Behavior

Babies' 'interfaces' go beyond mom

A 1-year-old girl responds to the encouragement of a woman she has never seen before and begins to explore the toys in a playroom. The child's mother looks on from the corner, a good 9 feet away. Suddenly, a remote-controlled robot toy emerges from under a cloth-covered table. The beeping robot slowly rolls toward the infant and stops just beyond her reach.

Will the child instinctively check out her mother's facial signals of safety or fear before deciding whether to approach the robot, or will she also act on cues from the friendly stranger? If the mother's expression is noncommittal, the child is likely to be influenced by the stranger's facial expression, according to a report in the July DEVELOPMENTAL PSYCHOLOGY.

A number of studies have demonstrated that infants look toward their mothers' facial expressions and use these emotional signals to guide their behavior in a wide variety of situations. But given the right circumstances, say Mary D. Klinnert of the National Jewish Center for Immunology and Respiratory Medicine in Denver and her colleagues, infants are influenced by a much broader group of adults than is often assumed.

Take the robot-toy example described above. Klinnert and her co-workers put 46 1-year-olds (25 girls and 21 boys) in this situation. When the beeping intruder appeared, an experimenter playing with the infants posed either happy or fearful expressions while the mother, sitting across the room, maintained a neutral expression. Mothers were usually able to keep a "straight face," as judged by observers behind a one-way mirror, but when they slipped into positive or negative expressions a child's behavior was excluded from the study.

The researchers found that 38 of the infants looked at the experimenter as well as their mothers after seeing the robot, and 30 of those looked first at the experimenter. Infants in the smile group were more likely to approach and touch the robot than those in the fear group. Infants in the latter group who approached the robot took much longer to make their move than those who had seen a smile; fear-group children also touched the toy for a shorter period of time.

Infants who received smiles showed more positive facial expressions than those who received fear signals. Initial responses to the robot were mostly positive, but the adult's facial reactions of fear still had powerful effects.

There were large individual differences in how children looked at and reacted to the experimenter and the mothers, conclude the researchers, but it is clear that even 1-year-olds are influenced by the emotional signals of relative strangers.

Medical misses on death row

Many death-row inmates probably have unrecognized psychiatric and neurological disorders, according to a study of 15 condemned individuals in the July AMERICAN JOURNAL OF PSYCHIATRY.

All 15 inmates had histories of head injuries dating to before their imprisonment, report Dorothy Otnow Lewis and her colleagues of New York University School of Medicine in New York City. Five had major neurological impairments, including seizures and paralysis, and 7 had histories of blackouts, dizziness and abnormal muscle reflexes. Six subjects had long histories of psychosis, and 2 others were manic-depressive.

Medical examinations were requested because execution was imminent and other avenues of appeal had been exhausted, not because mental problems were obvious.

It is not clear why these disorders had gone unrecognized, say the researchers. One reason, they suggest, was that nobody suspected their existence or bothered to check for them. In addition, the inmates did not consider themselves sick, and since their psychotic symptoms were not overwhelming, specialized evaluations had never been requested.

Technology

Talking by meteor

Shooting stars are good for more than wishing upon, as radio operators know. Since the 1950s, meteors have been put to work as reflectors for radio signals. Now, they may begin working harder than ever — carrying not only data but also the human voice. In July, engineers from GTE Government Systems in Waltham, Mass., became the first to send a spoken message via meteor trail. The words traveled 418 miles from Westborough, Mass., to Winchester, Va.

The technique can be used during times when naturally occurring ionospheric disturbances interfere with communication by satellite or shortwave radio, according to John R. Herman, the engineer in charge of the recent GTE tests. It also is expected to interest the U.S. military, the GTE subsidiary's primary customer, because it provides a way to communicate during nuclear war — when communication satellites could be wiped out.

The process is called "meteor burst" communication because it bounces a radio signal off the ionized trail of a meteor, about 60 to 75 miles above ground, in order to send the signal past the horizon. Meteor trails are a reliable way to reflect signals because meteorites enter the earth's atmosphere about 3 to 10 times a second. Amateur radio operators have used them since the 1950s, and more recently, meteorologists have used them as an inexpensive way to send weather data from remote rural areas.

But before meteors could be used to transmit voice, GTE scientists had to write the computer software that enables them to compress a digitized voice signal enough to bounce an entire message off one meteor trail. Each trail lasts from a few hundred milliseconds to a couple of seconds, Herman says.

During the first trials of the system in July, the voice sounded more "computerized" than a telephone voice, Herman says, because of the way the words were digitized and then translated at the receiving end. "It sounded a little better than the computer voice in the movies that speaks in a monotone," Herman says. Improvements in the software should make the voice sound more natural, he says.

Eventually, the GTE scientists expect to be able to send voice signals more than 1,000 miles, Herman says.

An electromagnetic measuring stick

The usual methods for measuring levels of contained liquids don't work well inside nuclear power plants; ordinary floats cannot withstand the heat and poisons inside the tanks, and methods that bounce ultrasonic signals to the top of the liquid are difficult to set up in a sealed, hostile environment. So scientists at Sandia National Laboratories in Albuquerque, N.M., have created a new liquid-level sensor that uses electromagnetic pulses.

The device sends an electromagnetic signal through two coaxial cables, one submersed in the liquid to be measured and another operating as a reference line. At the point where the first line reaches the liquid level, the signal automatically is reflected back to the source. The reference line is adjusted so that its signal bounces back from the exact same spot. Then, when the liquid level changes, the signals from the two lines differ, and the difference can be translated into measurements of the level change.

The device can measure changes as small as a millimeter, according to William Sullivan, one of the designers.

The sensor was designed to measure hot liquid sodium (about 1,475°F), which is used to cool the nuclear reactor core. Knowing the level is critical, Sullivan says, because the core must be entirely submersed. "As a matter of fact," he says, "defective knowledge of the liquid level was one of the major contributors to [the accident at] Three Mile Island."