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Building a More Resilient Brain

By SHIRLEY S. WANG



A lifetime of speaking two or more languages appears to pay off in old age, with recent research showing the symptoms of dementia can be delayed by an average of four years in bilingual people.

Multilingualism doesn't delay the onset of dementia—the brains of people who speak multiple languages still show physical signs of deterioration—but the process of speaking two or more languages appears to enable people to develop skills to better cope with the early symptoms of memory-robbing diseases, including Alzheimer's.



At Le Petit Paradis, preschoolers are learning their ABCs in both English and French. Aside from bilingualism's practical benefits, parents and experts alike say speaking multiple languages offer other advantages. WSJ's Christina Tsuei reports.

Scientists for years studied children and found that fluently speaking more than one language takes a lot of mental work. Compared with people who speak only one language, bilingual children and young adults have slightly smaller vocabularies and are slower performing certain verbal tasks, such as naming lists of animals or fruits.

But over time, regularly speaking more than one language appears to strengthen skills that boost the brain's so-called cognitive reserve, a capacity to work even when stressed or damaged. This build-up of cognitive reserve appears to help bilingual people as they age.

"Speaking two languages isn't going to do anything to dodge the bullet" of getting Alzheimer's disease or dementia, says Ellen Bialystok, a bilingualism researcher at York University in Toronto. But greater cognitive reserve means the "same as the reserve tank in a car: Once the brain runs out of fuel, it can go a little farther," she says.

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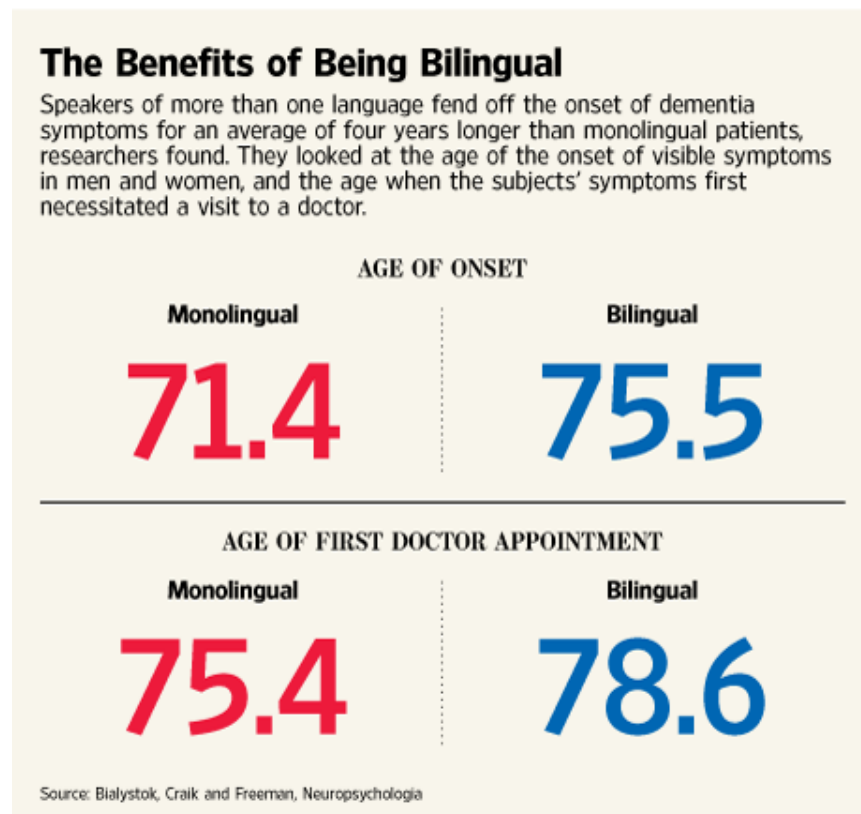
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Specifically, the advantages of bilingualism are thought to be related to a brain function known as inhibitory or cognitive control: the ability to stop paying attention to one thing and focus on something else, says Dr. Bialystok. Fluent speakers of more than one language have to use this skill continually to silence one language in their minds while communicating in another.

The idea of building up cognitive reserve has led to the popular advice that doing crossword puzzles or brain teasers, anything to remain mentally active, helps stave off dementia symptoms. A panel convened by the National Institutes of Health in July cautioned, however, that there isn't enough evidence to conclude that such

activities prevent Alzheimer's disease or related dementias.

Researchers don't know whether it is beneficial for people to learn more than one language if one doesn't speak them fluently or nearly every day. The age at which the second language needs to be acquired to yield the protective effect is also unknown.



Tamar Gollan, a researcher on bilingualism at the University of California San Diego and at the university's Alzheimer's Disease Research Center, says people can, of course, learn a new language if they want to, regardless of age. "But there's no magic point," Dr. Gollan cautions.

Dr. Bialystok began her decades-long research by studying how children learn a second language.

In 2004, she and her colleague Fergus Craik shifted to conduct three studies looking at the cognitive effects in some 150 monolingual and bilingual people between 30 and 80 years old. They found that in both middle and old age, the bilingual subjects were better

able to block out distracting information than the single-language speakers in a series of computerized tests. The advantage was even more pronounced in the older subjects.

Dr. Bialystok says other research also shows better performance from bilingual people on tests requiring cognitive control, such as when they are instructed to determine whether a sentence is grammatically correct, even if the content doesn't make sense. For example, in distinguishing, "apples grow on trees" from "apple trees on grow" and "apples grow on noses," the third sentence requires people to focus on the structure and suppress paying attention to the meaning of the words.

The findings from the 2004 study led Dr. Bialystok to wonder whether these benefits might help older people compensate for age-related losses in learning.

She and her colleagues examined the medical records of 228 memory-clinic patients who had been diagnosed with different kinds of dementia, two-thirds with Alzheimer's disease. The results, published in the journal *Neuropsychologia* in 2007, suggested that bilingual patients exhibit problematic memory problems later than those who only spoke one language.

Bilingual patients were, on average, four years older than single-language speakers when their families first noticed memory problems, or when the patient first came to the clinic seeking treatment.

Moreover, bilingual patients' memories were no worse than those of single-language speakers by the time they arrived at the clinic, and there was no difference in the length of time between the detection of symptoms and when the patients were first checked in.

In a subsequent study, Dr. Bialystok and her colleagues looked at brain images of monolingual and bilingual Alzheimer's patients at the same age and stage of disease. They found that the brains of the bilingual people appeared to be in worse physical condition. This suggests that bilingualism doesn't delay the disease process itself, but rather helps bilingual individuals better handle memory deficits, Dr. Bialystok says.

Their group has confirmed the finding in a further study that will be published later this year, says Dr. Craik, a senior scientist at the Rotman Research Institute of Baycrest, which is affiliated with the University of Toronto.

Other research, however, complicates the picture of the potential benefits of multilingualism. A recent review of the medical records of some 600 people at a Montreal memory clinic showed a protective benefit for people who were fluent in more than two languages and for bilingual people who learned French before they learned English.

English-only speakers, however, fared just as well as multilingual people who learned English first. This anomaly might be explained by the English-speakers' particular genetics, nutrition, stress levels and environmental exposure, says Howard Chertkow, a cognitive neurologist at Jewish General Hospital in Montreal and a professor at McGill University, one of the authors on the study.

Researchers in Europe, such as Wouter Duyck, a professor at the University of Ghent in Belgium, are also working on similar studies to replicate the effect in other bilingual populations.

Write to Shirley S. Wang at shirley.wang@wsj.com

Test Your Brain | Ponga a prueba su cerebro

Flanker Test

Which way is the **middle** arrow pointing?

Congruent



Incongruent



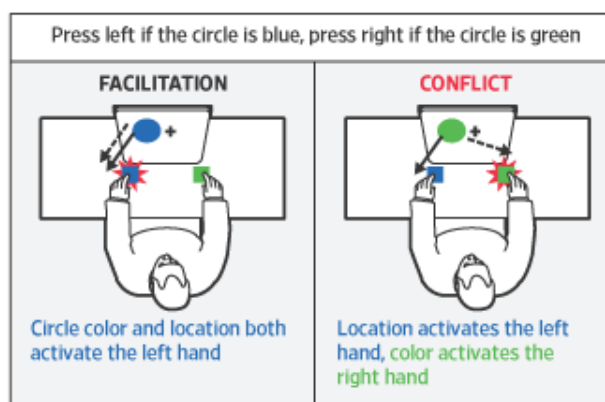
L ————— Press the 'L' for left and the 'R' for right ————— **R**

Stroop Task

Name the color of the font:

GREEN

Simon Effect



Researchers use computerized measures like these to test subjects' inhibitory control, the brain's ability to stop paying attention to one thing and focus on something else.

Speaking more than one language is believed to strengthen this control, bolstering the brain's cognitive reserve, or its capacity to work when stressed or damaged.

A more robust cognitive reserve developed by regularly speaking two or more languages may help delay the impact or effect of symptoms of dementia.

Source: Dr. Ellen Bialystok, bilingualism researcher at Toronto's York University

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