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Being Bilingual: Beneficial Workout for the Brain

By David L. Wheeler

Speaking two languages confers lifelong cognitive rewards that spread far beyond the improved ability to communicate, a series of scientific findings has shown.

In the latest research, described Friday at the American Association for the Advancement of Science, the onset of the symptoms of Alzheimer's disease was delayed by more than four years in elderly bilingual adults, even though they had identical brain damage compared with a group of adults in the study who spoke only one language. "It's not that being bilingual prevents Alzheimer's," said Ellen Bialystok, a professor of psychology at York University, in Toronto. "It's just that you are better able to cope."

Much of the early research on language learning focused on those who spoke only English. That research has expanded over the last decade to those speaking more than one language and to more universities outside of the United States, including Canadian institutions with ready access to French-English bilingual speakers, and European institutions surrounded by multilingual populations. The research on bilingualism begins with newborns, who are studied in part by counting how often they suck pacifiers when they are listening to languages they were exposed to in utero.

In the later stages of life, researchers have studied how long the elderly are able to stave off dementia and keep their ability to consciously switch between languages.

The chief benefit of being bilingual is stronger "executive control," or the ability to shut out irrelevant information and focus on what is important. Such executive functioning, says Ms. Bialystok, is the chief building block of higher thought. In one executive-control test, researchers ask subjects to tell the direction signaled by an arrow surrounded by distracting shapes. In another such test, subjects say the color of the ink that they see when they are presented, in rapid fire, the names of colors. If the word "red" is written out in blue ink, subjects need the cognitive agility to resist the temptation to say "red" and focus on the ink's color. Bilingual speakers produce the

correct answer more often and more quickly. Bilingual speakers are also better multitaskers, switching more rapidly between cognitive tasks.

Benefits of Linguistic Conflict

Research has shown that both languages of bilingual speakers are active when they are preparing to speak, although they may believe they are thinking in only one language. "For example, right now I'm trying to speak in English, but my Spanish is there all the time, activated, and it will compete," said Teresa Bajo, a professor of experimental psychology at the University of Granada, in Spain, at a news briefing. That linguistic conflict means that going from thinking to speaking might take milliseconds longer for bilingual people. But in the process of navigating the competition between languages, their executive-control systems are strengthened as they learn to shut down one language when they speak.

There are some interesting exceptions to this need: Hearing people brought up in deaf families who speak both American Sign Language and English can come close to speaking both of their languages simultaneously, although they do have to choose between the syntax of one. Research on such bilingual speakers done at San Diego State University found distinct cognitive benefits: Bilingual ASL-English speakers had improved spatial memory and a stronger ability to discriminate between faces.

For aging subjects, learning more than one language builds their "cognitive reserves," the capacity that helps adults maintain their mental skills as the brain deteriorates. And babies exposed to multiple languages do not get confused, but quickly learn to distinguish between languages and build a stronger "perceptual vigilance."

Babies use both their eyes and their ears, looking for visual cues on faces and listening to the language's rhythms, stresses, and syllables. One study done at the University of British Columbia and other institutions found that when 4-month-old babies were shown videos with the sound turned off, they could discriminate, presumably using facial cues, between those speaking a language they were learning and those speaking one they had not been exposed to. (Researchers measured how long the babies appeared to be paying attention to the videos.)

But this ability to discriminate between languages faded at about 8 months for babies exposed to only one language: They were losing some perceptual acuity. "Bilingual babies pay attention to visual information whether it is specific to their language or not," said

Janet F. Werker, director of the Infant Studies Centre at the University of British Columbia.

Preparation for Language Learning

In a separate session at the AAAS meeting, researchers spoke about how to make language learning more efficient. "We can ask, What kind of mental state do you need to bring to the game to make every second count?," said Amy S. Weinberg, deputy director of the Center for Advanced Study of Language at the University of Maryland at College Park, who organized the session. The answers to Ms. Weinberg's question: good perceptual acuity, strong executive control, and a good "working memory."

Much of the research on language learning has been for the U.S. government, which wants to improve language training for intelligence analysts, diplomats, and military officers. "We want to make training faster, better, and cheaper," says Ms. Weinberg.

The research so far points to exercises that could also be used in university classrooms to prepare adult students to learn languages: improving short-term memory by having students memorize long sequences of letters, and training readers and listeners to seek out and use, when appropriate, the much-less-common meanings of words, a process known as "divergent thinking." The help rendered by those exercises seems to expand to other forms of memory and to other cognitive functions, such as the ability to interpret ambiguity.

While research has firmly established that children and young adolescents are the best language learners, adults interested in adding a language should not despair. In terms of the cognitive improvements, "the more the better, and every little bit helps," says Ms. Bialystok.