

Spanish Survives Bilingual Challenge



Cuban flag



Mexican flag

Bilingual education programs for Spanish-speaking immigrants to the United States have elicited intense debate. One dispute pits the merits of teaching only English versus balancing English with Spanish to help preserve immigrants' native language and culture.

A study of Cuban and Mexican immigrants now finds that most learn English well after living in the United States for about 12 years, although much larger and faster language gains occur in those who receive formal English schooling. As many as 50 years after immigrating, these people show no loss of facility with Spanish and still speak their native tongue about half the time.

"Our data suggest that if you immigrate as an adolescent or young adult with a good grasp of Spanish, an English-immersion program will accelerate new-language learning and won't damage Spanish knowledge," asserts Harry P. Bahrlick, a psychologist at Ohio Wesleyan University in Delaware, Ohio.

Bahrlick and his colleagues tested 348 men and 453 women, most of whom had immigrated to the United States between age 10 and 26. Nearly equal numbers lived in one of three locales: Miami; El Paso, Texas; or Midwestern towns in which Hispanics are a small minority. Testing of Spanish and English language skills took place between 4 months and 50 years after immigration.

Overall, scores on Spanish text comprehension, vocabulary, grammar, and oral comprehension held largely stable across 50 years of U.S. residence. Age-related declines on these measures appeared in the oldest participants.

Volunteers readily identified "anglicized" Spanish words and phrases, such as "factorias" and "correctar." The use of these hybrid terms by many immigrants apparently does not interfere with their understanding of either Spanish or English, Bahrlick's team contends in the September *JOURNAL OF EXPERIMENTAL PSYCHOLOGY: GENERAL*.

Scores on English tests improved rapidly during the first year after immigration. English vocabulary recognition and category generation — measured by the ability to name examples of clothing and body parts — showed substantial gains over the next 30 years for each of the geographical groups; perfor-

mance on tests of oral comprehension and the ability to distinguish real from made-up words increased slightly in that same time period.

After statistically controlling for the amount of postimmigration English language usage and formal English education, those who immigrated at age 18 or older displayed more English knowledge than those who arrived before age 18. This finding contradicts the widespread assumption that the ability to learn a second language declines with age after passing through a critical period for language acquisition in early childhood, Bahrlick argues.

Conceptual similarities between English and Spanish aided English learning in older immigrants, who had larger Spanish vocabularies to draw on, Bahrlick theorizes. Participants citing the

most prior Spanish schooling and displaying the largest Spanish vocabularies learned the most English, he points out.

Native Spanish speakers may find it easier to learn English than native speakers of tongues with few conceptual links to English, such as Japanese, the Ohio psychologist holds.

Other data suggest a critical stage for learning to pronounce speech sounds in a language occurs early in childhood, according to Bahrlick, although it is not clear whether there exists a key period for learning how to arrange clauses and other linguistic elements.

"This new study has far-reaching implications for bilingual education," says Morton Ann Gernsbacher, a psychologist at the University of Wisconsin-Madison. "It should generate a lot of comment."

— B. Bower

Finding a place for the sun in a cloud

At present, the solar system appears embedded in a tenuous cloud of interstellar gas. As the sun and planets move through the enveloping material, the cloud feeds hydrogen, helium, and other types of atoms into the solar system.

These interloping atoms penetrate to the inner planets, where the atoms interact with the solar wind and, when ionized, with Earth's magnetic field. This interstellar material may even influence Earth's climate.

Using data from a variety of satellites, astronomers have started to construct a detailed picture of the gaseous environment in which the solar system resides (SN: 5/22/93, p.326). Now, a new analysis of satellite data suggests that the sun first entered this interstellar cloud just a few thousand years ago.

"Over the last several million years, the solar system has traversed a region of space devoid of [interstellar matter] and appears to have only recently encountered the surrounding interstellar cloud," says Priscilla C. Frisch of the University of Chicago. Moreover, "the sun appears to be skimming the cloud surface."

Frisch describes her analysis and reports her conclusions in the Sept. 2 *SCIENCE*.

To determine the cloud's geometry in the solar system's vicinity, Frisch focused on measurements of cosmic rays and the spectra of light emitted by stars. She used data from seven spacecraft — including the Hubble Space Telescope, the Extreme Ultravi-

olet Explorer, and Voyagers 1 and 2 — orbiting throughout the solar system.

The data support the notion that the initial encounter between the solar system and the surrounding cloud occurred between 2,000 and 8,000 years ago. The measurements also indicate that the interstellar cloud is not uniform but consists of at least two clumps.

As additional data on the shape and extent of these cloud components become available, the uncertainty in the encounter date could be reduced. "It may be possible to determine with precision the encounter epoch and therefore to establish whether relatively low-density interstellar clouds are capable of affecting the terrestrial climate," Frisch says.

Frisch's analysis also indicates that the surrounding interstellar cloud has not been violently heated within the past million years. She argues that this gas represents the quiescent, residual material from one or more supernova explosions, which created a "superbubble" centered on a group of nearby stars known as the Scorpius-Centaurus Association (SN: 4/17/93, p.244).

Considered separately, the motions of the sun and the interstellar cloud are nearly perpendicular. Hence, the sun appears to be skimming the cloud near its edge. This relative motion also indicates that the solar system creates a bow shock — a strong, leading disturbance where the speeding solar system impacts the expanding cloud.

— I. Peterson