

## Speech lessons *in computero*

Scientists have devised a computer system, known as a neural network, that acquires an ability to recognize different speech sounds on its own. This experiment supports the theory that babies in the final months of gestation and shortly after birth learn to perceive the acoustic building blocks of talk rather than relying on a brain prewired for this accomplishment, contend Bradley S. Seebach, a neuroscientist at the State University of New York at Stony Brook, and his colleagues.

"The auditory cortex and other parts of the brain may start out with a vague organization that becomes more complex in response to particular sensory inputs," Seebach holds. "Complex cognitive behavior, such as the perception of speech sounds, may have its roots in prenatal experience."

A fetus begins to hear low-frequency sounds, such as those from the mother's voice, in the third trimester of development. Seebach's group theorizes that perception of certain syllables—pa, ka, and ta—then becomes possible.

The researchers presented a mathematical representation of low-frequency acoustic features for these syllables, based on a set of pronunciations by the same individual, to a neural network consisting of five clusters of processing units. The clusters modified their activity with repeated exposure to speech sounds, and each eventually responded most strongly to a specific syllable, the scientists report in the Aug. 2 PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES.

In further trials, the computer network accurately sorted out six new syllables uttered by two other speakers. These included three syllables with acoustic features that differed substantially from the initial speech sounds.

A critical period of learning speech sounds begins in the womb, Seebach proposes. Various language disorders may arise if this early acoustic education gets delayed or derailed.

Neural network data of this sort add a new twist to long-standing debates over the nature of language. Peter D. Eimas, a psychologist at Brown University in Providence, R.I., disputes Seebach's conclusion and argues that much evidence points to an innate capacity in humans to pick out speech sounds.

Babies recognize speech sounds used in many languages, not just those spoken by their parents, Eimas asserts. A learned preference for syllables in one's native tongue emerges at 6 to 8 months of age, he says (SN: 2/8/92, p.91).

Seebach's neural network model overestimates the extent to which a fetus can hear what nearby people say, Eimas contends. In the womb, babies most likely perceive shifts in the emotional quality of speech rather than specific syllables, he says.

## The road to bulimia

A method of classifying women by their weight-control tactics may help to identify those most likely to develop bulimia, scientists report in the August AMERICAN JOURNAL OF PSYCHIATRY.

Adam Drewnowski, a psychologist at the University of Michigan Medical School in Ann Arbor, and his coworkers gave surveys on eating and dieting habits to 557 female college freshmen at the start of school and 6 months later.

The investigators initially classified 3 percent as bulimic, based on binge eating more than once a week and frequent fasting, laxative use, or induced vomiting; 10 percent as "dieters at risk," behaving much like bulimics, but with slightly less bingeing; 29 percent as "intensive dieters" who often dieted and binged without purging; 44 percent as "casual dieters" who did not binge; and 14 percent as "nondieters."

Bulimics remained largely unchanged 6 months later. However, 15 percent of dieters at risk and 4 percent of intensive dieters had become bulimic. No casual dieters or nondieters had developed an eating disorder.

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Elizabeth Pennisi reports from Bar Harbor, Maine, at the Short Course in Medical and Mammalian Genetics

## Apo E: Caught inside the nerve cell

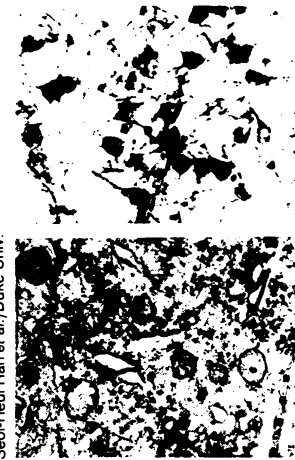
Over the past year, geneticists and epidemiologists have continued to build their case for the involvement of a lipid-carrying molecule called apolipoprotein E (apo E) in Alzheimer's disease (SN: 1/1/94, p.8; 5/7/94, p.295). Critics have argued, however, that apo E does not get into nerve cells. Now, Allen D. Roses at Duke University Medical Center in Durham, N.C., has captured apo E on film at the scene of the crime, so to speak.

Roses' team examined pieces of five temporal lobes right after surgeons had removed these tissues from patients with seizures. The researchers also studied autopsied brain tissue from one patient with Alzheimer's disease. They added antibodies designed to attach only to apo E molecules and then stained the tissue. Apo E linked to antibody showed up as dark spots.

With both electron and light microscopes, the researchers saw some accumulation of apo E, which appeared as tiny clumps within the bodies of nerve cells called cortical neurons. These cells are the ones most affected in Alzheimer's, Roses says. Nerve cells contained less apo E than other types of brain cells, the group will report in an upcoming JOURNAL OF NEUROPATHOLOGY AND EXPERIMENTAL NEUROLOGY.

*Darkened cells (top) and dark spots (bottom) indicate apo E.*

Seo-Heui Han et al./Duke Univ.



## Embryonic machismo

Even from their earliest moments, men seem to be trying to get ahead. Men typically inherit one Y and one X chromosome, while women get two X chromosomes. Geneticists seeking to understand how this initial difference plays out during development have discovered that at least one gene on the Y chromosome turns on quite early—even before the DNA from the egg and sperm have fully consolidated.

Moreover, XY (male) embryos grow and divide faster than their XX (female) counterparts, says Eugene Pergament of Prentice Women's Hospital in Chicago. This early difference may one day provide an easy way to determine the sex of embryos used for in vitro fertilization (IVF), he adds.

Pergament studied gene expression in embryos created through IVF. Because of abnormalities, these embryos could not be implanted into the mother. When a sperm first fertilizes an egg, only messages from maternal genes are active. Some of the embryo's genes then take over right away, while others don't get going until the embryo reaches the 10-cell stage, Pergament finds. The gene that codes for the male-determining factor, called *sry*, turns out to be one of the earliest to begin exerting its influence. No one knows exactly what the factor does, but once *sry* is turned on, it seems to stay active, he adds.

He and his colleagues then examined medical records for 36 IVF procedures. In IVF, physicians implant eggs 48 to 52 hours after fertilization, counting the number of cells in each implant. Pergament averaged these cell counts and matched that number against the sex of the resulting baby. He concludes that when the mother receives embryos that average four or more cells, she is six times more likely to have a boy.

Males of other species also tend to jump the gun in the womb, he notes. Male rat fetuses are heavier than female fetuses after 12 days, and male mice have more cells early on than females.

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