

Hernandez, A. E. (2013). *The bilingual brain*. Oxford, United Kingdom: Oxford University Press.

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Any field of research that continues to mystify and intrigue researchers for well over a century and manages to maintain scholars' steadfast dedication to investigating its many thought-provoking inquiries is a healthy and dynamic field indeed. How two languages are represented and processed in one brain is a perfect example of such a field, one which is at the very core of a new title by A. E. Hernandez, *The Bilingual Brain*. In the context of previous work conducted on bilingual aphasia, which Hernandez reviews in his first chapter, the author divides the book into three main sections each dedicated to exploring the effects of age of acquisition, proficiency level, and cognitive control, and their interaction with general cognitive processing. By reviewing each of these factors and uncovering stimulating new perspectives, the author effectively achieves his goal of shedding light on a better understanding of the nature of bilingual processing and the neural bases of the bilingual brain. The reader will appreciate not only the book's accessibility to both non-specialists and specialists alike but also the author's ability to relate language skills to a host of other skills including attention, memory, and even music and sports.

The first section is dedicated to exploring the role of age of acquisition in the neural foundations of the bilingual brain. Chapter 2 entertains the enduring debate on acquiring knowledge: Is it nature- or nurture-based? Hernandez digs further into this question in the context of language and cognitive development and argues that language skills are built from the bottom up (i.e., language learning is built on the utilisation of basic sound elements of language). This emergentist approach is further expanded on in Chapter 3 where Hernandez reviews one of the most central questions in the bilingualism literature: whether bilinguals have and use one (integrated) language system or two (separate) ones. The author reviews evidence suggesting that children are able to differentiate two languages very early in life, contrary to earlier work arguing that bilinguals begin with an integrated language system which later develops into two. This building up of two languages from the start implies a different neural representation than that of adult language learners. Furthermore, Hernandez demonstrates that skills seem to transfer fluidly from one language to another, offering additional support for his emergentist view.

The second section of the book considers the role of proficiency. In Chapter 4, Hernandez contextualizes this conversation around the notion of expertise, primarily based on Ericsson, Krampe, and Tesch-Römer's (1993) construct of deliberate practice, which argues a set of general principles that build up across many non-linguistic domains and over time. Hernandez applies this to bilingualism as well: practice leads to changes in proficiency and expertise that are specific to language. In this vein, Chapter 5 explores the role of proficiency in improved skill in certain domains such as semantic and lexical processing. Hernandez's review suggests that language functions involving the processing of meaning are more highly affected by proficiency, which the author interprets as a type of expertise having to do with learning that occurs above basic sensorimotor processing as with other skills such as music and sports.

In the last of three sections, Hernandez turns from age of acquisition and proficiency to a discussion on the role of cognitive control. In Chapter 6, the author reviews work in the monolingual context exploring how control emerges and develops across childhood and declines during older adulthood. He then expands on these issues in the bilingual context in Chapter 7 where he first discusses the notion of a switching mechanism in the brain that allows bilinguals to mediate access to their languages (Penfield & Roberts, 1959). In this section of the chapter, Hernandez provides a review of the development of the language switching studies from as early as a half a century ago to as recent as current studies employing brain imaging techniques. He notes that because of fMRI research, we now have a clearer picture of how the bilingual brain handles language switching insofar as it utilizes the same areas involved in cognitive control when switching between languages. The chapter also brings up the timely bilingual advantage debate by arguing that a bilingual experience (i.e., the constant control of two languages in one mind) may lead to better flexibility in attentional control. These claims have been substantiated by pioneering work over the last decade or so and have helped formulate hypotheses of cognitive reserve, a long-term benefit of bilingualism that helps to maintain cognitive functioning and to protect against the normal decline of the human mind that occurs with healthy aging (e.g., Bialystok & Craik, in press).

The concluding discussion in Chapter 8 coherently brings together the themes reviewed throughout the book. It is a summative-commentary style chapter that is successful at drawing together the sections of the book into an even stronger, cohesive whole than was introduced to the reader in Chapter 1. The concluding remarks and the evidence reviewed by Hernandez throughout the title clearly suggest that the neural bases of bilingualism are defined by a variety of factors such as age of acquisition, proficiency, and cognitive control, that interact with one another across time.

The knowledge and training that the legendary late Dr. Elizabeth Bates instilled in Hernandez is truly evident in *The Bilingual Brain*, which he dedicates to her, along with his mother and father. He has brought forth an excellent title that highlights pioneering and current findings related to this area and offers insightful ways of moving research forward. It not only is a call for future work to continue to take a biological or natural-systems approach to studying the bilingual brain, but it also paints an accurate picture of the complicated way in which two languages are represented and function in one brain, which could be sharpened through an integrated approach where control, ability, and language interface. Hernandez's book is certain to draw interest among a broad range of readers including researchers who study cognitive and/or neurocognitive approaches to bilingualism and/or second language acquisition, along with graduate students and advanced undergraduates in applied linguistics.

### References

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