

Multilingual cognitive performance: attention allocation in task-switching across linguistic and nonlinguistic domains

Viewing multilingualism as a continuum, this study examines whether multilingualism enhances cognitive performance and explores the relationship between attention allocation efficiency of multilinguals in tasks involving linguistic and nonlinguistic stimuli.

The studies of speech perception report that bilinguals exhibit higher “perceptual attentiveness,” which enables them to detect cues that aid the comprehension of speech (Cristia et al., 2012; Singh, 2021). These observations suggest a possible domain-specific advantage of bilingualism. While the presence of the domain-general cognitive advantage of bilinguals is debated (Von Bastian et al., 2016), Bialystok & Craik (2022) argue that bilinguals differ in the strategies of cognitive resource allocation in complicated tasks targeting attention rather than in cognitive capacity. Studies also highlight the importance of how bilingualism is defined as a criterion that can affect study outcomes (Poarch & Bialystok, 2015). While no significant differences in behavioral performance have been found between bilinguals and trilinguals (Chung-Fat-Yim et al., 2020), previous studies often used simple cognitive tasks, lacked consistency in targeted psychological mechanisms and defined bilingualism and trilingualism differently.

This study addresses these gaps by designing a cognitively challenging attention-targeted task and assigning participants to the groups of mono-, bi, or multilinguals using the same continuous metric. The degree of their multilingualism is calculated using the multilingual language diversity (MLD) score, which is obtained from the results of the Language History Questionnaire (LHQ3; Li & Zhao, 2020) and based on the number of languages a participant knows and the frequency of their use. The LexTale (Lemhöfer & Broersma, 2012) and the backward digit task are used to control for L2 and L3 proficiency and their working memory performance. The ongoing data collection involves 120 native Polish speakers, with varying frequency of English and German use. They complete two versions of the task switch paradigm tests with visual and auditory speech stimuli programmed on the PsyToolkit online platform in Polish (Stoet, 2017). In the visual version of the task, the participants must react to either the shape or the filling of the figure displayed on the screen, while in the speech version, they need to respond to either sound length or the speaker’s voice in audio clips. The tests consist of the single task and task switch blocks. The accuracy, switch and mixing costs are measured.

Preliminary data analysis shows that participants with lower MLD (<0.7) assigned to the “monolingual group” do not differ significantly in switch costs compared to “multilingual” participants (with MLD >1.7). However, “multilinguals” perform significantly more accurately and exhibit higher mixing costs, with performance correlating across both task types. These findings support the recent view on the effect of multilingualism, framing it as an efficiency in cognitive adaptation rather than cognitive superiority. Multilinguals adapt to the demands of the complex task, slowing their responses, which results in higher accuracy. Further analyses on the complete dataset will be presented to explore these cognitive adaptations in greater depth. (478 words)

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