BEHAVIOR

Preschool personality and learning

Like adults, children — even preschoolers — have wide-ranging personality differences that can affect their social interactions. Introverted children prefer being alone, have few friends and tend to be generally introspective and inhibited. Extroverted youngsters like to be with others, have many friends and are more impulsive than their introverted counterparts.

Because much of a child's life revolves around school, researchers are trying to determine how much a youngster's personality influences his or her ability to learn or the way in which learning takes place. Gregory T. Fouts of the University of Calgary and Marguerite Click of the University of Denver separated two groups of preschool children into the introverted and extroverted categories and exposed them to three "models": a live person, a person on television and a personless television scene, each demonstrating the assembly and use of certain toy-like objects.

The researchers report in the June PERCEPTUAL AND MOTOR SKILLS significant differences between the two groups. "Regardless of the modeling condition, extroverts showed more observational learning than introverts," they report, "and live modeling produced more observational learning than either of the two TV-mediated conditions." Both groups paid less attention to the TV sequences than to the live model, but extroverts paid less attention than did introverts to the TV scene without a person.

The overall results are "consistent with the hypothesis that extroverts learn more through observation than introverts," say Fouts and Click. The findings also suggest that extroverts, by responding more to social, person-oriented stimuli, have "an additional source of learning in their repertoires." Such observations may be used to tailor school programs to "optimize" learning conditions for introverts. This may include, the researchers suggest, having introverted children learn in more "non-social settings," such as with teaching machines or reading alone, or by modifying introverts' learning styles "so that they *can* learn in social situations."

Smoking hazards and the fetus

Evidence that smoking may be harmful to an unborn baby continues to mount. Some of the latest results come from the University of California at San Diego, where Robert Resnik says he has documented effects of nicotine on fetal blood flow.

Resnik and his colleagues injected a nicotine solution into pregnant sheep and studied the reaction of the uterus. The results, reported in the August JOURNAL OF CLINICAL INVESTIGATION, show that nicotine injected directly into the sheep's uterine artery causes no change in circulation. However, nicotine injected into a major body vein triggers a sympathetic nervous system discharge that causes constriction of blood vessels supplying the uterus.

The vein injection stimulated the release of hormones from the nervous system to the uterus and caused a 44 percent drop in blood flow and a 200 percent increase in blood vessel constriction, the researcher reports. These results match similar changes observed among pregnant women before and after smoking, Resnik says.

"This combination of nicotine reactions, together with prolonged increase in the amount of carbon dioxide in the fetal bloodstream, may cause a continuous oxygen deficiency," he says. Results of previous studies suggest that among infants of women who smoke during pregnancy, birth weight is lower and the chances of fetal distress or death and premature birth are higher. Other investigators have also shown a reduction in fetal breathing movement after the infusion of nicotine. Resnik's work is funded by the March of Dimes.

BIOCHEMISTRY

Cancer chemistry in human tissues

Many environmental chemicals are converted in the body to their active, carcinogenic forms. The liver, the body's detoxification center, has been accused of most of this unfortunate activity. Experiments at the National Cancer Institute, however, show that other tissues also can activate the chemicals.

Non-tumorous samples of human lung and colon tissue obtained during surgery or autopsy were maintained in laboratory culture for as long as six months. When the tissues were exposed to the carcinogens aflatoxin B_1 or benzo(a)pyrene, the chemicals were metabolized into their ultimate, DNA-binding forms, Herman Autrup, Curtis C. Harris and John M. Essigmann reported in Toronto at the International Congress of Biochemistry. Autrup says that tissue of the esophagus, trachea and pancreatic duct also activate the carcinogens.

Tracheobronchial tissue from laboratory animals, as well as from humans, was examined. "The qualitative similarities strengthen our confidence in the extrapolation of carcinogenesis data from experimental animals to humans," the scientists say. Among inbred mice they found the most activation in strains most susceptible to a carcinogen. They noted wide variation (50- to 100-fold) in metabolism and DNA binding of the carcinogen among individuals of populations that hadn't been inbred. Such quantitative variation may in part determine a person's susceptibility to a carcinogen.

Receptors as interchangeable parts

A cell senses its chemical surroundings in a two-component operation. A receptor on the surface specifically binds a particular chemical. That binding then activates an enzyme, called adenyl cyclase, which spews a cyclic AMP signal throughout the cell. Experiments by Michael Schramm at the Hebrew University in Jerusalem have shown that when two cells fuse, their components shuffle and receptors from one cell can team up with adenyl cyclase from the other. Receptors and enzymes from different tissues and even from different animals are compatible with each other. In addition, receptors for quite different chemicals (such as glucagon, epinephrine, prostaglandin E_1 and a peptide called VIP) are interchangeable as partners with a given adenylate cyclase. "The different hormone receptors [are] apparently plugged into the adenylate cyclase system by the same mechanism, suggesting considerable homology of their molecular structure," Schramm explains. He suggested at the International Congress of Biochemistry that receptors may be identical except for the hormone binding sites. Thus the structural strategy of receptor molecules may resemble that of antibodies — composites of constant and variable regions.

Enzymes reflect nerve damage

Evaluating chemical damage to the nervous system is a tedious and painstaking task. Microscopists examine slice after slice of tissue looking for signs of deterioration. Now measurement of two enzymes may provide a more rapid and more quantitative biochemical assessment of nerve damage. Scientists at the Shell Toxicology Laboratory in Kent, England, find that beta-glucoronidase and beta-galactosidase levels in homogenates of peripheral nerves reliably reflect chemically induced nerve damage. By assaying a series of small pieces of rat nerve (less than 10 milligrams of sample is required), A. J. Dewar, B. J. Moffett and G. P. Rose can distinguish different patterns of nerve damage. They reported at the International Congress of Biochemistry that the enzyme levels measured for a range of pesticides, industrial chemicals and drugs support previous clinical, electrophysiological and histological evidence of nerve damage.