Do animals feel emotion?

Behavioral scientists are taking note of the difficulty in extrapolation from animal to human behavior

Generalizations between animal and human behavior come easy. For scientific purposes they are too easy.

Primates are raised under a variety of conditions that are poor for the purpose of finding clues to human development. Drugs that affect emotions are tested in rats and no one knows whether a rat has such a thing as an emotion. Nevertheless experiments continue to be done and conclusions drawn from them as if a living thing is a living thing is a living thing.

Humans just assume that animals, even those with the simplest nervous systems, experience emotion like theirs.

Generalizations come even easier between different species of animals. But there is a turn in the air; reserchers who experiment with animal behavior are beginning to pay attention to the fact that differences exist.

The quick extrapolation of behavior across species was caught up short last year with the English publication of Konrad Lorenz's book "On Aggression." Lorenz's explanation of human aggression as a product of evolution stirred strong protests. Suddenly, in reaction to Lorenz, it seemed grossly naive to assume an innate aggressive drive in humans from the study of lower animals.

German biologist Lorenz proposed that man inherited aggression from his evolutionary past, but failed to inherit social inhibitions to control it—the reason being that humans in their natural state are not particularly dangerous. Men, unlike wolves, cannot easily kill each other, said Lorenz. But with the development of intelligence, man was able to devise dangerous weapons and thus his poorly-controlled aggressive capacity was loosed on the world.

Lorenz drew his theories of aggression from close observation of animals, fish in particular; his leap to humans started a major new movement in the study of emotions and behavior.

Where once the emphasis was on similarities between species, it is now on dissimilarities. But more important, there has been a shift from a primarily human focus to animals, with the realization that understanding of the full range of animal behavior, particularly its neurological base, is the first order of the day.

The new approach was evident during a New York Academy of Sciences meeting late in November. Titled "Experimental Approaches to the Study of Emotional Behavior," the conference was aimed at drawing together whatever is known about animal emotions.

"We have to start looking at differences between species," said Dr. Ethel Tobach, chairman of the conference and assistant curator of the department of animal behavior at the American Museum of Natural History.

The conditions which give rise to aggression are specific for each individual and depend upon that individual's species and personal history, Dr. Tobach believes. Some animals fight at a single cue—a color or a smell.

Human aggression is much more variable. It can, for instance, be channeled through symbolic cues: Words can inflame or defuse aggression in men. That is not true of any other animal, says Dr. Tobach.

As if to exemplify this point of view, Dr. Jose Delgado of Yale University gave evidence that aggression in monkeys as well is no simple outburst of innate drive. Well-known for his work in controlling animal behavior with implanted electrodes, Dr. Delgado this time used radio signals instead of electrical wires to stimulate monkey brains, and the animals were free to interact with their fellows.

A monkey's place in the social hierarchy makes all the difference in his aggression, Dr. Delgado concludes, even when the monkey's brain was directly stimulated in an area that would ordinarily provoke a fighting response.

If the animal was low on the totem pole, he drew attack by others. If he was high, he attacked. In each case, the same animal was under stimulation and in the same brain area.

"Aggressiveness is not a rigid response . . . but rather a tendency to react," says Dr. Delgado. It is just one factor of many and may be expressed or blocked depending on how a monkey sizes up his situation.

But even speaking about monkeys in general is too broad. Dr. Charles Kaufman of the Downstate Medical Center of the State University of New York made that clear with his studies of two related species, bonnets and pigtails.

The two species show profound differences in social patterns. Bonnets are gregarious, huddle together in large groups of adults and infants. Pigtails keep away from each other and only the mother and infant are close.

When infants of these species lose their mothers, their emotional reactions are entirely different. Both species get very agitated at first, but within a day or so, bonnet infants have found new mothers and are quite content. Pigtail infants don't. In fact, other adult females will not accept them. As a result, the poor pigtail ends in what appears to be a severe depression. He huddles in a corner with a facial expression that can only be called grief, says Dr. Kaufman. In no case did the bonnet infants show anything like a depressive reaction.

Whether the social patterns of these two species are genetically determined or grow out of early social experience is not known, says Dr. Kaufman. In any case, the study points up the dangers of generalizing emotional behavior even across closely related species, much less from monkeys to humans.

The conference produced very little in the way of new theories; too little is known about animal emotions and species differences.

Sound evidence on emotional behavior can only come through understanding its neurological basis, says Dr. Tobach.

A step in that direction came from

Dr. Delgado who proposes that emotions are composed of a series of fragments, facial expressions, vocal expressions, physiological responses and physical movements.

Any one of these fragments can be evoked by brain stimulation without emotional meaning says Dr. Delgado. Stimulation of one area elicited facial expressions—grimaces, smiles and drooped eyelids, none of which seemed to have emotional meaning for the monkey. Another area provoked loud cries that were again fragments. It was the same with violent running; the animal showed no fear nor did he hide.

Other animals seemed to know the difference between these fragments and real emotions, says Dr. Delgado. An animal could look very threatening to the human eye, but other monkeys showed no response.

There are, however, areas in the brain that integrate these fragments into whole behavior. And at that point, emotions become "very beautiful, well-organized behavior" that utilizes all the animal's stored experience and knowledge. Response can no longer be considered a direct result of stimulation, but varies according to the animal's individual history. ◈

SURGICAL MILESTONE

Spinal Cord Spliced, Paralyzed Patient Starts Recovery

A Toronto general surgeon found himself in an ethical and professional predicament last week because he had announced to a nonprofessional audience what can, if it holds up, be regarded as a major surgical breakthrough—the dramatic and unprecedented rejoining of the severed human spinal cord. He presented a patient during an after-dinner speech, instead of reporting first in a medical journal.

Dr. Gordon Murray, 73-year-old chief of surgery at the Toronto General Hospital, said he did not know reporters were present when he had Bertrand Proulx, 24, of St. Jean de Cherbourg, Quebec, wheeled into a fund-raising dinner meeting at the Toronto East General Hospital the week before.

But reporters along with the audience of physicians and laymen cheered as the young farm laborer and one-time quadriplegic raised himself by pulling on weights attached to a bar over his hospital bed. After sitting up, he proceeded to stand with support, then waved his arms.

Young Proulx had been unable to use his arms or legs since he was in an automobile accident four years ago. Last May Dr. Murray cut away the damaged part of the spinal cord near the base of Proulx's neck and rejoined the spliced parts, removing a matching section of the vertebrae to keep the cord from stretching and pulling the sutures loose.

This operation was one of seven such performed by Dr. Murray during the past 18 months—none of which had been reported in technical journals. The situation has left other surgeons nonplussed. Few will comment on work first announced in the popular press. Some are frankly dubious. Others are hopeful but await more definite proof of the operation's success. A Mayo Clinic neurosurgeon who did not wish to be named said he never expected to perform this kind of operation, which involves cutting through the entire spinal cord and the blood vessels connecting with the brain, although he has removed many tumors from the cord.

The publicity brought Dr. Murray a deluge of communications from families of some of the estimated 125,000 paraplegics, quadriplegics and others with total or partial paralysis.

Dr. John P. Gallagher of Washington, D.C., said he had had an almost immediate call from a young patient who wanted to know if he should make a trip to Toronto for Dr. Murray's operation.

Dr. Murray himself hastened to say he had no wish to raise the hopes of these thousands of paraplegics at this time.

"While the preliminary results are most encouraging," he said, "it will take at least two years or more to reach a final assessment.

"It should be clearly understood that the work presented at the dinner is still highly experimental and in no way reflects a universally acceptable procedure.

"When sufficient data have been obtained the experimental work will be presented to an appropriate medical meeting and published in a medical journal. Only after that time can the work be made available to more than a stringently selected group of patients."

Last week the University of Toronto and the hospital set up scientific protocol for future operations, with Dr. Murray as head of a research team that will select a limited number of patients.

One of the reasons the operation has been considered impossible is that when the spinal cord is cut or crushed, the two ends retract and scar tissue blocks the nerve endings that transmit messages between brain and body.

Dr. Murray developed his own surgical instrument to curve through bone into the spinal column where scar tissue has formed over the damaged part of the spinal cord.

The six other patients on whom he has performed surgery are all Americans, sent to the Canadian surgeon by U.S. doctors.

In 1965 he reported his experiments in rejoining the spinal cords of rabbits. A team under the direction of Dr. James B. Campbell of the New York University Medical Center has tried to rejoin the spinal cords of cats with some success.

Dr. Campbell, who says he has known Dr. Murray for many years and has great confidence in him, says he believes his present work should get the Nobel Prize. He has sent the Toronto surgeon a telegram of congratulation.

Other surgeons who have attempted rejoining nerve fibers in the human spinal cord have been unsuccessful in getting them to grow back together and become functional.

The next operation Dr. Murray is planning is one that will attempt to rejoin the spinal cord of a man from California who has been paralyzed as the result of a gunshot wound.

The surgeon believes that it is just a matter of time until Bertrand Proulx will walk. He already has some feeling in his legs, and he is able to feed himself and work with his hands in the hospital shop.

GAUGING THE TRICKLE

Soviet Space Efforts Detailed

Information on the Soviet Union's space program trickles out in after-the-fact press releases and other sketchy data. Even from this drought-like flow, however, Westerners manage to gather enough facts to draw a relatively complete picture of Russian activity.

Such a picture was delivered last week to the House Committee on Science and Astronautics. Prepared by Dr. Charles S. Sheldon II, acting chief of the Science Policy Research Division of the Library of Congress, the picture was in the form of a remarkably revealing report, covering in detail Soviet efforts from the start of the Space Age.

The report, Review of the Soviet Space Program (35 cents, Superintendent of Documents, Government Printing Office, Washington, D.C. 20402) is a spacewatcher's textbook. Detailed sections describe information sources ranging from a California space company to the British Royal Aircraft Establishment to the United Nations Secretariat. "With effort," says Dr. Sheldon, "one can construct a com-