Behavior

Baby's first phonemes

Before infants utter a single meaningful word, their perception of speech sounds, known as phonemes, changes as a result of consistently hearing adults speak a particular language, scientists report in the Jan. 31 SCIENCE.

The new data indicate that certain consonant and vowel sounds act as ideal examples, or prototypes, of particular phonemes and foster the learning of one's native language during the first six months of life, maintain psychologist Patricia K. Kuhl of the University of Washington in Seattle and her co-workers.

Kuhl and a colleague previously found that prototypes of English speech sounds identified by U.S. adults draw preferential responses from 6-month-olds born in this country (SN: 7/15/89, p.37). Other studies suggest that infants no more than 2 months old discern differences between speech sounds of many languages, including those never heard at home.

Kuhl's group tested 6-month-olds, 32 in the United States and 32 in Sweden. In each country, 16 babies listened to a prototype of an English vowel sound and the other 16 heard a prototype of a Swedish vowel sound. Training consisted of each infant listening to one of the prototypes repeated from a loudspeaker and receiving a reward (activation of a toy bear pounding a drum) for turning his or her head toward the loudspeaker when the prototype changed to one of its variations.

U.S. infants perceived the English prototype as identical to its variants (as evidenced by the lack of a head turn) on two-thirds of all trials; in contrast, they perceived the Swedish prototype as identical to its variants on half the trials. Swedish babies showed the reverse pattern, merging the Swedish prototype with its variants two-thirds of the time and treating the English prototype as identical to acoustic relatives half the time.

Thus, by age 6 months, infants begin to use prototypes of native-language vowel sounds to sort phonemes into categories, the researchers contend. This ability may reflect an innate biological capacity of infants to remember crucial stimuli, such as the faces of parents, familiar voices and the acoustic characteristics of speech, they maintain. Knowledge of how to blend phonemes together and what words mean apparently plays little or no role in this phenomenon, the scientists add.

Alcoholics heed medical advice

A study of employees at a large manufacturing plant finds a close association between receiving a warning from a physician about the health dangers of alcohol abuse and abstinence or reduced alcohol consumption more than two years later. Many factors contribute to recovery among alcoholics, but "a physician's warning may have a lasting beneficial effect," conclude psychologist Diana C. Walsh of the Harvard School of Public Health in Boston and her co-workers.

However, as in previous studies, Walsh's group reports that primary-care physicians rarely issue such warnings, even to patients with severe and obvious alcohol problems.

The researchers, who describe their findings in the Feb. 5 JOURNAL OF THE AMERICAN MEDICAL ASSOCIATION, studied 200 men identified through company-run assessments as suffering from alcoholism or bouts of alcohol abuse. Upon entering treatment – hospitalization, Alcoholics Anonymous or both – 148 men reported that they had seen a physician in the past year. Only 33 recalled getting a warning from a physician regarding alcohol's harmful health effects, although workplace evaluations easily picked up their alcohol problems.

Two years after entering treatment, men who had received physician warnings abstained more often and engaged in fewer monthly alcohol binges than their comrades. This finding held true even when the researchers controlled for severity of alcohol abuse and other factors linked to treatment success.

Earth Science

Did impacts help dinosaurs thrive?

The plot could come right out of a Greek tragedy: A ruler from long ago suffers defeat from the very forces that brought him to power years earlier. Only this time, the main character isn't Oedipus but the dinosaurs. Many scientists believe a meteorite or comet ended these reptiles' reign on Earth 65 million years ago, at the close of the Cretaceous period. Now, evidence from Italy raises the possibility that earlier impacts some 200 million years ago – at the end of the Triassic period – may have helped the dinosaurs rise to dominate their world.

In the Jan. 24 SCIENCE, David. M. Bice of Carleton College in Northfield, Minn., and his colleagues report discovering pieces of shocked quartz in sediments dating to the boundary between the Triassic and Jurassic periods. Shocked quartz has microscopic fractures, believed to result from intense shock waves created by impacts. Geologists have found similar bits of shocked quartz in sediments from the end of the Cretaceous.

Bice and his co-workers found three layers of shocked quartz spaced close together in the Italian rocks, leading them to suggest that a shower of comets struck Earth during a period lasting a few hundred thousand years. If one or more impacts did occur at that time, they may have caused some of the well-known extinctions at the end of the Triassic, the researchers suggest. The boundary between the Triassic and Jurassic periods marks one of the most severe die-offs in Earth's history. Many of the dinosaurs' competitors disappeared, paving the way for the reptiles' evolutionary success.

From fire comes ice

A global warming from greenhouse gas pollution could send the planet spiraling into an ice age over the next few thousand years, two geologists assert.

Gifford H. Miller of the University of Colorado at Boulder and Anne de Vernal at the University of Quebec in Montreal reached that conclusion after examining how glaciers and ice sheets behaved through the past 130,000 years, a time that includes the last ice age. Geologic records compiled by various researchers indicate that ice sheets began building in the high latitudes of North America, Europe and Asia at a time when the climate was at least as warm as today. In the Jan. 16 NATURE, Miller and de Vernal explain that the mild conditions – especially during winter – led to increased evaporation from the ocean, stimulating more snowfall over the far North. The snow survived during summer because shifts in Earth's orbit had reduced the amount of sunlight reaching the Arctic during that season.

The two researchers suggest that a greenhouse warming may bring the same sort of conditions that stimulated the growth of glacial sheets 120,000 years ago. Computer models of Earth's climate predict that a doubling of carbon dioxide concentrations will warm the winter Arctic by 8°C to 14°C, while raising summer temperatures much less. Some simulations predict a 20 to 40 percent increase in Arctic precipitation.

Earth's orbit may serve as an accomplice in the building of ice sheets. Over tens of thousands of years, slight variations occur in the orientation of the Earth's axis and the planet's distance from the sun. Because of such changes, the amount of solar radiation reaching key regions in the Arctic is now decreasing – one of the conditions believed to stimulate the growth of ice sheets. The radiation has already dropped to a level on a par with conditions at the start of the last ice age, Miller and de Vernal note.

Their theory counters the idea that a greenhouse warming will raise global sea levels by hastening melting of ice sheets and glaciers. The two researchers suggest that ice accumulation around the world could lower sea levels at the significant rate of 7 millimeters per year.