

monkeys may react to the same sound quite differently.

The vervets are not absolutely consistent about what intruder triggers an alarm call, so the scientists in the field kept track of the "mistakes." They found that the adult monkeys seldom err, juveniles err more frequently and infants err most frequently of all. The juveniles, for instance, give the eagle call on occasion at the sight of an innocuous bird such as a stork or a spoonbill. Infants carry their caution even further; one gave the eagle alarm at the sight of an airborne leaf.

"Although they make mistakes, there is an order to the errors," Marler says. The young monkeys, for instance, may give an eagle call at the sight of a pigeon, but they never mistakenly give the eagle call in response to a leopard. "It's as though they have a generally preordained mechanism, which specifies that the eagle alarm call should be given to something that may be defined as 'moving up above' of a certain size and with a certain trajectory," he proposes. Initially for the young monkey, many stimuli satisfy that requirement. Gradually, however, the animals' perception becomes more discriminating, like children sharpening their semantic sense, Marler says.

Marler suggests that these animal studies offer a glimmer of hope for experimental elucidation of the process by which a child brings "innate knowledge" to the task of developing understanding. "We blind ourselves to the prospect of new discoveries if we insist on treating animals as though they were automata. The knowledge they have of companions and their surroundings is probably as intricate and complex as our own, though with an emphasis that is unique to each species," Marler says. In other work Marler observes among songbirds a complex mix of innate tendency, imitation, modification and invention (see p. 362). In discussion at the recent meeting in Atlanta of the Society for Neuroscience, James L. Gould of Princeton University challenged the idea that complexity of a behavior necessarily implies cognition. He says that what appears to be animal awareness and intentions may just be preordained, preprogrammed learning routines combined with scientists' ignorance of how complicated such programs can get. His work with bees (SN:11/17/79, p. 342) indicates that apparently complicated feats of communication can be described by simple rules that could be genetically determined.

Donald R. Griffin of Rockefeller University emphasizes the importance of gathering information about whether nonhuman animals have intentions or are aware of themselves in relation to their surroundings. "A cognitive ethology can thus hope to illuminate the fundamental dimensions of those attributes we loosely call thinking and which, in their most versatile manifestations, are the sources of our most profound satisfactions." □

Fluoride: Prevents caries longer

Tooth decay may not be the most serious or painful health problem in the United States, but is probably the most common and certainly the most enduring. Most — but not all — dental researchers consider fluoridation the most effective means of preventing dental caries (SN: 9/1/79, p. 152). Now, in the most recent follow-up of a clinical study started in 1969, it looks as if fluoride's protective effects continue after treatment with fluoride tablets ceases. A year and a half after treatments were discontinued, the children in the Wayne County, North Carolina Public Health Service study who had received one or two fluoride tablets daily for six school years had fewer dental caries than those who had received a flavored placebo tablet. Both during and after treatment, the fluoride group had between 32 and 35 percent fewer caries than the control group.

The study — conducted by William S. Driscoll, Stanley B. Heifetz and Janet A. Brunelle of the National Institute of Dental

Dean justifies psychic research

Many respectable scientists, from Einstein on down, have speculated on the credibility of so-called "psychic" phenomena and on how they can be studied scientifically. Generally such efforts to legitimize this study have been thwarted by the obvious presence of charlatans and fools among reputed psychics and by open hostility from the scientific community at large. Perhaps worst of all, few new theoretical or experimental approaches to the subject have been generated.

Now a fresh set of "psi" experiments involving sophisticated technology has been designed by Princeton University's dean of Engineering and Applied Science, Robert G. Jahn, and his co-workers. Although Jahn is not yet ready to publish any conclusive results, he has offered some thoughts on a theoretical approach to psychic phenomena and has concluded that "once the overburden of illegitimate activity and irresponsible criticism is removed, there is sufficient residue of valid evidence to justify continued research."

Jahn, best known for his pioneering work with plasma discharges, summarized his two-year experience with psychic research during a recent science writers' meeting in Palo Alto.

Traditional psychic research has amounted to little more than the collection of anecdotes of spontaneous events, which tend to be spectacular but unverifiable, or of rather subjective laboratory

Research — started in 1969 when the 1,064 children were in first or second grade. After the original check-up, they were re-examined at intervals of 30 months, 55 months and six years. Following the six-year check-up, the fluoride/placebo treatments were stopped. Then in 1977, after one and a half treatment-free years, 354 children who had also been checked after six years were re-examined. This examination showed that "... cariostatic [anti-caries] benefits continue to be apparent for both [one and two] tablet treatment procedures at the end of seven and one half years.... Thus, the caries preventive benefit did not diminish as a result of discontinuing such treatment."

The study examined not only the protective effects of fluoride tablets, but also looked at the cost-effectiveness of using the treatment on large numbers of children. Overall, the fluoride treatments cost about \$25 per child for six school years and — if the post-treatment period is included — prevented 3.65 "decayed, missing or filled" tooth surfaces from occurring in each child during seven and a half years. This means that it cost about \$7 to prevent each decay, compared with the \$10 to \$20 it costs to have a decayed tooth filled. □

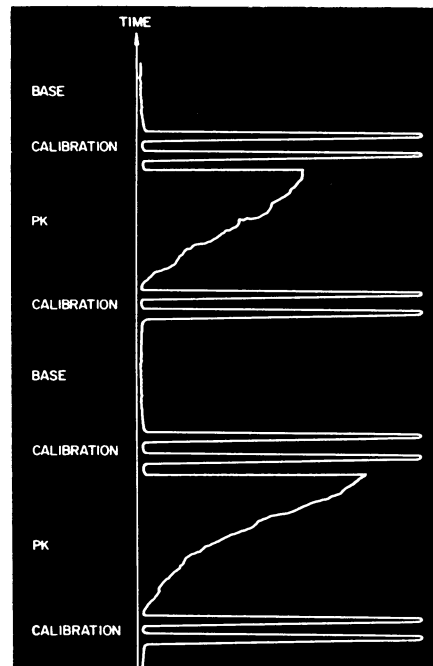


Chart produced by physical changes in a Fabry-Perot interferometer clearly shows different effects when a subject just relaxed (base) or tried to influence the instrument through psychokinesis (PK).

experiments, results of which can be scrutinized but not clearly interpreted. What the Princeton researchers have tried to do is design experiments in which the data are clear-cut and amenable to statistical analysis.

The work started when an undergraduate, Carol K. Curry, asked Jahn to supervise her independent study in psychic research