Caged Stumptailed Macaques Voluntarily Work for Ordinary Food

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INTRODUCTION

Unlike in the wild, primates in captivity are usually deprived of opportunities to forage because food is made readily available, requiring little effort for its procurement. Being forced to live permanently in an understimulating environment impairs the behavioral health of primates, thereby jeopardizing the validity of scientific research data collected on them. Recent Federal Rules address this issue, stipulating that captive nonhuman primates must be provided with species-appropriate stimuli for the expression of foraging activities (USDA, 1991). The provision of such stimuli implies that subjects should work for their food rather than have free access to it.

Rhesus macaques (Macaca mulatta) will spend a considerable amount of time retrieving ordinary monkey biscuits from food puzzles in the presence of freely accessible identical biscuits (Reinhardt 1994; cf. Evans et al. 1989; Line at al. 1989) This indicates that gathering food may be a rewarding experience on its own, independent of caloric intake (Neuringer, 1969). The present study tests this hypothesis in stumptailed macaques (Macaca arctoides) in order to find out if it would be ethically justifiable to make the animals work for their ordinary food.

MATERIALS AND METHODS

Subjects were 16 adult (5-11 years old), behaviorally and physically healthy, single caged male stumptailed macaques. Cages measured 0.72 m2 x 0.92 m and were each equipped with a drinking spout, a perch (PVC pipe) and a gnawing stick (loose red oak branch segment). Room temperature was maintained at 20- 22° C, with a relative air humidity of approximately 50%, and a 12-hour light-dark cycle.

Each subject was observed once, each on a different day from 9:00 a.m. to 10:00 a.m. after receiving a total of 132 commercial biscuits (40 x 24 x 16 mm, Purina Monkey Chow #5038). Ninety-nine of the biscuits were placed in a freely accessible dish attached to the mesh of the front of the cage. Thirty-three biscuits were offered in a food puzzle, which consisted of an ordinary feeder box (14 cm x 7 cm x 17 cm) remounted a few centimeters away for its access hole on the 22-mm square mesh of the front of the cage. Biscuits had to be skillfully maneuvered with the fingers and teeth in order to be retrieved (Figure 1). The animals had used the puzzles as primary feeders for several months prior to the test.

Figure 1: Dan spent 286 seconds retrieving 12 biscuits from the food puzzle after leaving 21 freely available dish-biscuits untouched.

The observer (senior author), who was familiar with the animals, sat at a distance of approximately 1.5 in from the center of the cages to record the following parameters for each subject:

- cumulative time spent collecting biscuits from the food dish,
- cumulative time spent retrieving biscuits from the food puzzle,
- total number of dish-biscuits and puzzle-biscuits consumed.

RESULTS

Twenty-five percent (4/16) of the subjects ignored the food puzzle during the 1-hour observation, and 75% (12/16) gathered biscuits from both the dish and the food puzzle.

Those foraging from both containers consumed an average of 59 biscuits. They spent 64 seconds collecting 51 of the biscuits from the dish and 182 seconds retrieving the other eight biscuits from the puzzle. Following are the specifics on each animal.

1. Upon distribution of the food, Bob immediately grabbed handfuls of biscuits from the dish. With his cheek pouches still full, he turned to the puzzle after 2 minutes and retrieved a few more biscuits. After having worked for some minutes, he again collected freely accessible biscuits. He repeated this sequence four times, gathering all 99 biscuits from the dish during a total of 51 seconds and retrieving all 33 biscuits from the puzzle during a total of 566 seconds. He consumed 40% (40/99) of the dish- biscuits and 100% (33/33) of the puzzle- biscuits.

2. Don also instantaneously took a handful of dish-biscuits and spent the first 3 minutes consuming them. He then attempted to remove food from the puzzle, but quickly went back to the dish to collect more freely available biscuits. He repeated this sequence 11 times, gathering 94 biscuits from the dish in 93 seconds and 2 biscuits from the puzzle in 104 seconds. He consumed 81% (76/94) of the dish-biscuits and 100% (2/2) of the puzzle-biscuits.

3. Jake initially took only a few biscuits from the dish. After less than 1 minute, he turned to the puzzle and worked for more biscuits. He repeated this sequence 16 times, collecting a total of 91 biscuits from the dish in 84 seconds and 21 biscuits from the puzzle in 589 seconds He consumed only 27% (23/91) of the dish-biscuits and 100% (21/21) of the puzzle-biscuits.

4. Bill, Dick, Steve, Tom, Joe, Leo, Rob and Al dumped all dish-biscuits on the floor and consumed 34% to 95% of them within 7 to 43 minutes. Ignoring the remaining biscuits, they began foraging from the puzzle thereafter, retrieving up to 9 biscuits in 287 seconds All puzzle biscuits were consumed.

5. Dan grabbed 78 biscuits from the dish and consumed 43% (37/78) of them. He turned to the puzzle after 3 minutes and spent a total of 286 seconds retrieving 12 biscuits, all of which he consumed.

DISCUSSION

The present findings are congruent with those of rhesus macaques (Reinhardt, 1994), demonstrating that most caged stumptailed macaques would voluntarily work for their ordinary food if given the opportunity to do so. Consuming fewer biscuits than were distributed in the dish, the subjects had no need to work at the puzzle, but could have gathered all biscuits they intended to eat with minimal effort from the dish. Twelve of the 16 subjects disregarded this option during the one-hour test period, instead spending 182 seconds laboriously retrieving 8 biscuits from the puzzle. They could have picked up the same number of biscuits from the dish in only 5 seconds.

The voluntary 36-fold increase in time investment indicates that the animals were strongly motivated to forage. This is not surprising when considering the fact that stumptailed macaques are biologically programmed to spend the major portion of the day gathering food in the wild (O'Keeffe and Lifshitz, 1985).

The present study endorses the USDA's attempts to provide caged nonhuman primates with more opportunities to express their species-typical foraging drive.

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