that placed greater cognitive or linguistic loads on participants) and the results highlighted the fact that linguistic control differed between low and high proficient bilinguals while cognitive control did not.

Keywords: *Executive control, response inhibition, cognitive flexibility, trend in performance*

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Introduction

Bilinguals are those who have had sufficient exposure to two languages to allow them to function fluently in both of them. The subjective nature of the term makes it difficult to develop concrete operational definitions of bilingualism (Ellen Bialystok, 1999). How well a person speaks a second language is used to characterize their linguistic profile as a bilingual. It has been suggested that bilinguals benefit in a number of ways, including enhanced linguistic and cognitive abilities.

Bilinguals have superior linguistic competence because of their ability to switch between languages. A correlation between fluency and the frequency with which a person switches languages is assumed (Blanco-Elorrieta, E., & Pylkkänen, L.2017). Expert monolinguals are in high demand because of their flexibility in switching between languages to meet a variety of communicative needs. Language switching may have an effect on one's ability to maintain a level of general cognitive control. Given that switching languages is an intentional and voluntary process, a generalised cognitive control is essential. An additional factor requiring cognitive regulation in such situations is the simultaneous activation of all of the person's knowledge languages, which compete for activation. This highlights the importance of cognitive regulation, especially for highly proficient bilinguals. Capabilities in cognitive control range from switching to monitoring.

The processes of cognitive control can also be broken down into linguistic and non-linguistic subsets. Cognitive control is classified according to the processes that underlie it. The adaptive control hypothesis provides a theoretical framework for explaining the regulation of language and cognition (Campbell, J. I., & Therriault, N. H. 2013). Since the development of each language is treated independently, it is assumed that this population will have tighter control over their linguistic heritage. It is also expected that this group will have better command of the English language, as constant monitoring and switching need high levels of cognitive control (Campbell, J. I., & Therriault, N. H. 2013). The current research aimed to assess the relationship between linguistic and cognitive control and proficiency. High-proficient bilinguals were predicted to have superior linguistic and cognitive control compared to low-proficient monolinguals.

Need for the study

People today are exposed to at least two languages, making it impossible for them to remain monolingual. Bilinguals can be classified into high- and low-proficient categories based on their levels of second-language competence. As a result, low-skilled bilinguals have a very limited command of their second language. Recent studies in this field have shown that those who speak two languages fluently have an advantage over monolinguals in terms of executive function (Hilchey, M. D., & Klein, R. M. 2011). However, there is a body of research that challenges the idea that higher linguistic burden activities are where low and high proficient bilinguals are separated. That is to say, there is no hard evidence that extremely proficient linguists who speak more than one language have superior overall cognitive capacities. High-proficient bilinguals have higher verbal control, according to some studies, but this finding has been disputed by others (Issa et al., 2021). Therefore, it is uncertain if low and high proficient bilinguals differ in their linguistic and cognitive control abilities. The current study assessed linguistic control and cognitive control in high and low proficient bilinguals with the underlying idea that these two processes should be investigated in relation to proficiency.

Aim: To test language and cognitive control in low and high proficient bilinguals

Methodology

Participants: The study's subjects were chosen through purposive sampling. A total of 40 volunteers, aged 18 to 30, were chosen, with 28 females and 12 males. The Language

Experience and Proficiency Questionnaire (LEAP Q) was filled out by these persons (Ramya & Goswami, 2009; Marian, Blumenfeld & Kaushanskaya, 2007). Using the questionnaire, the individuals were separated into groups based on their second-language proficiency. Question 10 of the LEAP Q asks takers to rate themselves on a scale of 1 to 4 in the areas of speaking, understanding, reading, and writing.

Individuals who scored 3 or 4 on a 4-point scale for their speaking skill and who were also skilled in other areas (understanding, reading and writing) were considered to be highly proficient bilinguals. Participants were also put into groups based on how well they thought they spoke the language. There were 22 high-proficient participants and 18 low-proficient participants. Everyone who took part in the study was given two more things to do. Task 1 was mostly about cognitive control, while Task 2 was mostly about verbal control. Task 1 was to draw 50 triangles, squares, rectangles, and circles, which are all common shapes.

Figure 1: Example of circular stimuli used in task 1

Figure 2: Example of triangle shaped stimuli used in task 1

Participants were shown the pictures at random and asked to determine the shape without consulting the accompanying "linguistic descriptor." The highest possible rating for this activity was 50. One thousand milliseconds separated each stimulus, and there was a 500 millisecond pause in between. DMDX version 4.0 was used to mediate the presentation of the stimulus.

The second task required participants to match a red or blue dot to a picture. When a red dot appeared on an image, participants were asked to give it a name in their L1 (Kannada), and when a blue dot appeared, they were asked to give it a name in their L2 (English). In cases when the proper linguistic phrase was provided in the 'right language,' the answers were deemed correct. The highest possible rating for this activity was 50. For this activity, as with the prior one, DMDX managed the stimulus and its presentation.

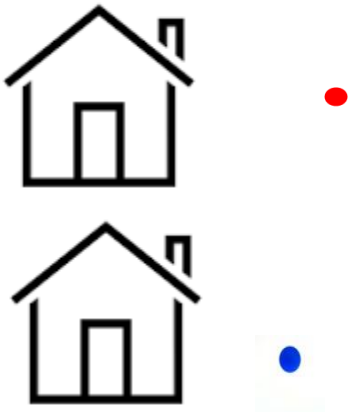

Figure 2: Dots associated with line drawings used in conditioned naming task

Scoring: The reaction time and accuracy of scores was determined for group 1 and group 2 participants.

Result and Discussion

For participants in groups 1 and 2, scores on tasks 1 and 2 were calculated and examined. On Task 1, participants in Group 1 earned a score of 43, while those in Group 2 earned a score of 39. Participants in groups 1 and 2 had scores of 38 and 27, respectively, on task 2 (Figure 3). On task 1, the reaction times for participants in groups 1 and 2 were 1988.34 ms and 2034 ms, respectively. While the reaction times for the two participant groups were 1853.44 ms and 2355.43 ms, respectively (Figure 4).

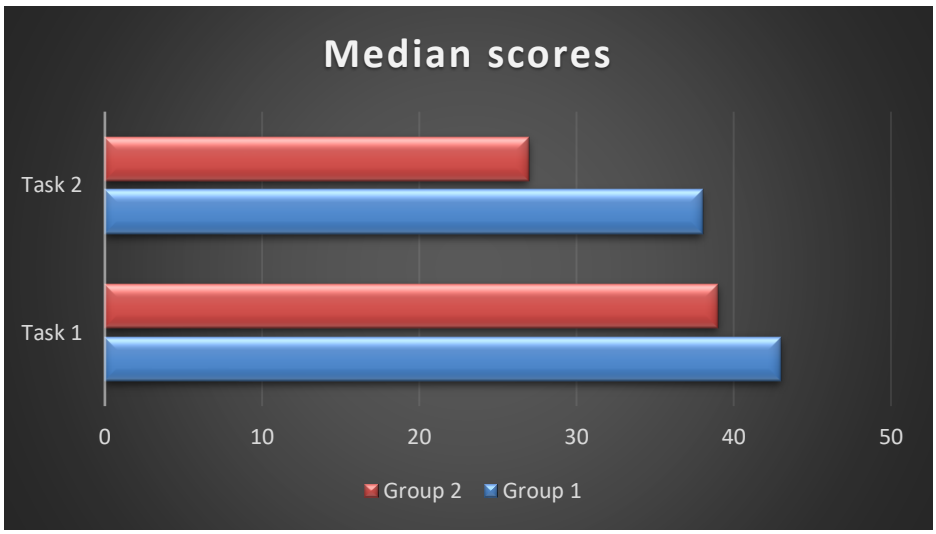

Figure 3: Comparing median scores of group 1 and group 2 on task 1

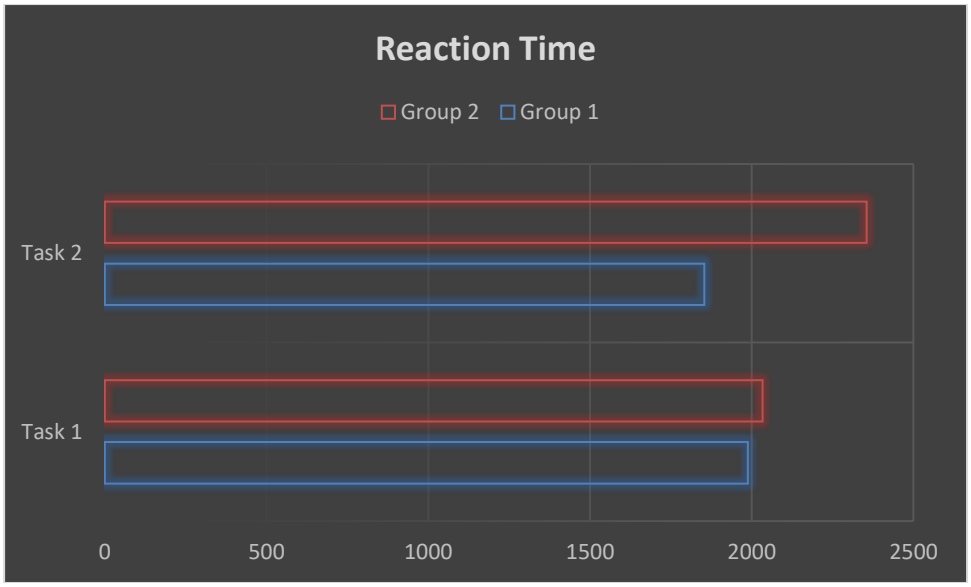

Figure 4: Comparing the reaction time of group 1 and group 2 on task 2

Participants from groups 1 and 2 were statistically compared in terms of how well they performed on tasks 1 and 2. Shapiro-test Wilk's revealed that the data did not follow the characteristics of a normal distribution (p0.05). Further analysis was performed using the Mann Whitney U test, and the /Z/ scores for task 1 and task 2 comparisons between group 1 and group 2 were 1.33 (p>0.05) and 2.89 (p0.05), respectively. Along the same lines, participants from groups 1 and 2 had their reaction times on tasks 1 and 2 compared. The Z scores for tasks 1 and 2 were 0.84 and 2.12, respectively, and the matching p value indicated that group 1 and group 2 differed significantly on task 2 alone. In conclusion, the data showed that group 1 and group 2 only differed significantly for task 2's median accuracy scores and reaction times.

It is believed that bilinguals benefit from a variety of advantages, including enhanced cognitive and language switching ability. By itself, the adaptive control hypothesis explains enhanced linguistic and cognitive control (Costa et al., 2008). This hypothesis proposes that bilinguals benefit from enhanced cognitive and verbal control as a result of superior monitoring, resource allocation, switching, and inhibition. These skills are considered to evolve as one gains experience. Fluent bilinguals are seen to have an advantage in both cognition and linguistic command (Issa et al., 2022).

Since finding monolinguals in the modern world is quite unlikely, we compared highly and less proficiently bilingual speakers on two tasks. Task 2 focused more on language control, while Task 1 assessed mental acuity. While the Mann Whitney U test found no significant differences between groups 1 and 2, it did find some using the same statistic for task 2. Everyone in both groups breezed through the first task with flying colors. The error analysis showed that this was due to participants being confused about which response should be used for the check-vocal, leading them to frequently provide a "double response," in which the second response was the correct one. Analysis of errors made on the second task showed that results were dependent on the participant's level of expertise. Mistakes like "no responses" and "switching" were more common in the group with low proficiency. There were still "switching errors," but they were less common among the highly proficient. The low proficient group demonstrated impressive monitoring and switching abilities on task 1, suggesting that task complexity played a significant role in determining performance.

Conclusion

The study sought to compare cognitive control and linguistic control in low and high proficient bilinguals. The LEAP Q questionnaire was used to classify participants as low or high proficient. The Hayward's criterion was used to categorize the participants. There was a separate group made up of people who scored particularly highly in the speaking domain.

The participants completed two tasks that tested their ability to think and use language. Participants were put through a cognitive control exercise where they were asked to name the shape (regardless of the linguistic label of the common object). While the linguistic control was tested by giving the participants a task in which they had to name the pictures in L1 and L2 based on the color of the dot. Whitney Mann the U test was done to see if there was a significant difference between low and high proficient bilinguals. This statistic showed that there was a significant difference between the two groups on the task tapping for language control, which shows that cognitive skills can be better even in low proficient groups. On task 2, there was a clear difference between the two groups, which showed that language control would vary based on proficiency.

Data Availability Statement

The authors confirm that the data supporting the findings of this study are available within the article and its supplementary materials.

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References

Blanco-Elorrieta, E., & Pylkkänen, L. (2017). Bilingual language switching in the laboratory versus in the wild: The spatiotemporal dynamics of adaptive language control. Journal of Neuroscience, 37(37), 9022-9036.

Campbell, J. I., & Therriault, N. H. (2013). Retrieval-induced forgetting of arithmetic facts but not rules. Journal of Cognitive Psychology, 25(6), 717-724.

Costa, A., Hernández, M., & Sebastián-Gallés, N. (2008). Bilingualism aids conflict resolution: Evidence from the ANT task. Cognition, 106(1), 59-86.

Hilchey, M. D., & Klein, R. M. (2011). Are there bilingual advantages on nonlinguistic interference tasks? Implications for the plasticity of executive control processes. Psychonomic bulletin & review, 18(4), 625-658.

Issa, S. H., Awadh, F. H., & Ahmed, H. R. (2022). The role of proficiency level in the speed of lexical activation. Cogent Arts & Humanities, 9(1), 1999613.

Issa, S. H., Ahmed, H. R., Alwan, E. E., Mutahar, A. A., Bajiri, M. E., & BP, A. (2021). An objective tool for classification of language deficits in adults. Review of International Geographical Education Online, 11(5).

Issa, S., Alfarhan, A., Awadh, F., & Aradhya, A. (2022). Relationship Between Age and Lexical Access. East European Journal of Psycholinguistics, 9(1).

Kang, C., & Lust, B. (2019). Code-switching does not predict Executive Function performance in proficient bilingual children: Bilingualism does. Bilingualism: Language and Cognition, 22(2), 366-382.

Marian, V., Blumenfeld, H. K., & Kaushanskaya, M. (2007). The Language Experience and Proficiency Questionnaire (LEAP-Q): Assessing language profiles in bilinguals and multilinguals.

Yow, W. Q., Tan, J. S., & Flynn, S. (2018). Code-switching as a marker of linguistic competence in bilingual children. Bilingualism: Language and Cognition, 21(5), 1075-1090.