

The Development of Grooming, Sociosexual Behavior, Play and Aggression in Captive Baboons in Their First Two Years

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ABSTRACT. This paper focuses on the development of behavior in a mixed-longitudinal sample of 77 baboons (*Papio* sp. — 46 males and 31 females) from birth to 2 years of age. Eleven behaviors measured as frequency of performance and frequency of reception were used to test null hypotheses of gender and rearing differences among the *Papio* sp. subjects. The behaviors measured included: groom, mount, present, open-mouth threat, hard bite, displace, avoid, grapple, play bite, charge and chase. The data indicate that gender differences exist in the development of grooming, sociosexual behavior and aggression and play. The data also indicate that subjects raised in the nursery environment were behaviorally indistinguishable from mother-reared peers on the basis of the 11 behavioral criteria.

INTRODUCTION

This paper provides information on the development of four major categories of social behavior in baboons from birth to 2 years of age and provides an analysis of the effects of gender and rearing environment on their development.

GROOMING

Infant baboons in East and South Africa were first observed grooming adults at about 5 months of age, and grooming one another between 6 and 12 months of age (DEVORE, 1963; RANSOM & ROWELL, 1972). An increase in grooming directed toward the mother occurs during the weaning period (from 11 to 15 months) (RANSOM & ROWELL, 1972; ANTHONY, 1968). Apparently, the infant uses grooming to maintain contact during maternal rejection. After weaning, young juveniles spend most of their time in play groups and have been observed to groom adult males, their mothers and other juveniles with about equal frequency (DEVORE, 1963).

HINDE and SPENCER-BOOTH (1967), in a study of captive rhesus monkeys from birth to 2.5 years, found infant-infant grooming very infrequent. No sex differences in grooming by infants were observed. They concluded that grooming is an adult activity that appears gradually in infants (ibid; HINDE, ROWELL & SPENCER-BOOTH, 1964). References to sex differences in grooming by wild monkeys are usually of a very general nature. SIMONDS (1974) explains that in wild bonnet macaques young females almost never join the chasing, wrestling or swimming play of the young males—but remain close to adult females and spend more time grooming and being groomed than young males. A longitudinal study of grooming in captive socially living vervet monkeys confirms these earlier findings (BUCKLEY, 1976).

SOCIOSEXUAL BEHAVIOR

Behaviors such as mounting and presenting oftentimes are not directly concerned with reproduction, but may instead serve communicatory functions associated with dominance, greeting, appeasement and so forth. Such behaviors have more accurately been termed "sociosexual" rather than "sexual" (OWENS, 1976).

Until recently, quantitative studies of the development of sociosexual behavior have been restricted to captive macaque species (e.g., HANBY & BROWN, 1974; HARLOW, 1962). With the exception of OWENS' (1976) study at Gombe Stream National Park, previous studies of baboons have provided only brief descriptions on the development of sociosexual behavior (e.g., ANTHONY, 1968).

AGGRESSION AND PLAY

In baboons most social play consists of aggressive movement patterns (OWENS, 1975a). However, the intense threat gestures of true aggression are absent in aggressive play.

In a recent review of behavioral sex differences, MITCHELL (1979) summarizes general observations applicable to most primates: (1) male infants and juveniles play more intensely and more often than females; (2) prenatal androgens apparently predispose males toward rough play and aggressive behavior; (3) males are usually more dominant; and (4) females generally demonstrate more nonaggressive (friendly) social behavior. There have been many studies describing play and aggression in Old World monkeys, but only a few focus on the development of these behaviors (HARLOW & MEARS, 1979; HINDE & SPENCER-BOOTH, 1967; OWENS, 1975a, b).

HYPOTHESES

The focus of this study is to describe the development of grooming, sociosexual behavior, and aggression and play in captive baboons from birth to 2 years of age. Two hypotheses are tested. First, sex differences exist in the development of these behaviors. Specifically, it is expected that males are more active in mounting, aggression and aggressive play. It is also expected that females will have higher scores for grooming, presenting and avoid behavior. Second, subjects raised in the nursery environment are behaviorally indistinguishable from mother-reared peers by 2 years of age.

MATERIALS AND METHODS

Data reported on in this study were obtained on baboons (*Papio* sp.) born at the Southwest Foundation for Research and Education (SFRE) in San Antonio, Texas. The parents of these animals were obtained from several East African trapping sites. This parent breeding stock contains animals conforming to the yellow (*P. cynocephalus cynocephalus*) and olive (*P. cynocephalus anubis*) baboon types. Consequently, the physical characteristics of the offspring represent a mixture of both phenotypes.

This paper focuses on the development of social behaviors in 77 baboons (46 males and 31 females) from birth to 2 years of age. The 77 subjects were raised from birth to 90 days of age in two contrasting environments: 25% of the subjects were raised in a mother-infant

social group, and 75% were raised in a nursery group with daily peer play. As birth occurred, infants were randomized with respect to placement in the two groups. Both groups contained equal numbers of each gender.

From 90 days to 2 years, the animals were assigned to social groups consisting of 25% mother-peer reared subjects and 75% nursery reared. Specific details of the housing, composition and rationale for these procedures are extensively documented by YOUNG and BRAMBLETT (1977) and COELHO and BRAMBLETT (1981c).

DATA ACQUISITION AND ANALYSIS

Detailed descriptions of the ethogram, focal animal sampling and scheduling procedures used in this study are contained in BRAMBLETT (1978), YOUNG and BRAMBLETT (1977) and COELHO and BRAMBLETT (1981a, b, c).

Frequency of performance or reception of each behavior type was tabulated for each animal for each month and standardized as rate per hour of observation sampling. Mean monthly behavioral rates for males and females and different rearing conditions were compared by means of the nonparametric sign test (SIEGEL, 1956). The sign test is not only handy to use, but also requires fairly consistent differences in monthly mean values between groups to be significant. The sign test evaluates the consistency of differences, not the magnitude of differences between mean scores. We felt that demonstration of consistent differences over time would provide better information on the biological significance of the behaviors to growing animals; additionally, the sign test may be easily applied to any segment of an age range.

RESULTS

In general, mother-reared and nursery-reared animals did not demonstrate differences on ten of the criterion behaviors by the end of the 2-year test period. Nursery-reared males received more hard bites than mother-reared males. Significant gender differences were present in all behaviors tested. Males performed more mount, open-mouth threat, hard bite, displace, grapple, play bite, charge and chase behaviors than females. Females were displaced more often, and were more active in groom and present. Males were avoided significantly more than females. Between-group differences due to early rearing environment were not discernible by the end of the test period; thus, data for the nursery- and mother-reared subjects were pooled to test for gender differences.

GROOMING

From 9 months of age onward, females consistently groomed more than males did. Groom performance values for female subjects were nearly twice those for males (Fig. 1). Reception of groom was very similar for both genders. The only rearing effect detected in the study was in the reception of grooming: mother-reared females received more grooming than their nursery-reared counterparts during early infancy. However, this is an artifact of the rearing conditions during the first 90 days of life since mother-reared subjects were groomed by their mothers. Males and females demonstrated marked peaks in groom received at 6 months of age which coincided with their introduction into the large outdoor juvenile gang cages (see YOUNG & BRAMBLETT, 1977; COELHO & BRAMBLETT, 1981c).

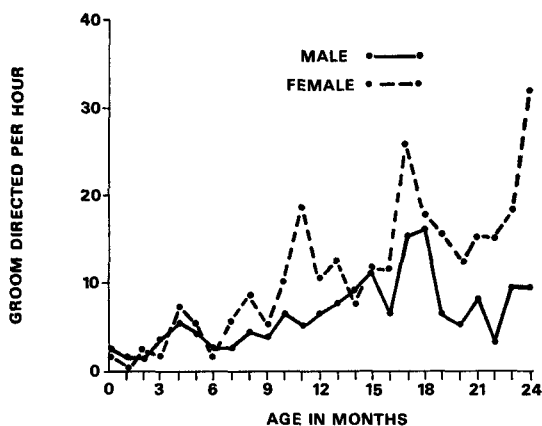


Fig. 1. Groom directed per hour.

However, no significant differences due to early rearing environment were detected after 12 months of age in groom directed.

In summary, grooming is a female behavior that becomes sexually dimorphic during the first year of life. Females groom almost twice as often as males. Differences due to early rearing cease after 12 months of age.

SOCIOSEXUAL BEHAVIOR

Throughout the age range, males consistently mounted more than females did (Fig. 2). Mean values were about five times greater in males than in females. Mounts received were similar in both genders. At 6 months of age, all subjects experienced a sharp increase in frequency of mounts received. This coincided with introduction into the large outdoor juvenile group cages (see YOUNG & BRAMBLETT, 1977). During the introductory period young males demonstrated a marked peak in mounting activity while mounting was very infrequent in females.

By 11 months of age, females performed present behavior significantly more than males

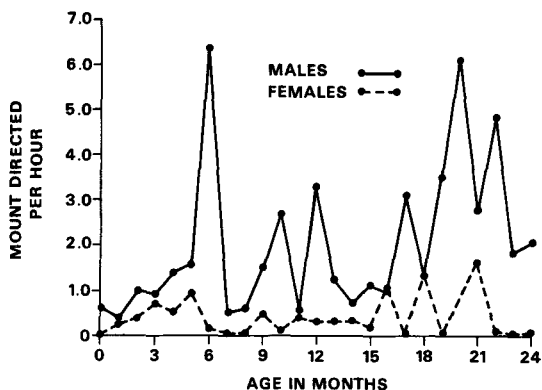


Fig. 2. Mount directed per hour.

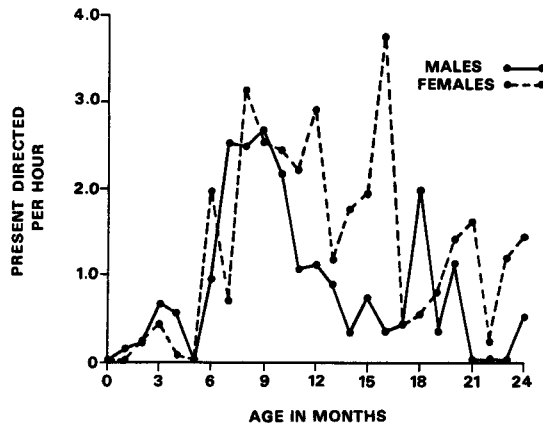


Fig. 3. Present directed per hour.

(Fig. 3). Nursery males presented significantly more than mother-peer reared males between 10 and 20 months, but thereafter no rearing differences were observed. During the first year, mother-peer reared males received more present behavior than mother-peer reared females.

Behavioral sex differences were most apparent in mount directed and present directed. Mounting was significantly greater in males, and presenting was significantly greater in females. This finding suggests that mount directed and present directed appear to be “key” sociosexual behaviors in pre-pubertal baboons.

AGGRESSION AND PLAY

Males direct (Fig. 4) and receive threats much more frequently than females. The frequency of threats directed peaked for both males and females during the early infancy period. This coincided with living in fairly close indoor quarters. Threats directed decreased upon entry into the large outdoor enclosures at 6 months of age. The decrease is due to the greater availability of flight room and visual barriers. A second peak occurred in male threats at 1.5

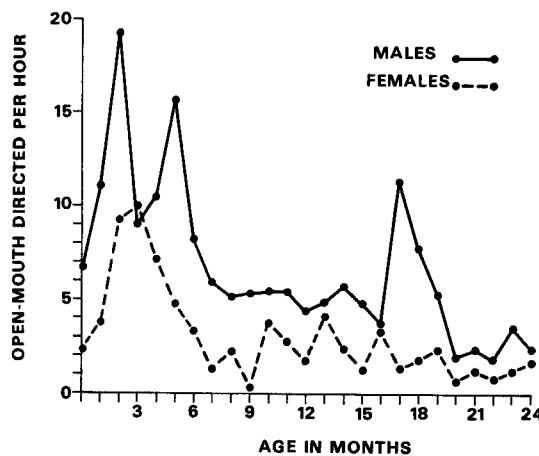


Fig. 4. Open mouth threat directed per hour.

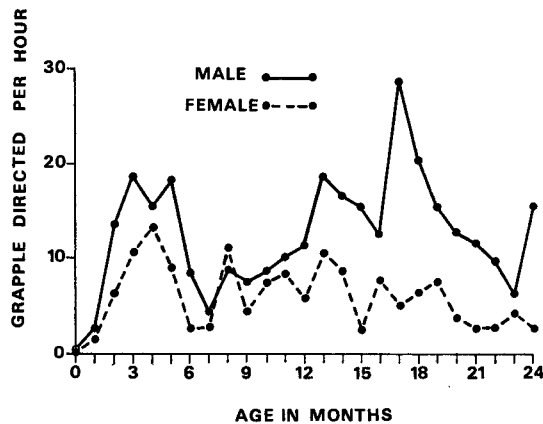


Fig. 5. Grapple directed per hour.

years of age, and then decreased to the end of the study period. Males also received threats almost twice as often as did females.

Frequencies of avoid directed were about the same in both sexes. However, males were avoided significantly more than females (Fig. 6). This is especially noticeable in the second year of life. Both sexes had peaks in hard bite in early infancy and at about 1.5 years of age, but hard bite was significantly greater in males. Males performed displace more often than females, and females were displaced more often than males. During the second year of life the sex difference in displace directed became more pronounced.

Early sex differences in grappling (or mutual wrestling) became more exaggerated as the animals got older (Fig. 5). Frequencies of grapple directed and received averaged about two times higher in males throughout the 2-year test period.

Play bite directed and received was significantly greater in males. After 6 months of age, males became very active in play biting. After 12 months of age, males became the preferred recipients of play bites and chase behavior. Males performed more chase behavior than females (Fig. 6). Males were also more active in charge behavior.

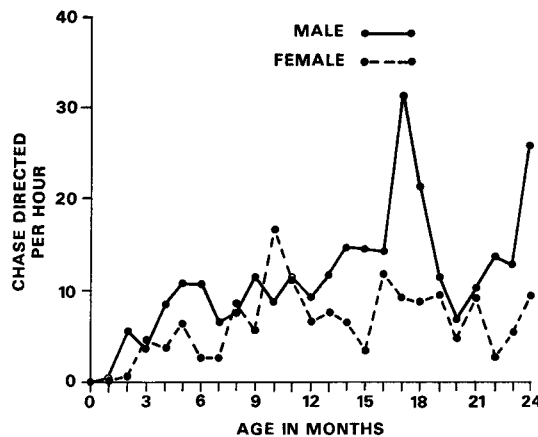


Fig. 6. Chase directed per hour.

Behavioral sex differences were most apparent in open-mouth threat, avoid, displace, grapple, play bite and chase. The young male baboon test subjects played more intensely and more often than the females. In addition, the males were more aggressive and apparently more dominant over their female peers.

DISCUSSION

The hypothesis that gender differences exist in the development of grooming, sociosexual behavior, and aggression and play was supported by the test results. Gender differences in all behavioral categories were significant. Males were more active in mount, open-mouth threat, hard bite, displace, grapple, play bite, chase and charge. Females were more active in groom and present, and were displaced more often. Males were avoided significantly more than females. The hypothesis that subjects reared in the nursery environment would be behaviorally indistinguishable from mother-reared peers by the end of the test period was also supported by the test results.

Grooming was more frequent among females. It increased in frequency throughout the test period in both sexes, and was significantly greater in females before the end of the first year of life. RANSOM and ROWELL (1972) report that females are more active groomers by 2 years of age, while males of this age spend more time in longer and rougher play bouts. Similar results have been reported for macaques (HINDE & SPENCER-BOOTH, 1976; SIMONDS, 1974) and patas monkeys *Cercopithecus patas* (= *Erythrocebus patas*) (LOY & LOY, 1978).

In the SFRE baboons, the frequency of mounts reached a peak somewhat later than in baboons at Gombe Stream (OWENS, 1976). OWENS (1976) observed a threefold increase in mounting by Gombe Stream baboons once males were able to achieve intromission. He explains that after 12 months of age young males increasingly selected adult female mounting partners over young females or other males. None of the female test subjects reported on in this paper attained menarche during the study period. The lack of cycling females and, possibly, the lessened chances of achieving intromission may have delayed the development of male mounting behavior.

Before the end of the first year of life, presenting became significantly greater in females than in males in all groups. Although the frequency of present directed tends to decrease in the second year of life, this behavior consistently remains sexually dimorphic. This is similar to the ages reported by RANSOM and ROWELL (1972), where infants between 3 and 6 months were observed to present in response to genital inspections by adults.

These results demonstrate rather clearly that presenting is a well developed female behavior by the second year of life. This is in agreement with the extensive studies carried out on captive rhesus monkeys. HARLOW et al. (1972) found that in surrogate and mother-reared subjects, male infants thrust significantly more in the second year of life, while presenting frequency is higher in females.

The age changes and sex differences in social play of our captive baboon study group are very similar to those described by OWENS (1975b) for wild baboons, SYMONS (1978) for wild rhesus monkeys, and HINDE and SPENCER-BOOTH (1967) for socially living captive rhesus.

BERNSTEIN (1978) in a review of behavioral sex differences points out that differences in the behavior of sexually dimorphic monkeys have been apparent since the earliest studies, but that the contributions of genetic and environmental influences were unknown until experimental data became available. Our experimental data indicate that gender differences in our

criterion behaviors appear to have a genetic basis since nursery-reared subjects exhibited the same gender differences as mother-peer reared subjects and none of the nursery-reared subjects were exposed to gender role models.

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