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The Benefits of Multilingualism to the Personal and Professional Development of Residents of The US

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Abstract

In the past two decades, new research on multilingualism has changed our understanding of the consequences of learning and using two or more languages for cognition, for the brain, and for success and well-being across the entire lifespan. Far from the stereotype that exposure to multiple languages in infancy complicates language and cognitive development, the new findings suggest that individuals benefit from that exposure, with greater openness to other languages and to new learning itself. At the other end of the lifespan, in old age, the active use of two or more languages appears to provide protection against cognitive decline. That protection is seen in healthy aging and most dramatically in compensating for the symptoms of pathology in those who develop dementia or are recovering from stroke. In this article we briefly review the most exciting of these new research developments and consider their implications.

Keywords

cognitive and neural consequences; language experience; language learning; multilingualism; myths

Although most of the world is multilingual, the use of two or more languages in the United States has historically been marked as a complicating factor rather than a benefit. Attitudes toward languages other than English have been confounded with attitudes toward immigration and cultural diversity, resulting in a wealth of mythology surrounding language learning and language use. The assumption of English as the only language, or the majority language, in the United States has helped promote the belief that acquiring a second language as an adult is an impossible task that can be accomplished successfully only by the few who possess a special talent for language learning. Likewise, although young children appear to be able to acquire multiple languages easily, it has often been assumed that introducing a second language too early during infancy will produce confusion and cause irrevocable damage to the child's language and cognitive development. It has also been suggested that language mixing or language switching among proficient speakers of two or

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more languages when they converse with others who are similarly proficient is a sign of pathology or incomplete language ability. These and other attitudes toward and views of multilingualism in the United States have affected not only public perceptions, but also those of educators and scientists.

However, accumulating data have shown that the assumptions and attitudes that have been prevalent historically are in fact myths:¹ Far from being a complication, research has shown that multilingualism provides benefits to individuals at all points along the lifespan, from the youngest infants and children, to young adults, and to older adults who may be facing cognitive decline (Bialystok, Craik, & Luk, 2012). Young babies are not confused by hearing two or more languages but develop the ability to discriminate among the languages they hear; they are more open to new language learning than their monolingually exposed counterparts (Petitto et al., 2012). Adult learners who are well past early childhood have been shown to be able to acquire sensitivity to the grammar of a second language despite their age (Morgan-Short, Steinhauer, Sanz, & Ullman, 2012). As for language mixing, code-switching is a common feature of bilingual discourse, is rule governed, and reflects a sophisticated cognitive strategy that enables listeners to exploit the features of bilingual speech as speech is produced (Fricke, Kroll, & Dussias, 2016). Taken together, a growing set of research discoveries in the last two decades provides compelling evidence to reverse the older false beliefs about multilingualism. For language scientists, the multilingual speaker is now seen as a model for understanding the way that language experience shapes the mind and the brain (Kroll, Dussias, Bice, & Perrotti, 2015).²

How then does language experience shape the brain? First, studies have shown that the brain has far greater plasticity throughout the lifespan than previously understood. Life experience at all ages has consequences for cognition and for both the structure and function of the brain. As an important aspect of life experience, language use reveals these consequences (Baum & Titone, 2014). Contrary to the view that the brain evolved to speak one language only, the evidence suggests that two or more languages coexist in the same brain networks, each language activating the other even when only one of the languages is in use. One might think that the engagement of all known languages would impose a terrible burden on bilingual and multilingual speakers; however, recent studies demonstrated that while there may be some small disadvantages with respect to speed, those disadvantages are far outweighed by what bilinguals and multilinguals learn about how to control potential competition across the two or more languages. Elsewhere, researchers have described the bilingual as a mental juggler, able to keep both languages in the air, as it were, and to simultaneously be able to use the intended language without making obvious mistakes (Kroll, Dussias, Bogulski, & Valdes-Kroff, 2012). Recent studies have substantiated the claim that this ability to juggle all the languages in play creates consequences more

¹See <http://www.bilingualism-matters.ppls.ed.ac.uk/>, the home of “Bilingualism Matters” at the University of Edinburgh, for additional background.

²We note for the purpose of this discussion that we take a broad view of bilingualism and multilingualism, considering anyone who uses two or more languages actively to be bilingual or multilingual. The form of language experience will differ across individuals and in different language and cultural contexts. Those distinctions, the trajectory of language learning, and the resulting proficiency in each language will be critically important factors, but our interpretation of the available research is that bilingualism and multilingualism are more similar than different. The critical distinction will be between individuals who are monolingual and individuals who speak two or more languages.

generally for bilinguals and multilinguals that enhance the ability to ignore irrelevant information, to switch from one task to another, and to resolve conflict across different alternatives (Bialystok, Craik, & Luk, 2012). These consequences may be most apparent at the two ends of life, for the youngest babies and children and for the oldest speakers.

In addition, the observation that a second or third language engages the same underlying cognitive and neural machinery as the first language also has implications for language itself. The interactivity of the networks that support all of the known languages comes to affect the native language. The native language of a bilingual or multilingual speaker differs from the native language of a monolingual speaker, reflecting the influence of the second or third language on the first. What is remarkable is that these bidirectional influences can be seen at every level of language use, from the way speech is perceived and spoken to the way that grammar is processed and to the way one chooses words to describe perceptual experience (Ameel, Storms, Malt, & Sloman, 2005; Dussias & Sagarra, 2007). An even more striking finding, in keeping with the claims about the plasticity of life experience, is that changes in the native language have been observed in second language learners at the earliest moments of new learning (Bice & Kroll, 2015; Chang, 2013).

Because the native language of the bilingual is no longer like the native language of the monolingual speaker, it becomes easy to see that these changes to the native language may be seen as a negative consequence of new language learning or at the very least as an indication of language attrition. However, that view fails to account for the variation that is normally seen among monolingual speakers themselves. Most Americans accept the idea that people living in the South will speak with a different accent than people living in the Northeast or Midwest. These regional differences in dialect among monolingual speakers may in fact be related to the changes that are observed in the native language of bilingual or multilingual speakers: Not all monolinguals are the same, and recent studies have begun to identify the ways that monolingual speakers of the same native language may differ from one another (Pakulak & Neville, 2010).

This growing body of evidence not only refutes some of the long-standing myths about multilingualism, but it also has implications for the contexts in which the benefits of multilingualism may best be realized. This article has two goals:

1. It focuses on those groups who are most vulnerable and for whom the opportunities and protections afforded by multilingualism—and thus the overall benefits to society—may be greatest. These include young children, for whom the failure to acquire literacy skills may endanger academic outcomes, and older adults, facing normal cognitive decline as they age or pathology if they are likely to develop dementia.
2. It proposes general directions for best practices in second language learning and offers recommendations about the types of investments that need to be made to overcome the myths and biases about multilingualism that prevent the full range of benefits to be observed for all Americans across the diverse contexts in which they find themselves.

Literacy and Academic Achievement in Young School-Age Children

One in five children in the United States lives in a household in which a language other than English is spoken (U.S. Census Bureau, 2013, n.p.). However, speaking a language other than English in the home is associated with a number of risk factors. The 2004 National Center for Education Statistics has reported that about 30% of children who speak English but who are exposed to another a language at home do not complete high school (National Center for Education Statistics, 2004, p. 9). Many studies have shown a well-established relationship between low socioeconomic status and low English skill level in children from homes where a language other than English is spoken (Hoff, 2003, 2006). Recent work has also suggested that speaking a language other than English at home acts as an independent risk factor (Lonigan, Farver, Nakamoto, & Eppe, 2013). Poor literacy outcomes among a significant portion of the population constitute a substantial public health concern because low levels of literacy are associated with higher rates of incarceration, unemployment, and mental illness (Chevalier & Feinstein, 2007). These facts are alarming and suggest that unless there is a marked improvement in the literacy skills of today's minority children, the future labor force will have lower literacy skills than the labor force of today (Murnane, Sawhill, & Snow, 2012). When considering this body of evidence, parents, educators, policy makers, and pediatricians unfortunately operate on the basis of a mix of folklore and intuition: Because mastery of English by immigrant children in the United States is a critical aim, one response has been to push aside the development of the home language to encourage the development of English. Furthermore, findings that bilingualism affects the rate at which each language is acquired (Hoff & Place, 2012) have been misinterpreted by some as evidence that bilingualism provides an inadequate environment for the development of English language skills. However, quite to the contrary, research that has systematically examined early and concurrent acquisition of a home language and a majority language has suggested a number of positive linguistic, cognitive, and academic outcomes that have the potential for significant impact for both multilingual children and society. First, home language development is related to the quality of relationships within the family and to measures of psychosocial adjustment in adolescence (Oh & Fuligni, 2010). Further, home language skill is important because in some linguistic domains (e.g., phonological awareness), skills acquired in one language support the acquisition of skills in the other language (Barac & Bialystok, 2012; Bialystok, Majumder, & Martin 2003; Dickinson, McCabe, Clark-Chiarelli, & Wolf, 2004). Multilingualism is a significant economic asset for individuals, and a bilingual and biliterate workforce is a national asset.

In addition to the value that home language development brings to children via its role on family relations and positive outcomes to society, recent scientific findings have dispelled the belief that children are confused by dual language input (Kovács & Mehler, 2009; Werker & Byers-Heinlein, 2008); more important, these findings demonstrate that bilingualism confers advantages in executive control—the brain's functions that allows humans to carry out complex tasks such as solving problems, planning a sequence of activities, inhibiting information that has already been perceived, directing attention to achieve a goal, or monitoring performance. To illustrate how important executive control is, individuals who show damage in the brain areas that are responsible for coordinating

executive function show impaired judgment, have difficulty with decision making, and have impaired intellectual abilities. A rapidly growing body of literature has indicated that bilingual children with abilities in psychomotor speed, general cognitive level, and socioeconomic status that are similar to those of monolingual children not only perform similarly to monolingual children on language tasks of grammatical knowledge and metalinguistic awareness, but also show a significant advantage on executive control tasks compared to monolingual children. Although bilingual children typically have lower receptive vocabulary than monolingual children, they outperform monolingual children in domains of cognitive function skill that require a high degree of attentional control (Barac, Bialystok, Castro, & Sanchez, 2014). Another significant finding is that the benefits within the domain of executive control have been found across levels of socioeconomic status (Engel de Abreu, Cruz-Santos, Touringo, Martin, & Bialystok, 2012). In this respect, bilingual language skill is relevant to academic success in children from dual-language homes because bilingualism is associated with an advantage in linguistic and nonlinguistic tasks (Bialystok & Barac, 2012; Costa, Hernández, Costa-Faidella, & Sebastian-Gallés, 2009).

Interestingly, the advantages that are conferred by bilingualism have been reported for bilingual children even in the earliest months of life. When adults speak, bilingual infants look at adults' mouths at an earlier age than do monolingual infants and for a longer period of time, providing the first evidence that bilingual babies "figure out" how to learn two different languages as easily as monolingual infants learn one (Pons, Bosch, & Lewkowicz, 2015). Furthermore, six-month-old babies growing up in a bilingual environment are better than monolingual babies at rapidly forming internal memory representations of novel visual stimuli (Singh et al., 2014). By 11 months, the brains of bilingually exposed babies are not only sensitive to both languages but also show evidence of enhanced neural activity in those areas of the brain that are involved in executive function (Ferjan Ramírez, Ramírez, Clarke, Taulu, & Kuhl, 2017), perhaps because learning two languages requires enhanced information processing efficiency compared to learning one language only, making it necessary for infants to develop enhanced skills to cope with the task of dual language acquisition.

One exciting result from the work exploring the effects of bilingualism in children growing up in poverty is that bilingual children from low-income families are better than monolingual matched controls on a number of verbal and nonverbal tasks (see Bialystok & Barac, 2012). Given that children in the United States who are born to the lowest-income families have a 43% chance of remaining in that income bracket (Autor, Katz, & Kearney, 2008; Greenstone, Looney, Patashnik, & Yu, 2013, p. 6), the development of bilingual language acquisition in children from language minority homes seems to provide a way to mitigate the academic risks that are associated with low socioeconomic status and to maximize school readiness. Like children who grow up in multilingual settings, monolingual children will also benefit from bilingual immersion programs because they too will experience the cognitive and linguistic advantages that are associated with growing up bilingual. Although the state of scientific knowledge is incomplete, a new and growing body of evidence strongly supports the benefits of maintaining the home languages and extending the transformative benefits of multilingualism to all learners.

Speaking Two or More Languages Protects Older Adults Against Cognitive Decline

Former Speaker of the House of Representatives Newt Gingrich (R-GA) published an Op-Ed column in the *New York Times* on April 22, 2015, in which he urged the U.S. Congress to double the National Institutes of Health budget and specifically pointed out that a breakthrough discovery that might delay the onset of Alzheimer's by five years would create a dramatic reduction in the number of afflicted Americans, with a corresponding reduction in health care costs and stress to family members (Gingrich, 2015). What he failed to mention is that research on bilingualism has already documented a delay of four to five years in the onset of Alzheimer's symptoms for bilinguals relative to age and education matched monolinguals (Bialystok, Craik, & Freedman, 2007; Perani et al., 2017). No known pharmaceutical agent has any effect that comes close to bilingualism. While bilingualism does not affect Alzheimer's directly, research has shown that it does have an impact on the symptoms of the disease: Life as a bilingual seems to provide protection to the cognitive mechanisms that enable someone to negotiate the deleterious consequences of the disease, perhaps in the same way that previous, sustained physical exercise may help a person deal with an injury. When cognitive resources are stressed by the presence of pathology, a life of bilingualism may provide the same sort of protection.

As with the research with young children, some have questioned whether the finding that bilingualism delays the onset of dementia symptoms in those who will develop Alzheimer's is seen only in adults who are relatively affluent and well educated. A recent study in India on a very large sample of patients who were diagnosed with dementia reported that there was a 4.5-year delay in the onset of symptoms for bilinguals relative to monolinguals. Most critically, the observed delay was independent of education, literacy, and other socioeconomic factors (Alladi et al., 2013, p. 1939). Other similar investigations have replicated the four- to five-year delay of dementia symptoms for bilinguals in different language contexts and for different language pairings (Woumans et al., 2015).

Others have wondered about the extent to which bilingualism benefits older adults who are healthy and free of signs of cognitive pathology but who are undergoing normal cognitive aging, such as those who report gradually increasing word-finding difficulties in spoken language and increasing disruption to executive control (Burke & Shafto, 2008; Campbell, Grady, Ng, & Hasher, 2012). Notably, the aspects of cognition that naturally decline in aging coincide with many of the features of executive function that have been reported to be influenced by bilingualism, such as the ability to ignore irrelevant information, resolve competition or conflict across alternative responses, and switch between tasks. Studies that have examined the performance of healthy older adults have shown that bilinguals often outperform monolinguals on these measures of executive function (Bialystok, Craik, Green, & Gollan, 2009). While the evidence on behavioral indexes of executive control is sometimes mixed, the findings from studies of structural and functional brain imaging provide compelling support for a difference in the brains of older bilinguals relative to monolinguals (Gold, Kim, Johnson, Kryscio, & Smith, 2013; Li, Legault, & Litcofsky,

2014). When bilinguals and monolinguals solve a problem, they may recruit the same brain areas, but bilinguals appear to use them more efficiently.

Given the growing body of evidence that multilingualism has benefits for both normally aging and more challenged older adults, and since studies on young adult bilinguals have suggested that many of the same cognitive benefits can be seen for late bilinguals as for early bilinguals (Bak, Vega-Mendoza, & Sorace, 2014), other studies have investigated whether a person needs to be bilingual from birth or whether late bilingualism can confer some of the same advantages as early bilingualism. Because age of acquisition and language proficiency are confounded—the longer a person has used a language, the more likely he or she is to be proficient, and proficiency seems to be more critical to these consequences of bilingualism than age of exposure per se—research has not yet provided a definitive answer. In addition, despite attempts to control or match as many factors as possible when comparing groups of people—for example, to examine the impact of bilingual or multilingual language experience apart from overall life experience—it is difficult to do this perfectly. Some individuals acquire a second or third language by choice and others as a consequence of the demands of immigration. Some live in an environment where everyone else speaks two or three languages, and others live in an environment that is strongly monolingual, like many locations in the United States. Thus, understanding how these different forms of language experience influence the observed consequences for the mind and the brain is a topic of ongoing research (Green & Abutalebi, 2013). In theory, a solution to the problem of between-group variability is to conduct longitudinal research with the same individuals, although this is both expensive and difficult because attrition over time requires very large samples to come to clear conclusions. In one such recent study, researchers exploited a unique database in Scotland, the Lothian Birth Cohort 1936, in which more than 1,000 individuals were given an intelligence test when they were 11 years old in 1947, and then tested again when they were in their 70s. A clear advantage was reported for bilinguals regardless of the age at which they became bilingual, supporting the findings from studies comparing bilingual and monolingual groups (Bak, Nissan, Allerhand, & Deary, 2014).

What Conclusions Can Be Drawn for Language Learning?

The research cited above suggests that multilingualism provides exceptional consequences across the lifespan that reach far beyond the benefits of having two languages available for communicative purposes. Having two languages will of course enhance opportunities for social interaction, for economic advancement, and for increasing intercultural understanding. However, being bilingual or multilingual also changes the mind and the brain in ways that create resilience under conditions of stress and that counter some of the deleterious effects of poverty and disease. This new body of work on multilingualism has a number of implications for approaches to language learning.

Many years ago, François Grosjean published a paper with a title that garnered great attention, noting that the bilingual was not two monolinguals in one (Grosjean, 1989). His comments were addressed to neurolinguists who interpreted mixed-language speech in bilingual patients as a sign of pathology. His point, reiterating what we have noted earlier in

this article, was that language mixing and code-switching are typical features in bilingual speech and, for many bilinguals, mixing is neither rare nor pathological. However, the claim that bilinguals are not simply the addition of two separate monolingual language systems has implications that go beyond the observation of language mixing. Speaking two or more languages changes all languages that an individual knows and uses: There are bidirectional influences that have been demonstrated within a highly interactive language system. The features of the languages in play are likely to influence one another, and the neural plasticity that has been shown to characterize learners at all ages suggests that these changes can sometimes occur quickly during the earliest stages of new language learning. The bottom line is that the two or more languages that are spoken by a bilingual or multilingual individual are not like the native language spoken by a monolingual speaker. The model in past research on second language learning has focused on the goal of attaining native speaker-like abilities in processing the second language. That model assumes, for the most part, that the two languages are independent of one another, an assumption that researchers now know to be incorrect. If proficient multilinguals are not like monolingual native speakers, then the classic native language model is the wrong model for language learning.

A problem in adopting a multilingual model for new language learning is that for adult learners who are already proficient speakers of their native language, there are some features of the native language and indeed of their native language skill that may need to suffer interference, at least briefly, to enable the second language to become established. Research on memory and learning has suggested that what Robert Bjork and Elizabeth Bjork at UCLA have called “desirable difficulties” may be essential to learning (E. Bjork & R. Bjork, 2011): Conditions of learning that give rise to difficulties increase the contextual salience of new material, those that produce errors that provide meaningful feedback, and those that encourage elaboration may ultimately produce better learning and better memory for what has been learned. Desirable difficulties can be imposed externally during learning, e.g., by having learners acquire information under conditions that are costly or slow, or by mentally imposing those conditions on themselves, by self-regulation (R. Bjork, Dunlosky, & Kornell, 2013). In the realm of language learning, the results of a few studies can be understood within this framework, but the implications for language learning more generally have yet to be developed (R. Bjork & Kroll, 2015). This suggests, however, that learning new material quickly may produce a level of satisfaction for the learner but may not necessarily produce enduring memory for what has been learned. The lessons about multilingualism and desirable difficulties come together when one considers what is known about mixing languages. As noted earlier, code-switching, even within a single utterance, is a common occurrence in bilingual speech. Not all bilinguals code-switch, but those who do appear to move seamlessly from one language to the other with little disruption on the part of either the bilingual speaker or the bilingual listener. Likewise, studies of memory and learning have suggested that learning under mixed conditions may produce more stable outcomes than learning under blocked conditions (Birbaum, Kornell, E. Bjork, & R. Bjork). In the field of education, the idea of “translanguaging” proposes a related concept about having learners exploit all known languages within the context of a given lesson (García & Wei, 2013). Mixing information may not simplify learning, but creating learning environments that simultaneously create desirable difficulties and move new language learners in a

direction that more closely resembles the experience of proficient bilinguals may be likely to enhance productive outcomes.

In addition, studies on infant learners have suggested that tremendous gains result when babies are exposed to language variation early in life. This body of work, which shows that bilinguals are better language learners than monolinguals, is not a surprise of course because bilinguals have learned something important about learning itself. One hypothesis about this finding is that the language learning benefit for bilinguals arises from enhancement to self-regulated processes. Bilinguals learn to control the languages not in use, and that control may produce benefits not only to executive function but also to learning mechanisms more generally. A recent proposal is that the very conditions that are available naturally during infancy may also give rise to learning strategies that may be applied to adult learners for whom entrenchment in existing knowledge may be an impediment to new learning (Cochran, McDonald, & Parault, 1999; Wu, 2013). A number of investigators are now pursuing a program of research to ask whether new language learning training for older adults will produce benefits to counter age-related cognitive decline (Antoniou, Gunasekera, & Wong, 2013). It will remain to be seen how effectively the lessons from each of these diverse areas of research will come together to provide concrete proposals for how new language learning might be implemented. The lessons from the field are clear in suggesting a new emphasis on exploiting a model that enables the learner to encounter complexity from the start and to then focus on the strategies that may encourage optimal self-regulation.

Addressing the Challenges to Multilingualism in the United States

As noted at the beginning of this article, the greatest challenges to multilingualism in the United States are characterized by the mythology about multilingualism. Learning a second or third language is not a cognitively unnatural task, nor does it create deleterious consequences at any point in the lifespan. The new research, especially work that has been made possible by the revolution in the neurosciences, shows that all the languages that an individual knows and uses are processed in an integrated language system in which there is extensive interaction (Sigman, Peña, Goldin, & Ribeiro, 2014). That interaction across languages gives rise to competition across the known languages, which requires regulation. Although that requirement may impose an initial cost during learning, it appears to be the other side of a process that produces significant benefits for the development of cognitive control. The evidence on multilingualism leads researchers to think that new approaches to language learning that allow learners to experience the variation across the two or more languages, and that may produce language mixing and initial effortful processing, may be beneficial to long-term outcomes.

There is an inspiring message in a film called “Speaking in Tongues” that documents the experiences of children in dual-language classrooms who come from very different backgrounds, including both heritage speakers and monolingual English-speaking learners who have no exposure to other languages at home.³ ² The spirit of that documentary meshes well with the scientific evidence that has been reviewed here. Encouraging others to embrace

³See <http://speakingintonguesfilm.info/>.

this view will require social action that draws on cross-disciplinary sciences and engages a larger community in working toward that goal.

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