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Bilingualism aids conflict resolution: Evidence from the ANT task

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Abstract

The need of bilinguals to continuously control two languages during speech production may exert general effects on their attentional networks. To explore this issue we compared the performance of bilinguals and monolinguals in the attentional network task (ANT) developed by Fan et al. [Fan, J., McCandliss, B.D. Sommer, T., Raz, A., Posner, M.I. (2002). Testing the efficiency and independence of attentional networks. *Journal of Cognitive Neuroscience, 14*, 340–347]. This task is supposed to tap into three different attentional networks: alerting, orienting and executive control. The results revealed that bilingual participants were not only faster in performing the task, but also more efficient in the alerting and executive control networks. In particular, bilinguals were aided more by the presentation of an alerting cue, and were also better at resolving conflicting information. Furthermore, bilinguals experienced a reduced switching cost between the different type of trials compared to monolinguals. These results show that bilingualism exerts an influence in the attainment of efficient attentional mechanisms by young adults that are supposed to be at the peak of their attentional capabilities.

Keywords: Bilingualism; Attentional control; Speech production; Language and attention

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1. Introduction

One of the most remarkable abilities of bilingual speakers is that of keeping their two languages apart during language processing. When producing and comprehending language bilinguals need to ensure that the correct lexical representations are accessed. Perhaps the domain in which this skill appears to be more relevant is that of speech production given that speakers need to decide the language they want to use. That is, to achieve successful communication bilinguals need to ensure that only lexical representations of the intended language are selected and finally uttered. Otherwise, on many occasions, communication will be disrupted given that the interlocutor may not know the other language of the bilingual. Given this scenario two critical questions emerge. First, what are the attentional/linguistic mechanisms that allow bilingual speakers to focus on the linguistic representations of the response language while preventing massive interference from the non-response language? Second, does the continuous use of such a control mechanism have an impact on other general-purpose attentional mechanisms? The present article aims at answering this second question.

The first question has been the focus of intense research leading to several proposals regarding the lexicalization processes in bilingual speakers (Costa, 2005; Costa, Miozzo, & Caramazza, 1999; Finkbeiner, Almeida, Janssen, & Caramazza, 2006; Green, 1998; Kroll, Bobb, & Wodniecka, 2006; La Heij, 2005). Despite some discrepancies, all these proposals agree that bilingual lexical access must involve some kind of attentional control mechanism. For example, according to some authors, bilingual language production entails the active inhibition of the linguistic representations of the language not used in the conversation (e.g., Green, 1998; Meuter & Allport, 1999). That is, in order to achieve successful selection of the lexical representations in the intended language, the activation of those representations corresponding to the other language needs to be suppressed. Accordingly, bilinguals unlike monolinguals use an inhibitory control mechanism in any conversational situation.

Perhaps the most compelling evidence, and relevant in the present context, supporting the hypothesis that bilinguals make use of inhibitory control comes from language-switching studies. An interesting observation from these studies is that low-proficient bilinguals take more time to switch from their weak second language (L2) into their dominant first language (L1) than vice-versa (Costa & Santesteban, 2004; Costa, Santesteban, & Ivanova, 2006a; Meuter & Allport, 1999). That is, switching to the stronger language is more costly than switching to the weaker one. This asymmetrical switching cost has been interpreted as revealing that when speaking in a L2 strong inhibition has to be applied to the representations of the much more dominant L1. As a consequence, if on a subsequent trial a response in L1 is required (switch trial into L1) low-proficient bilinguals need to overcome the large inhibition applied to those lexical representations belonging to L1. In contrast, to switch into L2 does not require the overcoming of such inhibition. This is because, when a trial involves naming in L1, the lexical representations of the L2 do not need to be inhibited. Therefore when in a subsequent trial, a L2 response needs to be given, the time cost associated with this switch will be smaller (but see Finkbeiner,