ZOOLOGY

Monkeys may approach tasks logically

According to a study, monkeys may be at least as logical as four-year-old children. Based on seven spider monkeys' success with reasoning tasks, two Edinburgh University (Scotland) scientists speculated that the simians may have a limited capacity to think logically.

The tests required the monkeys to evaluate, two at a time, the relative weights of four pairs of tin cans. The subjects were variously trained to recognize either the heavier or lighter member of each pair.

Following this initial training, they had to compare members from disparate pairs. In one critical comparison, they collectively made the correct choice 90 percent of the time. Comparing this to a previous study, Brendan O. McGonigle and Margaret Chalmers, noted that four-year-old children achieved 78 percent success with a similar chore.

The monkeys were also required to make critical evaluations among triplets of cans. This test was particularly significant, the authors report in the June 23 NATURE, because its results are a key in discriminating between two contesting hypotheses of a monkey's "logic."

One hypothesis contends that the triplet comparison entails a complex logical coordination of the pair information initially learned by the monkeys. This "transitivity" process is involved whenever any mind concludes that Bill is taller than Joe, given that Bill is taller than Frank and Frank taller than Joe.

The other hypothesis suggests that decisions about triplets are really comprised of many separate judgments about the associated pairs. It is easy to show mathematically that among any three objects, there are three distinguishable pairs.

The first idea predicts that an ideal subject will make the correct selections all the time, whereas the second predicts an average success of only 64 percent. In the experiment, the monkeys were correct an average of 67 percent of the time, in apparent agreement with the second idea.

The authors believe that the monkeys' level of achievement is an indication of their ability to make inferences based on given information. "Whether such operations [of 'inference'] provide for the foundations of logical development remains unknown," they conclude.

Crocodile parents: Better than many

The crocodile is not as negligent a parent as some contemporary studies have intimated. Although the animal is far less devoted than the exemplary mammal and avian parents, it is still a cut above the other reptiles, according to a scientist from the St. Lucia Estuary Game Reserve in Zululand, South Africa.

It is generally known that a typical expectant mother excavates and fashions an adobe-like nest made of mud and reeds. The pit lies below the ground and is large enough to accommodate an average clutch of 45 eggs. After laying her eggs in several carefully stacked tiers, she seals the nest's opening, creating something resembling an incubator.

A.C. Pooley has newly reported that the crocodile faithfully protects the nest and often fasts in the process. The mother fends off any potential adversary with an arsenal of dramatic fury. Threatened, she will gurgle, bubble and froth and often will heighten the intimidation by spraying jets of water from her nostrils.

When the progeny begin squeaking, their mother frees them by breaking open the nest. She then retrieves them into a special pouch in her lower jaw for safekeeping. Carrying them there, the mother crocodile wades into the water to introduce her young to the wet environment, Pooley reports in the JOURNAL OF ZOOLOGY (182:17).

ASTRONOMY

New supernova remnant

Astronomers see supernovas popping off in distant galaxies fairly regularly, but none has been seen in our galaxy since 1667. Supernovas leave behind glowing clouds of gas thrown out by the explosion, and these remnants can remain visible for centuries.

The only supernova remnant visible to the naked eye is the Crab nebula. It is the remains of an explosion that took place in 1054, one of only five supernovas recorded in our galaxy in the last millenium.

Now Kitt Peak National Observatory reports that the remnant of a much older supernova has been found in the constellation Cygnus by three visiting astronomers, Theodore Gull of the Lockheed Electronics Co., Robert P. Kirshner of the University of Michigan and Robert A. R. Parker of the National Aeronautics and Space Administration.

The remnant is an egg-shaped shell of gas and dust about 220 light-years across and 3,900 light-years from the earth. It is still expanding outward from the explosion center at 160,000 kilometers per hour. From the evidence it appears that the explosion happened about 300,000 years ago.

Odd twists in Jupiter's evolution

Planetologists generally assume that the planet Jupiter and its satellite system condensed out of material that was part of the presolar nebula that became the sun and the planets in a process that started about 5 billion years ago. The part that became Jupiter, it is usually assumed, was a uniformly rotating sphere of nebular matter.

But when the fluid dynamics of models of Jupiter's evolution are calculated on the basis of that assumption, certain difficulties arise. Peter Bodenheimer of the Max Planck Institute for Physics and Astrophysics at Munich sets them forth in a paper in ICARUS (31:356). The major difficulty is that if one assumes that the proto-Jupiter cloud was a uniformly rotating sphere of uniform composition and that its outer layers had an angular momentum that could give the present orbital motion of Jupiter's outermost regular satellite, the calculation leads to a fission of the cloud into two or more pieces. This would not produce the Jupiter system. But if the angular momentum of the uniform cloud is taken small enough that fission is avoided, and a single central planet thus produced, the outer layers of the cloud would have too little angular momentum to account for the orbits of the outer satellites. The solution, Bodenheimer thinks, is to abandon the hypothesis of the uniformly rotating sphere for one with angular momentum that varies with radius, being smaller in the center and greater in the outer regions.

Ready when you are, Mr. Halley

Of all the periodic comets, Halley's is certainly the most famous. It has reappeared regularly every 76 years and has been bright enough to notice easily. This high profile is surely why it was the first comet to have a relatively reliable orbit calculated by Isaac Newton's then new laws of gravity.

Comet Halley's next return is due at the turn of the years 1985-1986, and astronomers are sharpening their pencils in anticipation. One of the problems has been that although the year of return could be predicted by gravitational theory, the comet is subject to nongravitational forces that make accurate prediction of the perihelion date difficult. Recalculating past observations and fitting in corrections between predicted and actual perihelion, D. K. Yeomans of the Jet Propulsion Laboratory concludes in the June ASTRONOMICAL JOURNAL that the nongravitational forces are due to the rocket effect from outgassing of a water-ice cometary nucleus. He predicts perihelion for about 4 p.m. Eastern Time on Feb. 9, 1986.