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THE INFLUENCE OF IMITATION ON TOOL-USING IN CAPOUCHINE MONKEYS (*CEBUS APELLA*)

ABSTRACT. — In order to check the capability of monkeys to use tools three series of expriments were made with capouchine monkeys (Cebus apella). In an experiment following the capability of using stones to crack nuts none of the monkeys tried to crack the nut with a stone, neither did the capouchine monkeys try to get hold of a dainty bit with the help of implement (a stick, wire). In the third experiment the dominating individual was taught to pull nearer a dainty bit with the help of a T-shaped stick. Some of the imitating individuals were able to imitate tool behaviour in a wider extent than the dominating individual. Experiments have shown the importance of imitation in tool behaviour in the monkeys and also the necessity of a new approach to studying it.

KEY WORDS: Monkeys'tool behaviour — Cebus apella — Imitation

Articles dealing with the tool behaviour of primates often concentrate on the use of tools by the capouchine monkey *(Cebus apella)* (Voronin 1947, Kac 1973, Fabri 1980). Many authors notice also that certain species of macaques are able to learn through imitation how to use various implements as tools (eg. Beck 1976).

Nevertheless in our tests none of the monkeys was able to use implements as tools without preliminary learning. In order to check our conclusion three series of experiments were realized with capouchine monkeys *(Cebus apella)*.

The experiments were realized in July—November 1979 at the Physiological Institute of the Academy of Sciences of the USSR in Leningrad. Eleven individuals belonging to both sexes were followed. The group was caught in natural conditions and never before used for experimenting.

In the first series of experiments the capability to use stones for cracking nuts was studied.

Sixty experiments resulted in the following data: as soon as the nuts and stones were placed in the cages, the monkeys immediately took the nuts and tried to crack them with their teeth, producing strong feeding noises, they knocked the nuts — firmly held in their hands — against the wall or floor of the cage. They often picked up also the stones, tried to bite them, then threw them off. Only in one case was seen a monkey holding a nut in its left hand and a stone in the right one. It scrutinized the stone, smelled it then trew it off. None of the tested monkeys tried to crack the nut with the help of the stone.

In the second series of experiments the capability to get a distant titbit, with the help of various implements (a stick, wire) was studied.

None of the tested monkeys tried to use the implement for getting the titbit.

The third series of experiments, following the preliminary experiments was to check the influence of imitation on the use of tools.

In this series of experiments the following conditioned reflex was worked out with the dominating individual: To pull nearer the titbit with the help

of a T-shaped stick, so that the stick placed by the experimenter on the board be pulled right to the individual, without any additional manipulations *(Fig. 1a)*. All individuals included in the experiment could follow the process of learning by the dominating individual. Then the dominating individual "the demonstrator" was transfered to the cage housing the other individuals and the whole group "received the task" to get hold of the titbit placed out of reach. The positions of the T-shaped sticks are shown in *Fig. 1b*. At the very beginning of the experiment two capouchine monkeys tried to reach the titbit with the stick. They took the stick, threw it to the titbit and pulled it nearer. The movements

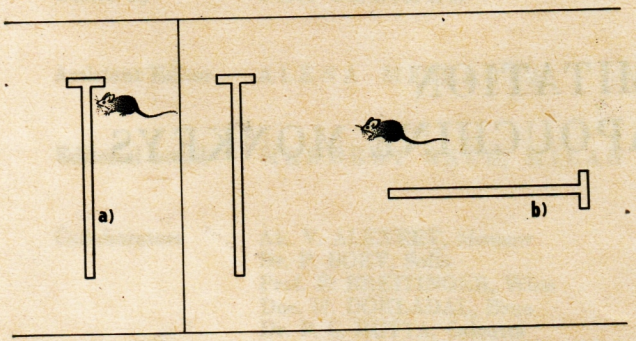

FIGURE 1. *Position of the stick and of the titbit during the experiments (both the sticks and the titbit are placed by the experimentator on the board in front of the cage)*
a) the dominating individual "demonstrator" both the stick and titbit are always in the position "stick behind the titbit", not requiring purposeful manipulation
b) individuals "imitators" the stick is placed in any position ("stick in front of the titbit"), within reach. The reaching of the titbit requires purposeful manipulation with the stick

of the monkeys in this phase of the experiment were very quick and the throwing of the stick was rather inaccurate. To get the titbit they had to make 15—20 attempts and only one of them was successful.

We must add that the monkey "demonstrator" used the stick *only* in position 1a *(Fig. 2)* while the other individuals, the "imitating" monkeys used it in position 1b *(Fig. 2)*. If the monkeys took the stick out of the cage, it immediatelly lost its "tool" characteristic and *never again* was it used for a repeated attempt to get the titbit.

FIGURE 2. *Monkey "demonstrator" reaching the titbit*

Our experiments have shown that without special training (practically without working out and acquiring a conditioned reflex in some of the individuals) none of the capouchine monkeys was able to use the implement as a tool. They were able to acquire the tool behaviour only through mediation of the imitation behaviour.

The results thus obtained show that for the tool-behaviour of monkeys it is necessary to interpret more concretely in what circumstances do the monkeys use the tool, and to take into account at the same time also the high degree of their imitating capability also in the historical connections of the origin of the given behaviour (e.g. being used in experiments, life in game parks and reserves and frequent contats with people, training in contact with man and the imitation of human behaviour).

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