


Object Manipulation in a Captive Group of Capuchin Monkeys (Cebus nigritious)

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Introduction

Capuchin monkeys (Cebus spp.) exploit embedded resources by using foraging strategies that involve several levels of object manipulation, from the simple tearing apart strips of wood to get access to invertebrates to the use of stones in tool use (hammer and anvil) to break and open nuts (Ottoni & Mannu 2001; Fragaszy et al. 2004; Moura & Lee 2004; Waga et al. 2006). Tool use or the use of a detached object as an extension or functional part of the body to modify the position of another object (Beck 1980; Panger 2007) has been reported in wild, semi-captive and captive capuchins (Visalberghi 1990; Fragaszy et al. 2004).

Cognitively more complex than tool use, tool making involves a modification of the physical structure of the tool to improve its efficiency, a behavior that requires an understanding of cause-and-effect (Beck 1980). Among primates, tool making has only been reported for great apes (chimpanzees, orangutans and gorillas; Boesch & Boesch 1990; Fontaine et al. 1995; van Schaik et al. 2003), including humans. Recently, however, Bortolini & Bicca-Marques (2007) observed opportunistically a putative spontaneous event of tool making by a captive adult female Cebus nigritious in the Sapucaia do Sul Zoological Park, state of Rio Grande do Sul, Brazil. These authors state that if capuchins can make tools, the cognitive difference between them and the great apes, lineages separated for at least 30 million years, is smaller than previously thought (Bortolini & Bicca-Marques 2007). Because Bortolini & Bicca-Marques (2007) were not able to record the context prior to this event and what happened after it, therefore compromising the interpretation of its meaning, in this research we investigate object manipulation behaviors by the same study group aiming at recording additional cases of capuchin tool making.

Methods

A group of five capuchin monkeys (adult females Chief and Matilda, adult male Black and juvenile males Sem-topete and Trainer) living in an enclosure (7.0 × 7.7 × 2.9 m) enriched with sand, twigs, ropes and a wood-made wheel in the Sapucaia do Sul Zoological Park, state of Rio Grande do Sul, Brazil, was observed between April and September 2008. Matilda is the individual whose tool-related behavior was reported by Bortolini & Bicca-Marques (2007). Data collection by the behavior sampling method with continuous recording (Martin & Bateson 1993) was conducted from 08:00–08:30 to 13:00–13:30 once a week. Object manipulation was classified into banging (the act of pounding an object against a surface or another object), washing (partial or total immersion of an object in water), scrubbing (the act of rubbing an object against a surface), handling (the act of just touching or holding an object) and biting (the act of biting an object). Events of food banging, washing and scrubbing were included in the analysis, whereas those of handling and biting were not included.

The study was divided into two 50-h stages. In the first stage there was no supplementation of objects to the monkeys besides those normally found in the enclosure, whereas 15 pieces of branch (30 to 40 cm in length) and five stones (6 to 7 cm in diameter) were supplemented before each observation session and removed at the end of the day in the second stage. The frequency of each type of object manipulation during each stage was compared among individuals by the chi-square test and the total individual frequency of object manipulation events was compared between stages by the Student t test considering a level of significance of 0.05 using the software BioEstat 5.0 (Ayres et al. 2007).

Results

Sixty-two events of object manipulation (48% banging, 26% washing, 19% handling and 6% scrubbing) were recorded during the first stage, resulting in a rate of 1.2 events per hour. Most of these events involved food items (n = 44). Supplementation with branches and stones in the second stage produced a significant increase in the frequency of object manipulation (428 events: 68% handling, 25% biting and 8% banging; t = 2.138, df = 4, p = 0.042) or a rate of 8.6 events per hour, and a substantial decrease in the number of events involving food items (n = 6). Object manipulation differed among individuals in both stages (1st: χ² = 13.559, df = 4, p = 0.008; 2nd: χ² = 210.570, df = 4, p = 0.0008).