who were worse off to begin with," she said.

Ackerman and colleagues Roscoe A. Dykman and John E. Peters were also disturbed to find that many of the hypoactive youngsters remained "overly passive" at followup. "Five of the hypoactives were extremely withdrawn, cold or lacking in affect — and one was so silly as to be bizarre," they report.

But the team's main concern was directed toward the hyperactive youngsters, most of whom at age 14 still exhibited the fidgetiness that plagued them in grade school, and a number of whom had gone on to have trouble with school and law enforcement authorities.

There is hope, however, for the post school years, according to Ackerman. A recent followup of hyperactive youngsters as young adults by Canadian researcher Gabrielle Weiss indicates that once such persons get out of school and into the job market, they "seem to do all right," Ackerman says. "Once they get away from the rigid demands of school, things seem to improve," she says. "As they get into their mid and late 20s, they adjust better. What I'm guessing is that age is the best thing that can happen to these kids." □

Pioneer 11 will go outside Saturn rings

Despite the near-unanimous vote of the Pioneer 11 spacecraft's principal scientists (SN: 11/12/77, p. 315), NASA officials have decided to send the probe outside the rings of Saturn, rather than between the rings and Saturn itself, when the craft flies close to the planet in early September of 1979.

The primary reason is to let Pioneer 11 serve as a pathfinder for the Voyager 2 spacecraft, which will pass close to Saturn in August 1981 with the option of then going on to a 1986 encounter with Uranus. There has been some concern that potentially spacecraft-killing particles may exist outside (as well as inside) the readily visible ring structure (SN: 10/15/77, p. 249), so Pioneer 11 will be aimed to cross through the plane of the rings at the same distance from Saturn as the ring-crossing of Voyager 2's Uranus-bound trajectory option. This will allow time to move Voyager 2's crossing outward (sacrificing the Uranus option) in the event that Pioneer 11 is destroyed.

Many of the Pioneer scientists had argued that an inside-the-ring passage would be more scientifically valuable, even if it ended abruptly at the ring plane. Voyager, however, would stand to lose much of its *pre*-crossing data as well, since the sophisticated probe will be gathering data so rapidly that many of the measurements must be stored on an on-board tape recorder for playback after the encounter. □

Reflecting on superluminal speed

An object that goes faster than light is about as welcome to physical scientists as a real live ghost would be to the American Humanist Association. Yet there are at least three quasars that appear to be composed of two or more pieces that are flying away from each other at speeds greater than that of light. The response of most astronomers is that it is just an appearance and must somehow be explained away. The most popular explanations to date seem a bit contrived, however, and a recent review of the subject by M. H. Cohen and colleagues left readers to conclude that maybe ghosts do exist.

Many purported ghost effects are done with mirrors, and that essentially is what's causing the appearance of objects going faster than light, argues D. Lynden-Bell of the Institute of Astronomy in Cambridge, England, in the Dec. 1 NATURE. He calls it a light echo.

Lynden-Bell has a theory of a quasar that sees it as a black hole surrounded by a disk of infalling matter. Near the hole, this disk is inflated almost to a spherical shape by radiation pressure. "Just as water flowing into the black hole in a bath does so around a narrow vortex," Lynden-Bell writes, "so the sphere is pierced by a narrow vortex hole on the sides of which velocities close to c are reached as the central black hole is approached."

This kind of action could produce flashes of light moving in opposite directions along the axis of the vortex. As these flashes struck patches of ionized gas in space, they would set it moving at speeds near that of light. The patches hit by the light burst would be visible from earth by reflection of the light from the central source or by light of their own generated as a result of the disturbance. Assuming that the central black-hole object was not visible from earth, the two plasma patches would appear to be moving apart at a relative velocity of nearly $2c$ if the arrangement were seen broadside. There is an historical precedent for this kind of model in the explosion of Nova Persei of 1901. Light from this explosion was reflected from a nearby nebula, and the part of the nebula that reflected the "echo" appeared to be moving across the sky at a speed of $2c$.

But the faster-than-light phenomena include apparent velocities up to $8c$ and also the galaxy 3C120, which at times has looked like a double source and at times like a triple source. The galaxy can be explained by a model in which the central black-hole object varies between visibility and invisibility from time to time. The apparent large multiples of c are gotten rid of by changing the value of the Hubble constant from the commonly used 55 kilometers per second per megaparsec to 110 kilometers per second per megaparsec. □

Luna 24: Shaking up the moon-watchers

None of the scientists who have been studying the 383 kilos of Apollo lunar rock samples would be rash enough to say that all or even most of the moon's mysteries have been solved as a result. Even so, a few *grams* of material provided last year by the Soviet Luna 24 robot spacecraft have now clearly informed the selenologists that a great deal more remains to be learned. For the Luna 24 sample is like no other sample ever brought back from the moon.

Only about 650 grams of moonstuff were returned by the probe, and the 3-gram U.S. share (presented as a gift by Soviet officials earlier this year) is barely half the weight of a nickel. Yet that tiny allotment, together with a few similar or smaller portions allocated to other countries such as France, brought nearly 100 scientists to the Lunar Science Institute in Houston last week for the first "single-sample" moon-rock gathering since the post-Apollo 11 meeting of 1969.

Luna 24 collected its prize from Mare Crisium, the major basin closest to the eastern limb of the moon's visible face, and there has been hope that the top of the sample core might include material blasted over the horizon from craters being formed on the otherwise unsampled far side. Unfortuantely, it is believed that the coring tube may have nudged the critical topmost layer of material aside as it dug in. Also, according to Ted Maxwell and Farouk El-Baz of the Smithsonian Institution, material ejected from the likeliest candidate crater — Giordano Bruno — probably just missed the landing site.

But the site had no need to import its surprises. One of its most distinctive characteristics is the dominant presence of very-low-titanium (VLT) basalts, a type otherwise known only in tiny traces from Apollo 17 and Luna 16. It is also lower in potassium (and apparently in the potassium-rare earth-phosphorus suite known as KREEP) than the Apollo-sampled central regions of the lunar near side. Olivine in the material has revealed some "unique" high-silica, low-alumina glass inclusions that are "at present inexplicable in several respects," and there is even a bit (though probably less than 2 percent) of highland material transported from outside the basin itself. The material is also providing valuable calibration for earth-based geochemical surveys of the moon, which have become abruptly more important with Luna 24's revelations of what Apollo didn't find. □