teenagers from both authoritative and authoritarian families. But the researchers found that youngsters in the authoritarian families, particularly daughters, were more unhappy, had more emotional problems and scored lower on achievement tests than their peers.

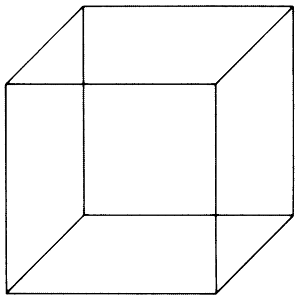
Reports of sexual activity and heavy or dependent drug use came most often from adolescents with unengaged parents, followed closely by adolescents from nondirective families.

Teenagers from good-enough homes displayed no serious problems and did fairly well on achievement tests. Daughters in these homes reported extremely low self-esteem, however. This finding is difficult to explain, Baumrind says. "These girls may need something more from their parents, perhaps a sense of being special," she suggests.

Although the authoritative parenting style proved most successful in this sample, Baumrind notes that well-functioning children also came from other types of homes, especially democratic ones.

Divorce was most frequent among authoritarian and unengaged parents, she adds. But single parents who used the authoritative style had teenagers who were just as competent and well adjusted as teenagers from intact authoritative families. *— B. Bower*

Tracking down the neurons of perception



Line drawing of a cube elicits rivalrous 3-D perceptions.

A simple sketch of a cube can prompt two rivalrous perceptions: A person might see the cube extending forward at one moment and backward the next, switching perceptions with each new glance.

By presenting rivalrous visual stimuli to rhesus monkeys and monitoring the monkeys' silent, inner perceptions — through behavioral clues and the responses of brain cells known to process visual motion — two neurophysiologists think they may have observed the cellular activity of perception.

"This is one of the first demonstrations of the activity of single neurons corresponding to a monkey's perceptual state," says Jeffrey D. Schall of Vanderbilt University in Nashville, who works on the ongoing project with Nikos K. Logothetis of the Massachusetts Institute of Technology in Cambridge. They report their progress in the Aug. 18 SCIENCE. "It's the best attempt I know of to look at the neurophysiology underlying rivalrous perception," notes neuroscientist William T. Newsome of Stanford University.

The stimuli in the experiments come from vertically moving gratings of horizontal bars, each visible to one eye through a viewer that fuses the gratings into a composite stimulus. In half the trials, the gratings move in the same direction and the monkey can perceive only up or down motion. In the other half, the gratings move in opposite directions, eliciting rivalrous perceptions of upward and downward movement.

Since monkeys can't describe their perceptions verbally, the scientists trained them to make quick eye movements to the right (signaling upward motion) or left (signaling downward motion) of a central fixation point presented after each trial. And *during* each trial, researchers tracked vertical movements of each monkey's eyes for a check on the animal's subsequent report of its perception.

At the same time, they used electrodes to study how 59 single neurons in the superior temporal sulcus — a brain groove roughly located behind each ear — responded in the different trials. As expected, most of these neurons fired fastest in response to exclusively upward or exclusively downward movement of the gratings. The response of many of the cells didn't change even during trials presenting rivalrous stimuli. That means they responded only to the visual stimulus and did not reflect the internal perception of the monkey. Yet with the same rivalrous stimuli, 13 of the neurons did change their firing behavior. These cells, therefore, could be related to the internal perceptual state of the monkeys, and not merely to some physical feature of the stimuli, Schall and Logothetis argue. *— I. Amato*

A snake-in-the-ring keeps spins aligned

Using a Soviet-conceived device known as a Siberian snake, U.S. physicists have wormed their way out of a tricky technical problem encountered in accelerating elementary particles.

The problem arises in trying to keep the spin of subatomic particles aligned, or polarized, as they whiz around an accelerator. Particles that maintain such alignment during high-energy collisions give scientists a window on the strength of the spin-dependent portion of the strong force, which holds nuclear particles together. Although the magnetic field that keeps a charged particle circling through the accelerator changes the direction of spin with each lap, at most energies these effects tend to cancel each other out after successive laps around the ring.

But at certain energies, called depolarizing resonances, the changes in spin direction become additive, throwing the spin orientation of such particles as protons out of alignment. While misalignment at a particular energy can be overcome electromagnetically, says physicist Alan D. Krisch of the University of Michigan at Ann Arbor, high-energy accelerators have thousands of resonances. Correcting for each misalignment then becomes impractical, if not impossible.

Enter the Siberian snake.

Although the device was first proposed in 1974 by Soviet theorists Yaroslav S. Derbenev and Anatoly M. Kondratenko of the Novosibirsk Laboratory, researchers were unable to build it because none of the world's existing high-energy accelerators had enough room in their beam pipes for the 19-foot-long electromagnet. The snake produces a magnetic field that reverses the spin of every proton in a particle beam each time the particle travels around the accelerator ring. As a result of the spin flip, unwanted magnetic disturbance that redirects a proton's spin after one lap has the opposite effect the next time around. Thus, the two effects cancel each other out and the particle beam remains polarized.

"It's a cute idea and it works for all resonances at once," says Krisch, who collaborated with scientists from the University of Michigan, Indiana University in Bloomington and the Brookhaven National Laboratory in Upton, N.Y., to build and insert the device inside the cooler-ring accelerator of Indiana University's cyclotron.

During the weekend of Aug. 5, the researchers put the snake through its paces. First, with the Siberian snake switched off, they accelerated protons in the cooler ring to an energy of 108.45 million electron-volts — one of two depolarizing resonances at the Indiana facility. A polarimeter measured the fraction of protons spinning in each direction. At resonance, the fraction of protons with aligned spins decreased from 70 to 20 percent. But after the investigators turned on the snake electromagnet, spin alignment remained at 70 percent despite the resonance. Krisch says he sent a telegram to the Novosibirsk Laboratory informing the director of the results.

Perhaps fittingly, Krisch says, one of the first high-energy accelerators to exploit the snake concept will be UNK, the Soviet Union's 3-trillion-electron-volt accelerator, located about 70 miles south of Moscow. *— R. Cowen*