



*Avoir une autre langue, c'est posséder une deuxième âme.*  
To have another Language is to possess a second soul.

CHARLEMAGNE

## Being Bilingual

ANDREW BROWN

FRENCH AMERICAN INTERNATIONAL SCHOOL  
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Fifty years of laboratory testing and field research have informed our understanding of multiple-language acquisition in very young children. Recent advances in neuroscience, especially neuroimaging, have augmented our knowledge of the bilingual brain.

The cognitive benefits associated with “Being Bilingual” only emerge when children reach a high degree of competence. This takes time. The optimal approach is a dual language immersion program that produces “balanced bilinguals”—those enviable individuals who can understand, speak, read and write with fluency, in either of their languages. Balanced bilingualism is “additive” in the sense that there is a positive transfer of competencies between the two languages and what neuroscientists have identified as “an executive function workout.”

### EARLY STUDIES

In his book, *The Mirror of Language*, Stanford Professor Enji Hakuta explores much of the history of research in bilingual education.<sup>1</sup> He points out that turn of the century intelligence studies on poor immigrants often reinforced the negative stereotypes of the time. Most of the early protocols were not corrected for variables like socio-economic status, assumed knowledge of specific cultural references, or limited English language skills.

In their landmark 1962 study, Peal and Lambert set the stage for subsequent research:

*Take any group of bilinguals who are approximately equivalent in their L<sub>1</sub> and L<sub>2</sub> abilities and match them with a monolingual group for age, socioeconomic level... Now, choose a measure of cognitive flexibility and administer it to both groups. The bilinguals will do better.<sup>2</sup>*

The positive cognitive advantages of bilingualism were confirmed in subsequent, well-controlled, statistically robust investigations conducted by other groups working in bilingual settings in various countries.<sup>3</sup>

### THE SENSITIVE PERIOD

Young children can learn two languages as easily as one; but much depends on the amount of immersion and the quality of the linguistic environment. There is no doubt that the optimal way to learn a second language is to begin at birth and learn two languages simultaneously. Children have more facility than adults at acquiring native proficiency in pronunciation. Infants and children are biologically predisposed to do this.

It is worth reflecting just for a moment on the existential contingency of language acquisition. Strange as it seems, we cannot escape the fact that we are only once in the world: thrown into a situation we have not chosen into a specific time and place, characterized by a particular cultural and linguistic context. As babies we are born with the ability to discern the phonemes—the smallest contrastive sound system units—in any of the world’s 7,000 or so languages.

Intriguing evidence for heightened early phonemic ability comes from “head turning” studies on babies. For example, adult Japanese speakers cannot reliably distinguish between the “r” and “l” sounds in English; presumably because this phonemic distinction is not present in Japanese. Patricia Kuhl, and her team at the Institute for Brain and Learning Sciences at the University of Washington, demonstrated that four-month-old Japanese infants are perfectly able to do this.<sup>4</sup>

The particular language or languages that we acquire during infancy are determined by the contingency of birthplace and upbringing. As childhood marches on towards puberty, the innate ability to discern novel spoken sounds, and to reproduce them “like a native,” diminishes steadily. In the spoken language domain, infants and young children are superior learners when compared to adults. There really is a one-time window of “sensitivity” for optimal language immersion.

<sup>1</sup> Hakuta (1986)

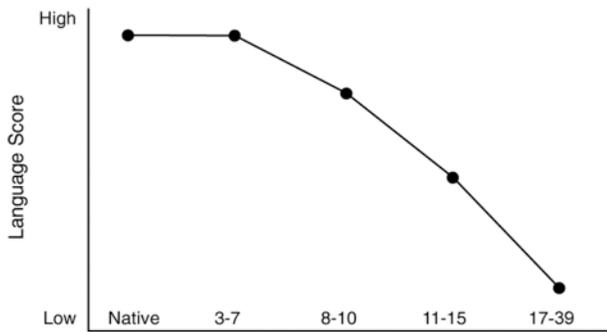
<sup>2</sup> Peal and Lambert (1962)

<sup>3</sup> Liedtke and Nelson (1968), Cummins and Gulutsan (1974), Ben-Zeev (1977) and Duncan, S and De Avila, E (1979)

<sup>4</sup> Kuhl et al. (2006)

According to Kuhl:

*Scientists generally agree that the “critical period” learning curve is representative of data across a wide variety of second-language learning studies.<sup>5</sup>*



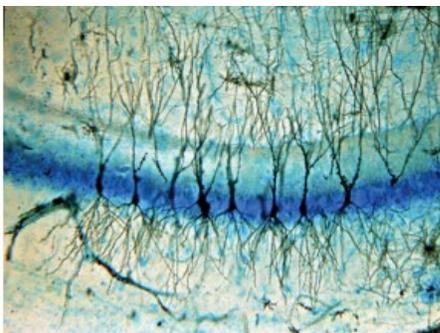
The relationship between age of acquisition of a second language and language skill. Adapted from: Johnson and Newport (1989)

## EVIDENCE FROM NEUROSCIENCE

Kuhl describes an “explosion in neuroscience research examining young children’s early processing of language that has implications for education.”<sup>6</sup> Rapid advances have been made in non-invasive techniques including electrical field change protocols, and more sophisticated and more expensive techniques including magnetoencephalography, functional magnetic resonance imaging, and near-infrared spectroscopy. Advances in traditional microscopical tissue staining techniques have also provided tantalizing clues into what is going on in the brain during the critical period for language acquisition.

## SYNAPTIC PRUNING

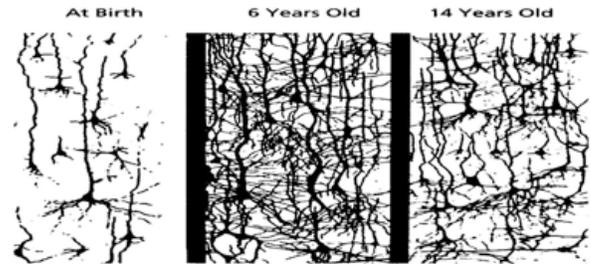
At birth the total number of neurons in the cerebral cortex is about the same as in the adult brain—despite the adult brain being five times bigger. The difference lies not in the number of neurons but in their spacing and in the production of synapses.<sup>7</sup>



Pyramidal neurons stained to show dendrites. Anatomical Institute, Aarhus University (2004).

There is a rapid proliferation and overproduction of synapses during infancy. By the age of two, synaptic density has peaked with an astonishing 50% more connections than in adults.<sup>8</sup> According to Shonkoff and Phillips, this is followed by:

*A phase of synapse elimination or pruning that eventually brings the overall number of synapses down to their adult levels. This process is most exuberant during the first few years of life, although it can extend well into adolescence.<sup>9</sup>*



**SYNAPTIC DENSITY:** Synapses are created with astonishing speed in the first three years of life. For the rest of the first decade, children’s brains have twice as many synapses as adults’ brains. Drawings supplied by H.T. Chugani.

Synaptic Density. In Chugani (1997)

There is a tantalizing correlation between the critical period for multiple language acquisition and the steady march of synaptic pruning. So what is going on? Our understanding of causality and the precise relationship between neuroanatomy and functionality is still in its infancy; but there does seem to be a “use it or lose it” element at play.

A key property of synapses is their plasticity. During the development and ongoing establishment of neuroanatomy, “neurons that fire together wire together.”<sup>10</sup> With more neural connections produced initially in infants than are eventually needed—all competing for a finite supply of oxygen and nutrients—some neural circuits are favored over others. There is an epigenetic selection process occurring in the developing brain in response to lived experience. Nobel prize-winning biologist, Gerald Edelman calls this “Neural Darwinism.” In his words:

*The brain, like the immune system, is a selection system that operates within an individual’s lifetime... Given the tenets of Neural Darwinism, each brain is necessarily unique in its anatomical structure and its dynamics. Even the brains of twins will differ.<sup>11</sup>*

## EXECUTIVE FUNCTION

Canadian psychologist, Ellen Bialystok has investigated the way bilingualism influences cognitive and linguistic performance, not just during the critical period, but also across the entire life span. She is well known for the discovery that bilingualism is associated with a delay in the onset of symptoms of dementia.<sup>12</sup>

<sup>5</sup> Kuhl (2011a); see also: Birdsong and Molis (2001), Flege and Yeni-Komshian (1999), Johnson and Newport (1989) and Brainard and Doupe (2000).  
<sup>6</sup> Kuhl (2011a)  
<sup>7</sup> Samuelsen et al. (2003) and Larsen C. et al. (2006).

<sup>8</sup> Huttenlocher (1979); Huttenlocher and Dabholkar (1997).  
<sup>9</sup> Shonkoff, and Phillips (2000)  
<sup>10</sup> Edelman (2006)  
<sup>11</sup> Ibid.  
<sup>12</sup> Bialystok et al. (2010)

But there is no such thing as a free lunch. Not surprisingly, “bilinguals typically have lower formal language proficiency”—smaller vocabularies, for example—in two languages than monolinguals exhibit in just one. Bialystok shows that this is eclipsed by a profoundly nuanced and far-reaching benefit. In her words: “Bilinguals exhibit enhanced executive control in a variety of tasks.”<sup>13</sup>

In their original 1962 study, Peal and Lambert did not define what they meant by the enhanced “mental flexibility” that they ascribed to bilinguals. Fifty years on—thanks to dozens of studies, utilizing established cognitive measures such as the Stroop test, the Eriksen flanker task, the Simon reaction task, Dimensional Change Card Sort tests, as well as sophisticated eye-tracking protocols—we know much more.<sup>14</sup> For Bialystok:

*Executive control is the set of cognitive skills based on limited cognitive resources for such functions as inhibition, switching attention, and working memory.... and supports such activities as high level thought, multi-tasking, and sustained attention.*<sup>15</sup>

Furthermore:

*Fluent bilinguals show some measure of activation of both languages and some interaction between them at all times, even in contexts that are entirely driven by only one of the languages.*<sup>16</sup>

This relentless executive functioning “workout” supports “high level thought, multi-tasking, and sustained attention,” as well as staying focused and screening out distractions and irrelevant information. “In children, executive control is central to academic achievement.”<sup>17</sup> The bilingual advantage is clear.

## LANGUAGE ACQUISITION IN CHILDREN AND ADULTS COMPARED



Stefka Marinova-Todd of the University of British Columbia provides insight into how adult learners often stop short of native fluency. Young children generally learn a second lan-

guage far more quickly and effortlessly than adults. That said, the ease of language acquisition varies widely between individuals. At any age, it is an intricate, often idiosyncratic journey, and it takes time.

*The fossilization of L<sub>2</sub> proficiency in older learners could result from lack of access to feedback. [A]fter a certain point... as long as the meaning of their utterances is understood, their grammar or pronunciation may not be corrected.*<sup>18</sup>

She counters this with:

*Although the general sentiment still is that, on average, late learners do not tend to realize levels of success as high as those of younger learners, new evidence continues to show that late learners definitely have the capacity to learn L<sub>2</sub> grammar, and indeed some do, to near-native level.*<sup>19</sup>

Research certainly does not provide all the answers. When attempting to compare adults and young children, it has proved quite difficult to perform controlled studies. The playing field is not level. A child has less to learn to obtain age-appropriate communicative competence. With the exception of pronunciation, commensurate criteria of language proficiency can hardly be applied to both. According to Hakuta:

*Direct comparisons of the qualitative aspects of child and adult second-language acquisition are rare, but the results... suggest overall similarities.*<sup>20</sup>

Children are more highly predisposed than adults to emulate their peers and elders. They learn what they need to learn in order to participate. With little prompting they try to imitate what they observe. Also children are less in control of their own destinies than adults, who have busy schedules and multiple responsibilities. Young children often have more uninterrupted time in a language-learning setting. The conclusion here is that context is all. For adults—as well as for children—the quality of the linguistic environment is what counts.

## NON-VERBAL PERIOD

In order to understand the progression of second-language acquisition in children, four essential skills must be addressed:

1. Comprehension
2. Speaking
3. Reading
4. Writing

Comprehension comes first. Speaking naturally follows. Later, reading and writing—the contrivances of literacy—come into play. Language skills unfold in a predictable developmental sequence. The journey begins with a “non-verbal period,” where the brain is busy processing, understanding and mentally rehearsing the new language in an authentic social context. Here is how Patton Tabors, Harvard Professor and author of *One Child Two Languages*, describes the so-called “silent-period”:

<sup>13</sup> Bialystok, Craik and Luk (2012)

<sup>14</sup> Bialystok and Cralk (2010); See also: Carlson and Meltzoff (2008), Marian and Spivey (2003), and Quin Yow and Xiaoqian (2015)

<sup>15</sup> Bialystok and Cralk (2010)

<sup>16</sup> Ibid.

<sup>17</sup> Bialystok, Craik and Luk (2012)

<sup>18</sup> Marinova-Todd, S (2003)

<sup>19</sup> Ibid.

<sup>20</sup> Hakuta (1986)

*There is a specific developmental sequence for second-language acquisition in early childhood settings... When children realize that their home language doesn't always work, they give up using it with those who don't understand them...*

*Moving beyond the non-verbal period... [m]ost children... start collecting information by watching and listening intently—spectating—and talking to themselves—rehearsing—in preparation for going public in their new language.<sup>21</sup>*

There would be less anxiety if parents knew more about this essential first phase of second-language acquisition. Soon after, the child will be saying words and phrases, which will be all the more productive, richer and better consolidated, if accompanied by reading and writing. This has the advantage of bringing the visual, auditory and tactile senses into play simultaneously. Reading in the target language is also essential in building up vocabulary and syntax.

## THE CANADIAN MODEL

The term “immersion education” came to prominence in Canada during the 1960s to describe innovative programs in which the French language was used as a medium of instruction for elementary school students whose home language was English. Professor Jim Cummings of the University of Toronto is a leading authority on bilingual education and second language acquisition. Here is how he characterizes the Canadian model:

*In early immersion programs, students gain fluency and literacy in French at no apparent cost to their English academic skills...*

*Usually students require additional time to catch up in English spelling but by grade 5 there are normally no differences... [They] are close to the level of native speakers in understanding and reading of French, but there are significant gaps between them and native speakers in spoken and written French.<sup>22</sup>*

Given the right setting, the second language comes as a “freebie,” in the sense that it is not something extra learned formally as it would in an adult language class. In a well wrought bilingual immersion program, a second language is acquired by living in it.

The Canadian model has a long pedigree. In the preschool and kindergarten years immersion in the target language is 80% or more. This high percentage is effective in the context of an ever present background of English—at home, outdoors, at structured activities, and, most significantly, among the children themselves in the school hallways and in the playgrounds. It seems odd at first that 80% immersion works better than a 100% “sink or swim” approach. This is explained by the natural “transfer of competencies” between languages.

However, by 3rd or 4th grade, there is a shift from 80% immersion to around 50%. Well on the way to becoming “bal-

anced bilinguals,” the children study the subject matter of the various academic disciplines in either of their languages. Navigating classes taught in the two languages and switching between languages with emerging native fluency is a considerable achievement. To arrive at this level of competence, early, intensive, structured immersion in the second language is required without neglect of the first. Both languages must be supported and sustained in parallel over a period of many years. Along the way, a distinct bilingual advantage manifests itself that Cummings calls the “additive bilingualism enrichment principle (ABEP)”:

*The development of additive bilingual and biliteracy skills entails no negative consequences for children's academic, linguistic, or intellectual development. On the contrary, although not conclusive, the evidence points in the direction of subtle metalinguistic, academic and intellectual benefits for bilingual children.<sup>23</sup>*

Inextricable from this is the “linguistic interdependence principle (LIP)”:

*First and second language academic skills are manifestations of a common underlying proficiency [which] makes possible the transfer of cognitive/academic or literacy-related skills across languages... The interdependence principle applies to languages that have little in common (e.g. Japanese/English) as well as to languages that have common roots.<sup>24</sup>*

Cummings roots ABEP and LIP in a “common underlying proficiency.” This phrasing more than faintly echoes Chomsky's “Universal Grammar”—a revolutionary idea that rose to prominence in the field of linguistics in the Sixties.<sup>25</sup> Of course, Cummings' more gently framed “common underlying proficiency,” though fundamentally no less metaphorical, does embrace fifty years of bilingual education research.

## IMPORTANCE OF HOME LANGUAGES

For Cummings a direct consequence of ABEP and LIP is the crucial importance of supporting the home language, or languages. Bilingual acquisition is optimal when children have meaningful and varied reinforcement in both languages. Monolingual parents can support their child's bilingual immersion quest by serving as appropriate and correct language models in their own language. Due to the natural transfer of competencies, and the development of common underlying competencies, they will automatically support learning in the target language. By reading to a child before bedtime in the “mother (or father) tongue,” the parent is unwittingly bolstering the development of reading and writing in the target language at school:

*When parents and other caregivers (e.g. grandparents) are able to spend time with their children and tell stories or discuss issues with them in a way that develops their mother tongue vocabulary and concepts, children come to school well prepared*

<sup>21</sup> Tabors (1998)

<sup>22</sup> Cummings (1998)

<sup>23</sup> Ibid.

<sup>24</sup> Ibid.

<sup>25</sup> Chomsky (1965)

to learn the school language and succeed educationally.

*Children's knowledge and skills transfer across languages from the mother tongue they have learned in the home to the school language.*<sup>26</sup>

## THE SOCIAL AND EMOTIONAL COMPONENT

In his well-known book, *Descartes' Error*, neuroscience professor, António Damásio puts to rest pre-scientific notions of the mind/body divide.<sup>27</sup> He champions the notion of embodiment and, in particular, the critical importance of the emotions in cognition. Daniel Goleman further popularized these ideas. He brought to prominence the epithets Emotional Intelligence and EQ (Emotional Quotient).<sup>28</sup>

Early impetuses for Damásio's writings were psychiatric patients—historical cases like Phineas Gage, as well his own—who had damage to emotional parts of the brain. These unfortunate individuals could not make even the simplest everyday decisions, despite having no reduction in IQ. Immordino-Yang and Damasio—in their aptly titled, *We Feel, Therefore We Learn: The Relevance of Affective and Social Neuroscience to Education*—declare that:

*Modern biology reveals humans to be fundamentally emotional and social creatures... Any competent teacher recognizes that emotions and feelings affect students' performance and learning, as does the state of the body, such as how well students have slept and eaten or whether they are feeling sick or well...*

*The original purpose for which our brains evolved was to manage our physiology, to optimize our survival, and to allow us to flourish. When one considers that this purpose inherently involves monitoring and altering the state of the body and mind in increasingly complex ways, one can appreciate that emotions, which play out in the body and mind, are profoundly intertwined with thought.*<sup>29</sup>

Teaching and learning are nothing if not collaborative and social. A high quality dual language environment is no exception. It should foster autonomy, instrumentality and a sense of belonging. It should also be caring and fun.

## LIMITATIONS OF TRANSMISSION-ORIENTED PEDAGOGY

Cummings is aware that some bilingual immersion teachers are still holding on to the last vestiges of “direct method,” barely straying from the target language. A dogmatic refusal to integrate, at least partially, the home or playground language slows down the transfer of competencies and development of common underlying competencies:

*When teachers are asked why they do not implement more cooperative learning and project-based strategies they usually*

*indicate concern that students will use English in these activities... contravening the basic premises of immersion. It rarely occurs to teachers to permit students to use their L<sub>1</sub> in these activities for discussion and initial draft purposes...<sup>30</sup>*

This conservative approach almost certainly results in pedagogy that is less varied and less challenging. Cummings points to the limitations of “highly teacher-centered or ‘transmission-oriented’ pedagogy. When the teacher is always center stage, there is less emphasis on creative and collaborative tasks and the opportunity for children to “generate new knowledge” rather than merely “consume information.” There is an impoverishment of the immersion experience if the class dynamic permits “only minimal opportunities to use oral or written French for creative or problem-solving or social activities.” For Cummings, the children:

*... must have opportunities to communicate powerfully in the target language if they are to integrate their language and cognitive development with their growing personal identities.<sup>31</sup>*



Pieter Bruegel the Elder (c. 1563) *The Tower of Babel*. Oil on panel. Kunsthistorisches Museum, Vienna.

## TRANSLANGUAGING—CODE SWITCHING

Echoing the fall from grace in the story of Babel, bilingualism is very often viewed through a narrow and distorted, strictly monolingual, perspective.<sup>32</sup> The awkward and misguided simplification here is that bilinguals are seen crudely as monolinguals with their second language as an interfering add-on; with resultant reduced competence and vocabulary in both languages.<sup>33</sup>

Bilinguals are not double monolinguals. The reality is far more interesting, especially for children and teenagers still on their bilingual journeys. The two languages of a high functioning bilingual are distinct yet inextricable and always additive

<sup>26</sup> Cummings (2001)

<sup>27</sup> Damásio (1994)

<sup>28</sup> Goleman (1995)

<sup>29</sup> Immordino-Yang and Damasio (2007)

<sup>30</sup> Cummings (2001)

<sup>31</sup> Cummings (1998)

<sup>32</sup> Ludi and Bernard (2003)

<sup>33</sup> Brasart (2016); Garcia (2014)

and mutually reinforcing. Looked at holistically, both languages are simultaneously playing in to an individual's thinking, communicative competence, and emerging sense of identity.<sup>34</sup> All other things being equal, a balanced bilingual will have a far larger total vocabulary and syntactic repertoire than the vast majority of even highly competent monolinguals. This effect is real because there is never a one-to-one mapping between any two languages. Languages are always somewhat incommensurable with each other and are chock full of non-cognate terms, unique lexical structures and highly idiosyncratic conventions of usage in specific contexts.

Psycholinguistics professor, Rafael Javier of St. John's University in New York, has written extensively on spontaneous code switching between languages—the norm for bilinguals:

*It is quite amazing and fascinating to observe bilingual individuals changing languages in the middle of conversations with other bilinguals as they go from one topic to another, or as they interact with monolingual members from any of their languages. And this is done automatically in a more or less conscious state...*

According to Javier, they:

*...engage in a highly sophisticated process of assessing all the cues in the environment where the interaction is taking place to determine appropriateness and accuracy. In the final analysis, the process is guided by the intentionality of the speaker to communicate specific content, at a specific time, for specific effect...*<sup>35</sup>

Ofelia Garcia, professor of Urban Education and of Hispanic and Luso-Brazilian Literatures and Languages at the Graduate Center of the City University of New York, defines translanguaging as:

*the deployment of a speaker's full linguistic repertoire without regard for watchful adherence to the socially and politically defined boundaries of named (and usually national and state) languages.*<sup>36</sup>

Garcia provides a charming and deceptively simple example from an Early Learning study that demonstrates how code switching is ubiquitous from the very beginning of a bilingual journey:

*The teacher is going through some comparative exercise, 'this tree is bigger, that tree is smaller'... If you've ever sat with kindergartners, you know they talk out loud all the time, right? So I am sitting next to Alici and she is trying it out under her breath and she says 'this tree is grander,' which is, of course, 'grande' from the Spanish...*<sup>37</sup>

Rather than being evidence of confusion, or stumbling along the way to more perfect fluency, code switching (especially in the flow of conversation) is a natural, playful, and quite enjoyable way of expanding and enriching communicative compe-

tence and expressing—sometimes, quite self-consciously and with pride—a robust bi-cultural identity.

In the bilingual classroom, indiscriminate discouraging of code switching can narrow the quality of the bilingual learning environment by not capitalizing on a natural, informal and spontaneous aspect of the learning process and the development of an emerging sense of self. Garcia reminds us that in certain classroom contexts, where there is a prevalent “hierarchy of language practices that deem some more valuable than others,” principles of social justice come into play.<sup>38</sup>

## EMERGENT TRANSCENDENTAL THRILL

High functioning academic literacy in two or more languages is a long and intricate journey—usually only fully consolidated in the high school years; and often enhanced by bridging geographic and/or syntactic distances with a series of exchange trips and other authentic travel experiences.

A pristine emergent property of all this, is that balanced bilinguals become fearless meta-linguists. Bilinguals experience, first hand, the differences and commonalities that exist between languages. Their knowledge of the grammatical rules of their own languages is powerfully consolidated and their potential to acquire a third or fourth language is enhanced.

Beyond the fascinating details of epigenetic brain “wet-wiring” (including selective neural pruning), and those relentless cognitive workouts and enhancements of executive functionality; achieving mastery in two or more languages is personally transformative and highly empowering.

Bilingualism is an astonishing gift that can open doors. The insights and intuitions that are inextricable from becoming a high functioning bilingual can never be unlearned.

In a certain light such insights and intuitions can be viewed as the existential backdrop for developing confident, principled, open and compassionate individuals whose default mode of being in the world is pluralistic. Balanced bilinguals come to each new, nuanced, highly specific cultural context they encounter preloaded with a heightened sensitivity and receptivity to social cues and norms. Bilinguals are primed for working collaboratively and purposefully with people from different cultural, linguistic and racial backgrounds. *This is nothing less than an emergent transcendental thrill.*

This provocative assertion and a final challenge from French Professor of education, Philippe Meirieu, brings to a close this encapsulation of fifty years of research informing bilingual education.

*Comment faire émerger la joie d'apprendre et de penser?  
Une joie galopante et contagieuse, une joie qui batte en  
breche les fatalités, erode la resignation et invite au partage  
des savoirs.*<sup>39</sup>

How can we bring out the joy of learning and thinking in our students? A galloping and contagious joy that defeats fatalism, erodes resignation and invites the sharing of knowledge.

<sup>34</sup> Brasart (2013); Brasart (2014)

<sup>35</sup> Javier (2007)

<sup>36</sup> Otheguy, Garcia and Reid (2015)

<sup>37</sup> Garcia (2009)

<sup>38</sup> Garcia and Leiva (2014) and Garcia (2014)

<sup>39</sup> Meirieu (2014)

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