Videotape as a replacement for the human observer in studies of nonhuman primate behavior*

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For both field and laboratory studies of animal behavior, the availability of portable videotape recorders permits both improved techniques of observation and a means for permanent storage and rapid retrieval of observations. In some circumstances, videotape may be used to replace a human O. Evidence is presented that the behavior of at least one nonhuman primate commonly used in behavioral research, the squirrel monkey, differs when a human O is present from when behavior is recorded solely by videotape, even after 3 years of daily contact with human beings.

A common concern of students of animal behavior is the effect on the animal of the presence and activities of a human investigator. The problem of controlling for the effects of the human E or O creates special problems for the student of nonhuman primate behavior. The concentrated work on nonhuman primates during the past decade has reached a stage of development at which it is evident that understanding nonhuman primate behavior requires both field and laboratory studies. Although field studies commonly supply demographic information on the behavior of individuals and groups, studying the relation of such behaviors to their social or biological correlates most often requires laboratory procedures. A variable in both field and laboratory situations likely to contaminate behavioral data is the activity of, or merely the presence of, a human O. Field workers expect nonhuman primates to react to their presence and either (1) use blinds (Kortlandt, 1962) to remove the human O from the environment or (2) actively become part of the animals' environment in an attempt to establish conditions under which the animals might be expected to habituate to the presence of the human being (Goodall, 1965; van Lawick-Goodall, 1968). In the laboratory, elaborate conditions are established to eliminate the human beings' effect on the animals once the animals' responses are being recorded. Rarely, however, do laboratory investigators include control groups to

account for the effect on the animal of his being removed from a cage, transported to apparatus, and other similar sources of behavioral contamination.

Because of the possible contamination of behavioral data by the presence of human Os, we found it necessary to design a control

experiment to permit us to evaluate data already collected. This design required using videotape in place of a human O. The results of the experiment suggest the extensive influence on behavior of a human O and indicate the need for improved technical procedures for studies involving observation of nonhuman primates.

METHOD

The colony under observation contained three male and three female adult squirrel monkeys (*Saimiri sciureus*, Iquitos) which had lived together for 3 years. During the first 2 years, the animals' major contact with human beings came from the caretaker's servicing the area in which they lived and the presence of visitors who often watched the animals. During the third year, the animals were routinely removed from the living area to permit placement and adjustment of FM transmitters on their backs (a process requiring approximately ½ h which created stress by removal from the living area and handling). In addition, the animals were observed for 20 min three times

Fig. 1. Simulated naturalistic setting for housing squirrel monkey colony. The setting contains numbered and color-coded grids constructed of wood slats crossed to form 66 squares. One section of the gridwork is placed above the other. The grids permit the squirrel monkeys to retain some of their arboreal habits.

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Fig. 2. Frequencies of selected behavior as a function of the presence or absence of a human O.

each day (morning, afternoon, and evening) on from 2 to 3 days each week by three to seven Os. From these experiences, the animals had ample opportunity to adapt or habituate to the presence of human beings.

The colony was housed communally in a simulated naturalistic setting, as shown in Fig. 1. The area was illuminated by four 40-W fluorescent lights which provided a light-dark cycle, seasonally timed to simulate the daylight/night ratio of Iquitos from where the animals were obtained. The temperature was $22^{\circ} \pm 1^{\circ} \text{C}$. Observation windows were in each of three walls. A closed-circuit television system was used to monitor behavior. Two cameras, each fitted with a wide-angle lens, were mounted outside the chamber. The monitors were in a room distant from the chamber.

On the first day, behavior patterns were recorded continuously by closed-circuit TV beginning at 7:00 a.m. and ending at 6:00 p.m. EST. The frequencies of eating, drinking, scratching, and social or

sexual behavior (defined as genital manipulation, penile display, genital sniffing, mounting, or attempted mounting) were noted, along with qualitative descriptions of group movements and the distance between individuals. On the second day, during the first quarter of odd-numbered hours beginning at 7:00 a.m., a human O entered the area and stood quietly outside the chamber, looking through the glass but making few noises other than occasional movements. Simultaneous observations were made by closed-circuit television in a way identical to that on the first day. Day 3 replicated Day 1, and Day 4 replicated Day 2, with the exception that the 15-min intervals when the O was present began at 8:00 a.m. and continued throughout the day on even-numbered hours.

Combining observations from Days 2 and 4 provides data on the presence of a human O for each hour of the day. This procedure provides 2,640 min of observation, of which 1,320 min were made without the

presence of a human being and the remaining 1,320 min were made with a human O being present for 15 min of each hour. In addition, the colony was observed on closed-circuit TV at different times of the day for 9 months in order to make qualitative observations of the daily pattern of social and consummatory behavior.

Quantitative analysis of the behavioral patterns shows that four categories (scratching, social-sexual, eating, and drinking) account for approximately 80% of all observations noted. Figure 2 shows the frequency of occurrence for each of these behavioral classifications as a function of time of day and the presence or absence of the human O. Data from Days 1 and 3 (no O) are combined, as are data from Days 2 and 4 (O).

The human O increases the frequency of scratching ($p < .001$). The increase in scratching is greater when the monkeys are awakened during the nap period, although at all times of the day the presence of a human being increases the frequency of scratching. When an O is not present, scratching remains at a stable rate, ranging between 3 and 12 scratches per hour. With the human O, the range of frequencies is between 6 and 27.

Social-sexual behavior includes huddling, holding one another, and those behaviors described previously as sexual. Without a human O, the frequency of such behaviors is almost nil. With an O, the frequency of social-sexual behaviors averaged 3.36/h—significantly more frequent than when there is no O ($p < .05$). Mountings were rarely noticed, and those recorded occurred primarily in the early morning hours.

The human O totally inhibits eating, although when there is no O the frequency of eating remains at a stable rate (ranging from 2 to 5 occurrences) throughout the day ($p < .001$). The frequency of drinking, however, does not change as a function of the presence or absence of a human O. In summary, the presence of a human O increases the frequency of scratching and social-sexual behaviors, inhibits eating, and does not affect drinking.

Thorington (1968), working in Colombia with freely ranging *Saimiri*, notes a slightly different daily pattern from that observed in our setting; namely, the animals he observed rested only once during the day for 1-2 h. Our animals rested for shorter periods three times a day. Climatic differences and the need to forage for food in the wild are the most likely reasons for this discrepancy in the daily activity pattern. He also noted an increase in eating following awakening—a pattern

we noted when the animals awakened after the night's sleep. Of primary importance is the fact that his freely ranging animals devoted large periods of time to foraging. Foraging reduces agonistic behavior, and it is likely that social-sexual behavior is incompatible with foraging.

Workers in the field commonly devote enough time to being observed by the animals so that they are able to claim that the animals are relatively uninfluenced by their presence. It may be suggested that the differences reported here are transitory and that the continued presence of the human O would eliminate the differences in frequencies of behaviors found. That these animals were accustomed to being watched by human Os for 3 years prior to this study argues against this interpretation. It is unknown whether additional experiences with

human Os would have mitigated the differences found in this study. Nonetheless, it is evident that accommodation to the human O, if it occurs, is not rapid.

Whether or not the finding of differences in frequency of behaviors as a result of the presence of a human being is true of other nonhuman primates, especially of the more commonly studied great apes and Old World monkeys, is a question of great importance to workers specializing in naturalistic observations. The behavior of these animals is more complex and varied than those of the squirrel monkeys, making it likely that the human O affects more different kinds of behavior than has been noted in the squirrel monkey.

We have used videotape recordings, both in the field and in the laboratory, to eliminate the need for the presence

of a human O. The development of portable color videotape models clearly makes videotape the method of choice for the continuous photographic recording of animal behavior.

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