

# Review

## The bilingual brain: And what it tells us about the science of language (a review)

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Well over half the world is bilingual but little is known about it and how it works. In this short and highly readable study, Professor Albert Costa examines the impact of bilingualism on young people from infancy to old age and explains how bilingualism affects people's daily lives. Costa uses his experience in neuro-linguistic research in Barcelona, itself a bilingual city speaking Spanish and Catalan, as well as studies from all over the world to show the effects of bilingualism, including examples from Canada, France and South Korea. *The Bilingual Brain* has five chapters: *The Bilingual Cradle* about babies born and brought up in a bilingual environment; *Two Languages, One Brain*; *How Bilingualism Sculpts the Brain*; *Mental Gymnastics*, and, finally, *Making Decisions*. In doing so he cites research from all over the world, including his own laboratory in Barcelona, Spain. Costa explains various research experiments into bilingualism around the world and the *Further Reading* section at the end of the book directs the reader to further research sources.

The book is a valuable neuro-linguistic resource for linguists and researchers into bilingualism and also for language teachers. Written in a non-scientific and reader-friendly style, it offers insights into how our brains manage the challenges of picking up and using a second language and shows how bilinguals and users of a second language have considerable advantages over monolinguals, while not going as far as saying bilinguals are all-round smarter than monolinguals. Costa explores neurology and psychology to explain how two languages can exist in the same brain. He goes on to show how dual language ability gives the speaker certain behavioural advantages and can even delay the onset of dementia by up to four years. He also shows that bilinguals are often better at making considered decisions, less prone to instinctive reactions and better at managing conflict.

So, what do we learn? Some pretty astonishing things. In Chapter 1 Costa analyses experiments on babies and shows how they are able to differentiate change in speech sounds and what is said

within hours after birth. Research using dummies with electrical sensors show how babies recognise the rhythm of language and separate changes in sounds very quickly and even separate the sounds of different languages even though they cannot say them until much later.

One final comment in Chapter 1 took me by surprise. Costa's contention is that interaction between people using language (as in a classroom) is fundamental to successful language learning whereas learning from a disengaged source – self-study materials – is less successful. As someone who has spent much of his life developing materials for self-study, I found this conclusion somewhat disturbing. However, it does make the case for the importance of blended learning, where live interaction (for example via WhatsApp or Zoom in the absence of face-to-face contact) is combined with self-study materials delivered by radio, TV or online.

Chapter 2 begins by examining the impact of brain damage on bilinguals. Costa examines the impact of sports accidents resulting in brain injury and notes that in the recovery period those wounded might talk in their second language rather than their first but research suggests that brain damage or aphasia affects all brain organs equally, suggesting the areas of the brain involved in processing language are the same. However, research also suggests that the use of a second language uses more areas of the brain than using our mother tongue and that working in a second language involves a higher degree of second-language motor control. Readers may have noticed that children of bilingual parents (e.g. a French mother and an English father) who go on holiday in France experience a temporary slowing down in English when they return to their English school. Why? Because they have got used to using French and it takes a little longer to return fully to the use of English, although they speak both fluently. The ability to move between languages is known as 'code switching'. I've also noticed that if you have learned a language but have not used it for a long period of time the first thing to go is vocabulary. The words just don't seem to come to mind. How-

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ever, research indicates that you never completely forget a language you have learned and a comparative degree of fluency recurs after even a short stay in the country where they speak it. In terms of brain function the use of a language that has become unfamiliar is costlier in terms of time. So, the answer is regular practice in speaking, in interacting with speakers of the other language if you can and reading and following media (movies, documentaries and news broadcasts) in the second language. Costa's purpose is to describe rather than advise but he does stress the importance for linguistic brain development of reading in the first language, the second language or both with very young children.

Chapter 3 explores how bilingualism sculpts the brain. Interestingly, Costa states that a human being will have up to 35,000 mother tongue words stored in their brain, but use few and fewer as they advance in age. Research indicates that bilinguals have a 'brain library' of fewer words than monolinguals but more overall as they know both the words and the translated equivalent in their second language. However, as he goes on to say, bilingualism is only one small part of the develop-

ment of linguistic control in the brain. More significant is the difference between the neural process of learning new words (vocabulary) and learning how to combine them (syntax). Research done at University College London using neuro-imaging indicates that learning and use of a second language does not affect the brain representation of the first language but it does affect the effort required for processing, especially when speaking.

Chapter 4 deals with the ability of bilinguals and multilinguals to multitask and also whether brain deterioration in old age affects monolinguals or bilinguals first. Research done with children and also with young adults indicates that bilinguals are better at multi-tasking than monolinguals because bilingualism helps develop an attentional system which encourages flexibility and adaptation to new tasks. On brain deterioration, Costa describes two studies in Toronto and Hyderabad which indicated that bilinguals visiting doctors reported symptoms of old age cognitive reserve up to four years later than monolinguals in the same age group. So, is it possible that bilingualism not only makes you cleverer but can also prolong your life?

The final chapter starts with Nelson Mandela, Nobel peace prize winner and president of South Africa who spent 27 years in jail for opposing apartheid (South Africa's racial separatist policy). While in prison Mandela, a speaker of Xhosa and English, also learned Afrikaans, the language of the Boer colonists of South Africa. Why? As he said, 'If you talk to a man in a language he understands it goes to his head. If you talk to a man in his own language it goes to his heart'. The citation stresses the importance of the relationship between language and emotion.

Emotion is significant in learning a new language. I have known many people with bilingual parents who refused to learn their parent's mother tongue, partly, I suspect, because of some emotional disconnect. I think Costa would endorse parents encouraging children to learn the language they learned at home as well as the mother tongue of the country where the child is brought up if only because of its beneficial effects on brain development. Discussing bilinguals from an early age and also second language learners operating at a higher level, Costa concludes that second language speakers tend to approach issues from a less emotional bias and analyse issues more lucidly. They also find it easier to cultivate empathy.

In summary, Costa's findings emphasise the importance of learning and understanding a foreign language and the advantages it gives the learner in both their personal and working lives based on neurological linguistic research. He emphasises that further research is needed, particularly in the areas of emotion and empathy. It may also influence language policy in countries where languages are contested. He describes the research into bilingualism and monolingualism and how it influences and sculps the brain and presents research exercises that teachers can try in their classes. He also emphasises that much more research is needed in how language and bilingualism influences brain development and linguistic and attentional control. Above all, it makes the case for the importance of the teaching of languages in schools as a means of broadening the mind not just linguistically and culturally but also neurologically and intellectually. Highly recommended for all researchers and language teachers.

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