



Brief article

Revisiting the bilingual lexical deficit: The impact of age of acquisition

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ABSTRACT

Whereas the cognitive advantages brought about by bilingualism have recently been called into question, the so-called ‘lexical deficit’ in bilinguals is still largely taken for granted. Here, we argue that, in analogy with cognitive advantages, the lexical deficit does not apply across the board of bilinguals, but varies as a function of acquisition trajectory. To test this, we implement a novel methodological design, where the variables of bilingualism and first/second language status have been fully crossed in four different groups. While the results confirm effects of bilingualism on lexical proficiency and processing, they show more robust effects of age of acquisition. We conclude that the traditional view of the linguistic costs of bilingualism need to give way to a new understanding of lexical development in which age of acquisition is seen as a major determinant.

1. Introduction

Decades of inquiry on bilingualism within psychology, linguistics, and cognitive neuroscience have established that the frequent use of two (or more) languages exerts an influence on both cognitive and linguistic abilities (for recent overviews, see Bialystok, 2017; Kroll, Bobb, & Hoshino, 2014). On the one hand, bilingualism seems to afford a cognitive advantage: compared to individuals who only use one language, bilinguals exhibit enhanced levels of executive control, conflict resolution, and protection against early age-related cognitive decline (but see Lehtonen et al., 2018). However, on the other hand, bilingualism produces a so-called lexical “deficit”: the same studies that document the cognitive advantage also routinely report that adult bilinguals exhibit smaller vocabularies in each language compared to monolingual speakers, as seen, for instance, in picture naming tasks. Moreover, bilingual speakers take somewhat longer than monolinguals to name objects in the same tasks, and to recognize words in lexical decision tasks. It has been suggested that these two effects are epiphenomena of the joint activation of the two language systems of the bilingual, which creates a conflict of selecting the context-appropriate linguistic forms and inhibiting the non-target language (for recent treatments, see De Baene, Duyck, Brass, & Carreiras, 2015; Luk, Green,

Abutalebi, & Grady, 2011). This process thus functions as a booster of executive control (giving rise to the cognitive advantage), while at the same time compromising lexical representation and processing speed (giving rise to the lexical deficit).

Recent years have seen an increasing number of discussions on the importance of differentiating between different types of bilinguals in order to better understand the effects of bilingualism on language and cognition (Bialystok, 2016, 2017; Kroll et al., 2014; Luk & Bialystok, 2013). So far, however, this debate has mainly concerned the effects on cognition, largely leaving aside the possibility that different types of bilingualism may also yield different effects on lexical behaviour. The current study addresses this gap. Here, we ask whether the lexical deficit is really an effect of bilingualism alone: a potentially serious problem with interpreting the findings to date on the lexical deficit is that existing studies do not always provide sufficient information on the language acquisition trajectories of their participants, or do not differentiate between individuals who acquired two languages from birth (i.e., simultaneous bilinguals) from individuals who acquired one language from birth and a second language (L2) after that (i.e., sequential bilinguals).¹ Evidence from studies on L2 acquisition suggests that such practice is problematic because, first, even speakers with early ages of L2 acquisition (AoA) do not necessarily obtain nativelike L2 proficiency

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¹ In those rare instances where AoA is considered, negative correlations are reported (e.g., Luk & Bialystok, 2013; Pelham & Abrams, 2014; Portocarrero, Burright, & Donovick, 2007). However, due to their specific research scopes, these studies do not directly compare L1 and L2 bilinguals to one another, thus rendering any solid conclusions about AoA effects difficult. Moreover, it is not always clear how the notions of L1 and L2 are operationalised. For instance, Bialystok, Craik, and Luk (2008) do mention that they took into account whether English was the “first or second language” of their participants. It is unclear though what is understood by these terms here, since the additional remark is made that “the differences between proficiency groups did not reflect the differences in *dominance* patterns” (p. 535, our italics), thus suggesting that first and second language related to dominance, not order of acquisition.

Table 1

The parameters of age of acquisition and bilingualism in a crossed design.

	L1 monolinguals (native monolinguals)	L1 bilinguals (simultaneous bilinguals)	L2 monolinguals (international adoptees)	L2 bilinguals (sequential bilinguals)
Second language	–	–	+	+
Bilingualism	–	+	–	+

(e.g., Abrahamsson & Hyltenstam, 2009; Nishikawa, 2014; Norrman & Bylund, 2016; Sebastián-Gallés, Echeverría, & Bosch, 2005), and moreover, simultaneous bilinguals do not necessarily differ from monolingual native speakers in terms of their proficiency with the dominant language (e.g., Kupisch, 2012; Kupisch, Akpınar, & Stöhr, 2013). This raises the question as to whether the by now well-known bilingual lexical deficit is indeed an effect of bilingualism alone, or whether there is a potential confound of age of acquisition. Should age of acquisition indeed turn out to play a role here, it could have far-reaching consequences for our understanding of the linguistic costs of bilingualism.

The present study implements a unique methodological design to investigate this question. We test vocabulary knowledge and lexical processing in an unprecedented constellation of speakers where the variables of monolingualism vs. bilingualism and L1 vs. L2 have been fully crossed (Table 1). In this design, simultaneous and sequential bilinguals are thoroughly differentiated, and, crucially, L2 status is dissociated from bilingualism. This eliminates the limitations of previous research where L2 status has been an ever-present confound, and robustly assesses to what extent the lexical deficit is an effect of bilingualism alone.

If bilingualism alone is responsible for producing the lexical deficit, this should be manifested in the current design as a standalone main effect of the factor of bilingualism, whereas the opposite would hold should AoA be the driving factor behind said deficit. However, more nuanced outcomes may also be attested, manifested as an interaction between, or a confluence of, bilingualism and AoA.

In keeping with standard psycholinguistic practice we use the notions L1 and L2 strictly to refer to order of acquisition, regardless of language dominance. The term ‘L1 bilingual’ will be used to describe a person who acquired two languages from birth and uses them on a regular basis (i.e. simultaneous bilingual); ‘L2 bilingual’ refers to a person who learnt a L2 after the onset of L1 acquisition (even if that L2 is learnt in early childhood), and uses both languages on a regular basis (i.e. sequential bilingual); ‘L1 monolingual’ is a person who acquired one language from birth, possibly has some foreign language skills, but uses only the L1 for communication; ‘L2 monolingual’ refers to an individual who at one point in life stopped using his/her L1, lost proficiency in it, acquired an L2, and uses only the L2 for communication (while possibly possessing some foreign language skills). International adoptees are often L2 monolinguals.

Finally, following previous studies on the lexical deficit, the current study assesses lexical knowledge and processing in the societally dominant language of the participants’ residential context (in this case, Swedish in Sweden).

2. Methodology

2.1. Participants

Eighty adult speakers living in Sweden participated in the study, distributed equally as per the following groups:

L1 monolinguals: These participants ($M_{\text{age}} = 29.8$) had grown up in Sweden, and had acquired Swedish from birth as only language by native-speaking Swedish parents.

L1 bilinguals: The participants in this group ($M_{\text{age}} = 32.2$) had one Spanish-speaking parent and one Swedish-speaking parent, and had

acquired both these languages from birth. They were fluent in both Swedish and Spanish and used both languages on a regular basis. Access to these participants was gained through newspaper advertisements.

L2 monolinguals: This group consisted of individuals ($M_{\text{age}} = 33.7$) born in Latin American countries and adopted to Sweden between 3 and 7 years of age (mean 4.4; SD 1.4). Even though Spanish was their L1, they reported having lost proficiency in this language shortly after adoption (as is often the case; see Norrman, Hyltenstam, & Bylund, 2016). Instead, they reported using only Swedish in their everyday lives. Their mean length of residence in Sweden was 29.0 years (SD 5.7). Access to these participants was gained through newspaper advertisements, adoption agencies, adoption associations, and social media.

L2 bilinguals: These participants ($M_{\text{age}} = 28.8$) were born in Latin American countries and had acquired Spanish from birth. They arrived in Sweden through immigration with their native Spanish-speaking families between the ages of 3 and 8 years (mean 5.2; SD 1.8), which was when they started acquiring Swedish. On average, they had lived in Sweden for 26.7 years (SD 5.7). These individuals had continued using their Spanish since arrival, and reported using both Swedish and Spanish in their everyday lives. Access to these participants was gained through newspaper advertisements.

All participants had learnt English as compulsory foreign language at school (along with an additional foreign language, e.g., French or German). However, they used only Swedish (and in the case of the bilinguals, Spanish) in their everyday lives.

All groups were matched for gender and education level; L2 groups were matched for AoA; and bilingual groups were matched for Spanish proficiency (see Supplemental Materials).

2.2. Materials & procedure

All participants were tested individually by a functionally monolingual L1 speaker of Swedish.

The Boston naming test (Kaplan, Goodglass, & Weintraub, 1983) was used to elicit productive lexical knowledge. Participants were shown 60 pictures of objects in a fixed order on a computer screen, and asked to name them as fast as they could. Responses were audio-recorded and analysed for accuracy and latency.

A lexical decision task was used to assess receptive lexical knowledge. This test consisted of 160 items, half of which were pseudowords, with word frequency² and orthographic neighbourhood controlled for (test-internal consistency: $\alpha = .99$). Participants indicated whether the word on the screen was a real Swedish word or not by pressing a button. Responses were analysed for accuracy and latency.

Both tests were run in E-Prime.

2.3. Design

Likelihood ratio tests of models fitted using mixed effects regression were conducted using the Lme4 package (Bates, Maechler, Bolker, & Walker, 2014) in R (R Core Team, 2014). The models included AoA and bilingualism as predictor variables (depending on their contribution to the fit) with random intercept for subject and item, and AoA, bilingualism and their interaction as random slope for item, which was the

² The Parole Corpus, 24 million words: <https://spraakbanken.gu.se>.

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