

Bilingualism, Executive Function, and the Delayed Onset of Dementia Symptoms

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Summary

For centuries, second language acquisition has been viewed as something that had detrimental consequences to students. In 1890, a professor at Cambridge University said that a child living in two languages equally would have their intellectual and spiritual growth halved (Baker & Wright, 2017). This deficit view of second language acquisition has rippled down through the centuries and remains with us today. It is reflected in the politicization of bilingual education through state voter initiatives such as Proposition 227, Proposition 203 and Question 2, and in how bilingualism has been de-emphasized in federal education policy (Baker & Wright, 2017). There is an increasing volume of recent research that demonstrates bilingualism produces advantages for students including increasing educational motivation and outcomes, strengthening the students' sense of self, as well as providing cognitive benefits, two of which this paper explores (Gándara, 2015). In spite of an increasing research-based evidence, deficit-oriented misconceptions about bilingualism and second language acquisition remain (Baker & Wright, 2017).

The emerging field of linguistic neuroscience is beginning to scientifically examine how language and the cognitive processing that bilinguals do in accessing language is processed in the brain. Neuroscientists have only recently begun engaging in rigorous multilingualism research. However, there is already clear evidence that second language acquisition changes the neural pathways in the brain in positive ways (Bialystok, 2011). This paper explores how bilingualism impacts the brain in ways that

strengthen executive function and delay the onset of symptoms associated with dementia and Alzheimer's disease.

Understanding the positive biological changes bilinguals experience in the neural activity of the brain can go a long way in helping to dissolve the deeply held yet mistaken beliefs that are prevalent about second language acquisition. Many parents believe that bilingualism can cause delay and confusion in their children (King, 2006). By educating families about the ways bilingualism strengthens and tones the brain throughout the course of their childrens' lifetimes we can begin to dispel that myth. This is vital because we need our parents to embrace and to continue to nurture bilingualism to support our students on their journey to English proficiency. The more evidence we can bring forward the more effective we will be in shifting thinking away from a deficit-oriented view of bilingualism and towards a benefit-oriented view of it.

Analysis

One of the most complex cognitive activities we engage in is to process language. A neural image of someone doing any kind of language processing shows activity in most of the centers of the brain. All humans have an abstract representation of language in their brains. People who are bilingual have two language abstractions, both of which are always active to some degree. The brain uses the prefrontal cortex's executive function capabilities to selectively decide what to pay attention to and surface. Bilingual people are continuously using their prefrontal cortex to access and navigate between both language abstractions they have. In this way they are more regularly engaging this executive function part of the brain. In the same way that a cross-country ski trail

becomes faster and more efficient the more it's used, the executive functions of the brain experience a metaphorically similar effect in bilingual people. (Bialystok, 2015). Other neuro linguistic studies have affirmed that neural activity in the executive function areas of the brain is elevated in bilingual people. The switching that the brain engages in to control the two languages increases the load of the executive control system and results in a more “tuned brain” (Li et al., 2017). Bilingual people outperform their monolingual peers in executive function tasks across all stages of life (Bialystok, 2011).

Bilingualism can also equip the brain to better cope with early symptoms of dementia and Alzheimer's disease. There is a prevailing view that a cognitive reserve results from the extra neural load bilinguals regularly engage in to switch between languages. This constant mental activity allows bilinguals, as they age, to continue to function and navigate around the brain's cellular deterioration that is associated with dementia and Alzheimer's. It's very important to note that bilingualism does not prevent dementia or Alzheimer's. The studies indicate that bilinguals have the neuroplasticity to be able to navigate around this physiological deterioration in the brain to continue functioning without presenting with the symptoms that would signal the disease has taken hold. In various studies, the families of bilingual people noticed symptoms associated with dementia and Alzheimer's were delayed by 4-5 years as compared to the symptoms of dementia that monolingual families observed (Bialystok, 2011).

With both the findings associated with executive function and those associated with the delay of dementia symptoms a number of important caveats must be noted. First, the field of neuro linguistic study is in its infancy. It was only in 1962 that Canadian

researchers Pearl and Lambert first challenged conventional thinking on bilingualism and cognition and presented evidence that bilingualism can present cognitive advantages (Baker & Wright, 2017). It was only in the 21st century that brain imaging technology has advanced to the point where we can detect neural activity in specific areas and correlate them with language and the cognitive work we do in processing language. And it was only in 2013 that the first direct evidence of bilingualism being associated with neural advantages was published (Baker & Wright, 2017). The neurological effects we've explored associated with bilingualism are complex and the understanding of them is still evolving. (Bialystok, 2015).

Application

Being able to explain the ways in which bilingualism improves brain function can be an important tool for teachers working to enlist the active support and engagement of a students' families in continuing to support the development of the child's heritage language at home. Parents may be harboring the false myth that total English immersion will accelerate their child's journey to proficiency and seek to stop supporting oracy and literacy in the heritage language at home (Espinosa, 2013). As teachers we are advocating for our families to support our students at home with ongoing and deliberate instruction in their heritage language as they are acquiring English. Explaining the benefits that a bilingual speaker experiences in terms of executive function and the delayed onset of symptoms associated with dementia can be another tool that we can use to explain how continuing to invest in the heritage language will help, and not hurt, the child.

Interpretation

It's an over reach to say that bilingualism makes you smarter. While bilinguals are faster and more accurate in executive function tasks, language processing is more effortful for bilinguals. They tend to have smaller vocabularies in each of their languages (though not necessarily in total vocabulary), and take milliseconds longer to retrieve individual words (Bialystok, 2015). It's also over reach to say that bilingualism staves off dementia and Alzheimers. The disease progresses in a fixed way for comparable monolingual and bilingual people. Bilingualism and the neural plasticity that it engenders allows the brains of bilinguals to navigate around this atrophy and avoid surrendering memories and cognitive function to it years longer than their monolingual peers.

In our increasingly complex, rapid-fire world executive function is becoming ever more vital in being able to navigate daily life. Advances in medicine, nutrition, economic and other factors are driving longer life expectancies. In interpreting this research we can see how bilingualism and the ways in which it shapes the brain can support a person in navigating both of these dynamics more effectively throughout their lifetimes. However, it is important to recognize that this field of study is in its infancy, and many neuro linguistic questions of bilingualism remain unanswered.

Reflection

The extent to which this research is meaningful and practically relevant in my classroom practice is directly correlated to my ability to use it to shift thinking away from a deficit-oriented view of second language acquisition for both the families and the students that I will serve. It's vital that they attach the same value to their heritage language that I do. My practice will be rooted in leveraging the linguistic knowledge the

child is bringing into the classroom with them to build English proficiency and fluency. I understand how it could seem completely counterintuitive to a family if I send home a book in their heritage language. This research can help me counteract that dissonance and help my families and my students see how important it is for them to use that book and other tools to continue to develop their heritage language oracy and literacy. Bilingualism brings cognitive benefits over the course of a lifetime and this will be another datapoint that I use to continually signal value to bilingualism.

An area that I hope neuro linguistic research will move to explore is the extent to which there is neurological evidence for the Translanguaging model. It seemed like there might be. With both language abstractions always active I would be interested if there's any neurological evidence of one language repertoire from which we select features that make sense for us to use to communicate. Such research would have meaningful insights for second language acquisition and implications for the power differential and system of control issues that Translanguaging surfaces as well.

Executive function is what helps us navigate through the day and is one of the most highly valued mental activities. Memories are the things that define as individuals and go to the core of our identities. There's clear evidence that bilingualism helps both. This insight will be a powerful tool in my advocacy and support of my bilingual and multilingual students. And it will be a tool that I use to support them in their journey to English proficiency. Bilingualism doesn't make you smarter, but it makes your brain's most important functions stronger and more able to side-step the symptoms of dementia and Alzheimer's.

References

- Baker, C., & Wright, W. E. (2017). *Foundations of bilingual education and bilingualism (6th ed.)*. Bristol, UK & Blue Ridge Summit, PA: Multilingual Matters. ISBN 978-1-78309-720-3.
- Bialystok E. (2011). Reshaping the mind: the benefits of bilingualism. *Canadian journal of experimental psychology = Revue canadienne de psychologie experimentale*, 65(4), 229–235. <https://doi.org/10.1037/a0025406>.
- Bialystok, E. (2015, May 5). *How bilingualism helps your brain*. Lecture presented at University of Reading's School of Psychology & Clinical Language Sciences in Reading, United Kingdom.
- Gándara, P. (2015). Rethinking bilingual instruction. *Educational Leadership*, March 2015, 60-74.
- King, K. & Fogle, L. (2006). Raising bilingual children: Common parental concerns and current research. *CALdigest*, April 2006.
- Li, L., Abutalebi, J., Emmorey, K., Gong, G., Yan, X., Feng, X., . . . Ding, G. (2017). Bilingualism, mind, and brain. *Human Brain Mapping*, 38(1), 4109-4124. doi:10.1002/hbm.23652.
- Marian, V., & Shook, A. (2012). The cognitive benefits of being bilingual. *Cerebrum : the Dana forum on brain science*, 2012, 13.