



Photos: Yerkes Primate Center

Learning how to compare sight and touch

An unsuspected learning ability in apes may have implications for reading disabilities in humans

by Robert J. Trotter

A sensory stimulus produces a response but it does not always produce learning. A child, for example, could look at the pages of a book all day, but if he did not relate the written words to known sounds he would never learn to read. So teachers have their students read aloud in class. By hearing and seeing the words, the children learn to read. Blind persons hear and feel the words as they learn to read. This learning process requires comparison and correlation of separate modes of sensory input and is called cross-modal integration.

Animals respond to stimuli but researchers were reluctant to believe them capable of cross-modal learning. Last year Richard K. Davenport of Georgia Institute of Technology in Atlanta reported that apes do have the ability to compare and use information from two senses (SN: 10/23/71, p. 281). He and Charles M. Rogers worked with two chimpanzees and an orangutan at the Yerkes Primate Center in Atlanta. The experimental set up that they are still using allows an ape to see an object through a window. The animal is taught to reach through a slot beneath the window and feel two objects, one of which is similar to the one seen through the window. If the ape tugs on the matching object he is rewarded. In 80 tests each of the apes chose the correct object more than 75 percent of the time. This, says

Davenport, is a new phenomenon in ape studies. It shows an unsuspected neurological organization in these primates.

The experiments have since been expanded and Davenport believes he has clear evidence for cross-modal learning. Hundreds of tests have been conducted, changing the position of the matching object and using many different pairs of objects. Color, black-and-white and various sized photographs were substituted for the objects behind the window. The animals recognized them and did as well as with the real objects. Even high-contrast, symbolic photos and rough line drawings were used. The results were well above chance.

Five apes have been added to the experimental group, and a recent set of experiments has shown the phenomenon to be bidirectional. The windows were darkened and the animals were taught to reach through the slot and tug on one of the objects. The window then lit up showing two objects. The animal then put his hand to the one he had felt. With funds from the National Science Foundation, Davenport intends to continue the testing with other modalities—specifically, sound and light.

Davenport says gorillas are also capable of cross-modal learning, but tests have been unsuccessful because the animals will not cooperate. Mon-

keys are being tested but they do not show the ability and Davenport does not expect them to. Man and the apes, he says, are above a phylogenetic cut-off line. Monkeys are below it and do not have the necessary mental development.

"These studies are an interesting way of getting at the higher mental processes of animals," says Davenport, "but there are also human applications." Dyslexia, for example, is a reading disability that affects 10 percent of the children in public schools and is a major cause of learning frustrations and school drop outs.

Probably of genetic origin, the disease runs in families and occurs most often in left-handed males. Those who have it characteristically transpose *M* and *W* and *d* and *b* while copying or reading. The problem is thought to be caused by a lack of communication between various modalities. It usually goes undetected until the child learns to speak or read. If it were detected at an earlier age, it could be treated and frustration in school could possibly be avoided.

Davenport says his studies with the apes show that language is not necessary to detect such a disability. In Atlanta he recently began testing cross-modal ability in children with reading problems. "The work," he says, "is just beginning, but the first results are promising." □