

Bilingual children switch tasks faster than speakers of a single language

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Children who grow up learning to speak two languages are better at switching between tasks than are children who learn to speak only one language, according to a study funded in part by the National Institutes of Health. However, the study also found that bilinguals are slower to acquire vocabulary than are monolinguals, because bilinguals must divide their time between two languages while monolinguals focus on only one.

In the study, bilingual and monolingual children were asked to press a computer key as they viewed a series of images -- either of animals or of depictions of colors. When the responses were limited to either of the two categories, the children responded at the same speed. But when the children were asked to switch, from animals to a color, and press a different button for the new category, bilinguals were faster at making the change than were the monolinguals.

Researchers often use this switching task to gauge a set of [mental processes](#) known as executive functioning—generally defined as the ability to pay attention, plan, organize, and strategize. The task engages three mental processes: the ability to keep a rule or principle in mind (working memory), inhibition (the ability to refrain from carrying out one rule), and shifting (the ability to make the change and act on another rule).

"In simplest terms, the switching task is an indicator of the ability to multi-task," said Peggy McCardle, Ph.D., chief of the Child

Development and Behavior Branch at the NIH's Eunice Kennedy Shriver National Institute of Child Health and Human Development, which provided funding for the study. "Bilinguals have two sets of [language](#) rules in mind, and their brains apparently are wired to toggle back and forth between them depending on the circumstances."

The study, published online in *Child Development*, was conducted by Raluca Barac and Ellen Bialystok at York University in Toronto, Canada. The researchers tested a total of 104 children. They compared test results of English-speaking monolinguals to those of Chinese-English bilinguals, French-English bilinguals, and Spanish-English bilinguals.

The NICHD's Child Development and Behavior Branch sponsors research on reading and reading disabilities, with the goal of identifying those factors that help English speaking children, bilinguals, and children who learn English as a second language become proficient in reading and writing in English. In 2009, 21 percent of U.S. children spoke a language other than English at home.

Dr. McCardle noted that, in the United States, studies of bilingualism are often complicated by the cultural and economic differences between the majority, English-speaking monolinguals and bilingual, or second language-learning immigrant groups, who often also lack economic resources. For this reason, researchers don't know if the difference they may see in test scores between groups is due to bilingualism itself, or to the economic differences between recent immigrants and those whose families have been in the country longer. Canada has a large French speaking population, with income levels comparable to that of the English speaking population. For this reason, the researchers of the current study could rule out economic differences as a potential contributor to the study results, at least when comparing English-speaking monolinguals to the French-English bilinguals.

In the study, the researchers tested verbal and nonverbal cognitive abilities of 104 6-year-old children from the Toronto area. All were public school students, and from similar economic and social backgrounds. In addition to English monolinguals and English-French bilinguals, the study also included English-Spanish and English-Chinese bilinguals. Along with the switching task, the test battery consisted of three English language tests of verbal ability. The verbal tests measured vocabulary and children's understanding of such linguistic tasks as forming plurals, conjugating verbs, grammatical structure, and English pronunciation rules.

For the switching task, accuracy scores were similar for all the groups, with the groups choosing the correct option approximately the same proportion of times. However, all of the bilinguals could switch from one task to another more rapidly than could the monolinguals.

Earlier studies also had shown that bilinguals could perform the switching task more rapidly than could monolinguals. However, these studies tended to include only one group of bilinguals, and so couldn't rule out whether it was bilingualism itself that conferred the increased ability to make the switch, or whether it was some aspect of the language the bilinguals spoke. The fact that all three groups of bilinguals in the current study could make the switch faster than could the monolinguals indicates that it's the bilingualism itself that confers the more rapid switching ability.

In tests of verbal ability, the English language monolinguals scored highest on a measure of English receptive vocabulary—the body of words a person recognizes well enough to comprehend when hearing them or listening to them. Because they have to learn only English, the monolinguals were able to acquire a larger vocabulary than could any of the bilingual groups, who need to divide their time between acquiring two vocabularies. However, English-Spanish bilinguals scored nearly as

well as English monolinguals on the measure of receptive [vocabulary](#).

The monolinguals also scored higher than did the other groups on a test measuring knowledge of English grammar and word meaning. The English-Spanish bilinguals scored higher on the grammatical test than did the Chinese-English bilinguals, who scored higher than did English-French bilinguals. The Spanish bilinguals attended English language schools, which may have provided an advantage in tests of English grammar in comparison to the French bilinguals, who attended French language schools.

The Spanish bilinguals scored highest on the test of metalinguistic awareness—an understanding of the structure of words as a basis for forming plurals, possessive, verb tenses, and compound words. The monolinguals and the Chinese and French bilinguals received comparable scores on the metalinguistic test. The researchers concluded that the similarity of Spanish to English, and the fact that the Spanish bilinguals attended English speaking schools likely combined to give the Spanish [bilinguals](#) an advantage over all the other groups on the metalinguistic task, and an advantage over all of the bilingual groups in the other language tasks.

More information: The NIH Radio interview with Dr. McCardle on the study, "Bilingual kids may have a cognitive advantage," is available at www.nih.gov/news/radio/healthmatters/index.htm

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