

Bilingualism and Cognitive Control: The ANT in a Canadian Context

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Cognitive control-e.g. the abilities to pay attention to relevant input, to ignore irrelevant input, and to switch between tasks effectively- has recently received much attention in the field of linguistics. In particular, a growing number of studies link the ability to speak two languages with improved cognitive control skills (e.g. Costa, Hernández, & Sebastián-Gallés 2008; Coderre, Van Heuven, & Conklin 2013). However, the nature of this bilingual advantage, and whether it truly exists, is currently the topic of considerable debate (e.g. Paap & Greenberg 2013).

In this study, we investigate the link between bilingualism and general cognitive control skills by using the Attention Network Test (ANT; Fan et al., 2002), and ask 1) Does bilingualism improve cognitive control? and 2) Are any advantages modulated by the degree of bilingual experience, i.e. earlier Age of L2 Acquisition (AoA)? Importantly, we explore this issue in the context of the National Capital Region of Canada- where, unlike in a number of previous studies, both languages (English and French) are readily accessible and widely spoken.

Strong evidence suggests that both of the bilingual's languages are active and available during comprehension (Marian & Spivey, 2003) and production (Kroll, Bobb, & Wodniecka, 2006). In any given discourse, the two languages compete for selection in the mental lexicon, creating a conflict that must be resolved in order to produce the target language. Cognitive control becomes a crucial tool for managing this conflict. The skills gained from managing two languages (e.g. inhibiting one language while paying attention to the other) may be transferred to general cognitive processing (e.g. ignoring irrelevant and attending to relevant information), giving the bilingual an advantage in not only language processing, but also general cognitive control (e.g. Bialystok et al., 2012). These processes, however, may also be affected by several factors, including the type of bilingual environment (Green & Abutalebi, 2013).

We used the ANT to examine 3 cognitive control components (Alerting, Orienting, and Executive Control) in 57 English-French bilinguals, who were either Functional Monolinguals (FM; $n=17$), Simultaneous Bilinguals (SB; $n=22$) or Early Bilinguals (EB; $n=18$). We found significant effects only for the Orienting network ($p = .011$). A pair-wise comparison revealed that EBs had significantly better orienting abilities than SBs ($p = .010$). However, we failed to find previously-reported advantages in Executive Control and Alerting (e.g. Costa et al., 2008).

We do not interpret these findings as showing a lack of bilingual advantages. Instead, we feel that the results reflect the bilingual environment of our participants, as a similar apparent lack of advantages were shown in a linguistic task by Kousaie and Phillips (2012), whose participants are arguably in a similar environment as ours (Montreal). Recent work by Green and Abutalebi (2013) suggests that cognitive processes adapt themselves to the language environment demands, with dense code-switching and single-language (one language blocked while the other is used) situations requiring different processing strategies. If the bilingual advantage is said to come about as a result of practice in blocking one language and attending to the other (i.e. a single-language environment), then the National Capital Region does not provide the appropriate environment for these skills to develop, since many people code-switch between their two languages frequently and fluently, and may not need to block either language. This effect of the environment may also be reflected in the EB's advantage over SB's in Orienting, as the latter group acquired their L2 in an environment where both languages were part of the input. To say with certainty that these results are due to the bilingual environment, further investigations are needed. However, our results suggest a role of the bilingual environment, and urge researchers not to take it for granted when conducting studies with bilinguals.

References

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