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# The Social Daily Activity Correlation of Olive Baboon (*Papio Anubis*) in Gashaka-Gumti National Park, Nigeria

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## ABSTRACT

*Baboons range throughout sub-Saharan Africa, across a multitude of habitat types making them the most widespread African primate genus and perhaps coincidentally, are one of the best studied primates. In recent times, the rapid expansion of human population, the spread of agriculture, and the resulting destruction of natural habitats has drastically increased in sub-saharan Africa. Thus, the consequences of this close association between wildlife and humans are absolutely relevant to conservation and management strategies. The objective of this study was to determine the daily correlation of social behavior of the Olive baboon in the national park ecosystem. The study was undertaken for one year in Gashaka-Gumti National Park, Taraba State, Nigeria. A single animal group habituated for some years by a previous research team was constantly followed for a focal and scan data collection. The daily and monthly data collected on checksheets was statistically analysed using the Chi-square and correlation statistical models. The Olive baboon daily movement activity or, positively and significantly correlated to feeding r2 = 0.82, and vocal r2 = 0.80 at (P<0.05) respectively. Also, aggression positively and significantly correlated to grooming r2 = 0.82, feeding r2 = 0.71 and resting r2 = 0.73 at (P<0.05) respectively. Futhermore, the Olive baboon daily activity (morning, afternoon, and evening periods) revealed a positive and significant correlation as well at (P<0.05).*

**Keywords:** *Wildlife, Conservation, management strategies, olive baboon, social behviours;*

## INTRODUCTION

Primates are among the most intensely social of all animals. This sociality forms an integral part of each individual's attempts to survive and reproduce successfully in a world that is not always conducive to successful survival and reproduction (Barrett et al, 2006). So it is that when we observe one monkey approach and groom another, we do not see an isolated event occurring in the vacuum. Rather, it is the end product of a long series of interactions that can be traced back through those two or more individuals (Swedell, 2002). What seemed at first sight to be an isolated event, or simple interaction between two or more animals, spawn questions that oblige us to look far beyond the immediate context in which two or more animals are interacting to explore not only the intricacies of the social system in which they live, but also the ecological context in which they are embedded (Alberts, *et al*,1996 ).

An animal's ability to operate effectively within a social group depends as much on its ability to manipulate the behaviour of fellow group members as on its ability to anticipate what they are about to do (Katsvanga, *et al*. 2006). Thus, monitoring of the on-going activity within a primate group plays an important role in allowing an animal both to anticipate imminent events and to learn from observing other individuals interacting. Altmann, (1998) found that juvenile baboon seemed to know which adult female were the most valuable allies (as judged by the frequency with which they tried to groom with them) even though they had never actually been involved in agonistic interactions with them.

Savannah baboons occupy a diverse set of habitats including the African woodland savannah and highland grassland. They are found in Angola, Botswana, Mozambique, Zambia and Zimbabwe. Baboons are large group living primates (Altmann, 1998). The Olive baboon (*Papio anubis)* is highly gregarious and social,

living in troops of 15-50 individuals (Gillespie, & Chapman, 2001).

In areas where aspects of the habitat such as food and living spaces are patchy, the populations are found in clusters or clumps (Di Fiore, & Rodman, 2000**).** Within a troop, all adult males are dominant over the females a status achieved in their fifth year but there is strict order of rank (Codron, *et al* 2005 ). Baboons are highly terrestrial primates, which makes them easy to observe when compared to arboreal primates. An adult male baboon measure 120- 180 cm while the female 100-120 cm in length. The weight varies between 20-45 kilograms and 12-28 kilograms for adult male and female respectively (Codron, *et al*. 2005 ). Activity patterns have been studied in several primate taxa including hominoids, cercopithecines, and colobines. Time is limited for most animals (Dunbar, 1992). Thus, animals are faced with the challenge of allocating the limited time to different activities. According to the optimality theory, "the amount of time that an organism spends engaged in various activities depends on the cost of the activity relative to the derived benefits in that organism's habitat (Hill, *et al*. 2003 ).

The amount of time spent on foraging activities therefore relates to the energy content of the food relative to the costs of obtaining the food plus the cost of all other activities (resting, moving or socialising), (Silk, *et al*.1999). Thus, specifically, food availability and energy content are critical determinants of an animals' daily activity pattern. Therefore, factors that influence the availability of food have a strong bearing on time allocation profiles in baboons. However, due to the different costs and benefits of specific activities animals have varying time allocation profiles based on age and sex for certain activities (Johnson & Bock, 2004). Furthermore, since these activities cannot be performed simultaneously some individuals may allocate time between various behaviours better than others (Dunbar, 1992). The costs and benefits of these activities change with changes in the ecological and social state of the environment as well as the physiological state of the animal.

Nevertheless, interactions in primates are mediated by behaviour. Without communicating, an animal cannot inform another of its intentions nor persuade that individual to behave in ways that best suit its own reproductive strategies (Hoffman, 2007). Successful manipulation of other individuals obviously depends on a system of communication that is both sophisticated and functional. Primates are essentially visual and auditory animals, with only the prosimians having a well-developed sense of smell. It's worth stressing at the outset, however, that communication is often multi-channel (Gillespie & Chapman 2001). Not only is information transmitted simultaneously through several sensory channels (e.g. animals rarely give a threat vocalization without an accompanying facial expression), but also the sender closely monitors the response of the addressee to ensure that the message is getting through, and if it is not, the sender may increase the intensity (Barton, et al. 1992 ).

## MATERIALS AND METHODS

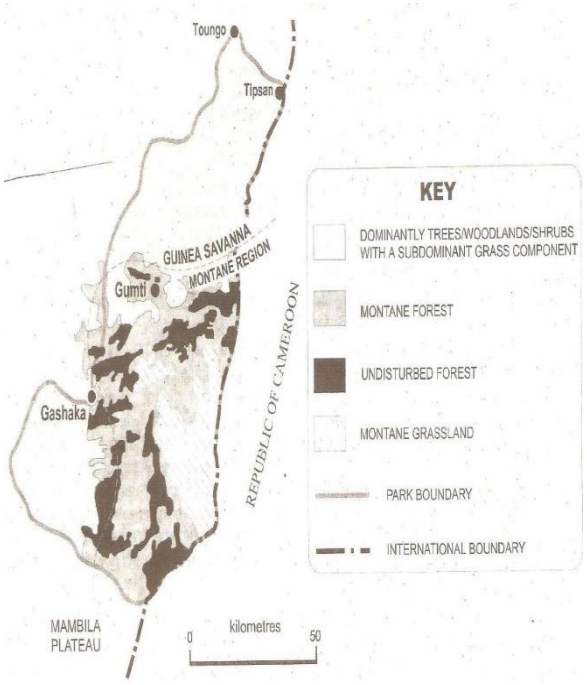


**Figure1.***The map of Gashaka-Gumti National Park*

**Source**: NPS/NCF/WWF (1998)

The data collection was done on a single animal group in southern zone of the national park. This group consisted of thirty baboons (adult males and females, sub adulat male and females, and juveniles). All the observations were made on foot. Initially the baboons would flee from the researcher to a distance of about 30m, but flight distance was progressively reduced in the course of time, and by the end of the study the animals in the group accepted an observation distance of about 15m. Data were collected on check sheets, and the categories of behaviours targeted were for ageing, travelling, grooming, vocalization,

and aggression, resting, playing, and mating (Altmann, 1998).

Scan data collection was based on a simple rule meant to avoid bias during the observation of the individual animal activity. This rule only permitted observation from right to left or left to right, on a single scan. During this particular time attention was given to an individual animal and its activities in the group. The left-to-right or right-to-left rule ensured that data collection was not biased in favour of more conspicuous animals with attractive behaviours (e.g. jumping or backing) and neglect those animals that just sat and rested.In each individual animal scanned, concern was given to age-sex class,and activity state. The left-to-right observation across the entire animal group ensured that animals that appeared behind the observation direction were neglected to avoid bias. During scanning the individual animals not seen in the group at the time were never looked for to avoid time waste.

## RESULTS

### Group Activity and Olive Baboon Daily Engagement

The olive baboon group activity was significantly related to the photo-period; $x^2$ = 127.05 at ($p<0.05$) as it is shown in Table 1. The adaptive significance of diurnal variability in primates activity budget is poorly understood (Boinski, et al.2000). However, it is difficult to interpret the absence of significant diurnal pattern in *Papio anubis*. Triphasic activity pattern with morning, mid-day and evening activity profile have been commonly reported among arboreal species (Boinski et al. 2000). The day-period activity of the baboon ranged from 6:00am – 6:00pm. In the morning period, from 6:00am – 11:59am the olive baboon group activity increased gradually. Activity and visual exploration built up as the group travelled slowly and constantly through the middle forest canopy and the ground.

**Table1.** *Baboon activity and photo period*

| Daytime (G.M.T.) | Activity | | | | | |
|---|---|---|---|---|---|---|
| | Groom No (%) | Rest No (%) | Forage No (%) | Movement No (%) | Vocal No (%) | Total No (%) |
| 6.00-6.59 | 8(0.9) | 21(2.2) | 46(4.9) | 16(1.7) | 2(0.2) | 91(9.8) |
| 7.00-759 | 25(2.7) | 32(3.4) | 30(3.2) | 14(1.5) | 2(0.2) | 101(10.8) |
| 8.00-8.59 | 9(1.0) | 33(3.5 | 39(3.1) | 0(2.1) | 2(0.2) | 101(10.8) |
| 9.00-9.59 | 9(1.0) | 35(3.7) | 32(3.4) | 8(0.8) | 1(0.1) | 84(9.0) |
| 10.00-10.59 | 19(2.0) | 20(2.1) | 31(3.3) | 18(1.9) | - | 88(9.4) |
| 11.00-11.59 | 12(1.3) | 14(1.6) | 17(1.8) | 21(2.2) | 2(0.2) | 65(7.0) |
| 12.00-12.59 | - | 21(2.2) | 41(4.4) | 21(2.2) | 3(0.3) | 85(9.1) |
| 13.00-13.59 | 2(0.2) | 28(3.0) | 37(4.0) | 13(1.4) | 5(0.5) | 98(8.9) |
| 14.00-14.59 | 2(0.2) | 15(1.6) | 37(4.0 | 13(1.4) | - | 67(7.2) |
| 15.00-15.59 | - | 17(1.8) | 37(4.0 | 10(1.1) | 1(0.1) | 65(7.0) |
| 16.00-16.59 | 3(0.3) | 16(1.7) | 22(2.4) | 7(0.8) | 2(0.2) | 49(5.3) |
| 17.00-17.59 | 3(0.3) | 8(0.8) | 23(2.5) | 3.(0.3) | 2(0.2) | 38(4.1) |
| Total | 103(11.0) | 270(28.2) | 389(41.7) | 160(17.1) | 20(0.2) | 932(100) |

**Table2.** *The correlation of olive baboon behavior*

| Variable | Travel time(hrs) | Forage time(hrs) | Rest time(hrs) | Groom time(hrs) | Vocal time(hrs) | Attack time (hrs) |
|---|---|---|---|---|---|---|
| **Travel T.** | 1.00n | 0.82* | 0.50 | 0.64 | 0.80* | 0.36 |
| **Forage T.** | 0.82* | 1.00 | 0.86* | 0.91* | 0.73* | 0.71* |
| **Rest T.** | 0.50n | 0.86* | 1.00n | 0.80* | 0.54n | 0.73* |
| **Groom T.** | 0.64n | 0.91* | 0.80* | 1.00n | 0.50n | 0.82* |
| **Vocal T.** | 0.80* | 0.73* | 0.54n | 0.50n | 1.00n | 0.07n |
| **Attack T.** | 0.36n | 0.71* | 0.73* | 0.82* | 0.07n | 1.00n |

*n = No correlation*

**= Significant correlation*

Feeding was observed greatest during this period of the day. At midday, from 12:00am – 3:59pm, the group lowered its activity profile comparatively. In this transitional period the

group slowed down often in the lower canopy and descended onto the ground. While from 4:00pm – 5:59pm the group activity profile went even lower, they would walk more often, feed a little, and look less worried. Finally, the animals would be seen climbing night-trees (sleeping trees) at the sleeping cliffs. Vocalization was recorded more at midday when other activities were at a lower profile. Both grooming and vocalization were recorded low or absent during the day-hours with heavy feeding activity. The animal group apportioned 41.7% of its day-period activity on feeding, 11.0% on grooming, and 2.0% on vocalization. The Individual day feeding and movement acquired much energy and metabolic work; hence the animal group would sequentially have moderate rest after these energy exhaustible activities and later on re-emerged on full-scale energy demanding activities.

In table 2, movement showed a positive and significant correlation to feeding time $r^2 = 0.82$, and vocal time $r^2 = 0.80$ at ($p<0.05$) respectively. Also, aggression positively and significantly correlated to groom time $r^2 = 0.82$, feeding time $r^2= 0.71$ and rest time $r^2 = 0.73$ at ($p<0.05$) respectively. It does appear that baboon inhabiting mosaic vegetation landscape spend approximately three quarter of their time feeding and moving (Zinner, *et al*. 2001). This might depend on the nutritional quality and quantity of the food types produced by this vegetation. For this desire to become achievable the baboons have to constantly mobilize within the feeding range in groups. And the fact that the food resources in the range are always scarce and spatially distributed demand much time and energy on daily bases reaching them during which time they are heard releasing routine calls (Boug, *et al.*1994). This communication was believed to mark their presence in the feeding range which consequently scares other animal groups from exploiting the range. Movement is very much required for the animal group to visit the usual feeding site (Chapman & Chapman 2000). The park is rich in baboon food resources, thus, movement from one feeding site to the other does not pose a challenge as such. Secondly, the territoriality has reduced feeding ranges of individual groups of baboon to approximately two-square kilometers. The baboons were also observed to be more routine to feeding sites closest to their night-trees than any other (Byrne, et al.1993). On the grassland and shrub land they were observed moving in single file and while in the forest were leaping and hooping (Henzi, & Barrett, 2002).

## DISCUSSION

Baboons generally have a very diverse dietary feeding pattern. Hence, highly specialized adaptations, such as keen vision, climbing, digging, pulling, plucking, gnawing, and great distance movement enable them to exploit a wide variety of foods, thus, survive in a great diversity of habitats. Further, they are the most widely spread and abundant primate species on the African continent (Bronikowski, & Altmann, 1996). In Kwano, Olive baboon food types are both seasonal and year-round. The seasonal changes synchronize and determine the availability of different primate food resources. The major invertebrates eaten by baboons in Kwano are some species of caterpillar and spider, more abundant in the dry-season (January - April) while tsetse-fly, termites, dung-beetle, and black-ants were seen eaten in the wet season (May - September). Fungi feeding by the olive baboon in the park were only seen in the wet season when there was a prevalent and abundant growth of mushroom. Weather patterns have both direct and indirect influences on the activity pattern of primates. Rainfall and temperature have pervasive effects on animals (Bronikowski & Altman, 1996) and so influence time allocation patterns both temporally and spatially. The most important effect of weather on primates is indirect in that food availability is strongly influenced by weather conditions. Furthermore, analyses within species have shown variation in time budgets across primate populations to be related to local climatic conditions (Dunbar, 1992). One variable of particular importance is rainfall, which is known to be a reliable predictor of primary productivity in sub-Saharan habitats. Since spatial and temporal variations in rainfall affect the distribution of important food resources, baboon time allocation profiles are impacted.

Olive Baboons are known to eat diverse food items (Whiten et al., 1991). Fruits were a major food items for an extended time. This may be due to most plants in ground water forest had fruits throughout the year with very little monthly variation. In additions some fruits, for example fruits of Ficus spp. have about one-third digestible components, mostly carbohydrate with some lipids and proteins. It also contains high amount of minerals such as potassium,

calcium, sodium and phosphorus (Wendeln et al., 2000). They have also suggested that free standing figs had higher percentage of protein, complex carbohydrate and ash than strangler figs. It has been suggested that protein is one of the important nutrients for the growth and reproduction, and that its availability governs the feeding ecology of all organisms (White, 1993). Food items of Olive Baboons were high in abundance in the present study area, because of moderate temperature and rainfall, and due to the presence of enough water sources from ground water streams. In the current study area, the distribution of figs (the tree that produces sweet-tasting fruits) was of free standing types.

A positive correlative between grooming and resting is a phenomenon in primate and other group-living animals. Group living has long been identified with matrilineality, in primates it is a heritage that benefits the primate group social care, invasion defense, and maintenance of hierarchy. These factors give much advantage to grooming which is routinely more observed during group-resting. The animals were more closed to each other during the period of group resting which was maximum at midday and late evening hours as an obvious signal of disengagement from more energy demanding activities like feeding and movement. The grooming behaviour could be conflict mitigative, on the other hand could generate conflict between some members of the group who seem not to be flexible in grooming culture at the time. Such conflicts were more observed during feeding intrusions behaviour that was hardly accepted by the adult male in particular. Generally, baboons are among the most social and affiliative animals with very strong social bonds, fundamental to their lives. These social bonds are also observed to be much strong among adult males in the group unlike in some other monkey groups in which adult males avoid one another (Henzi, & Barrett, 2003).

The study also revealed that the adult females in the animal group are a constituent factor toward group defense against phenomena of group aggression. These females quite often would scream in alarm and progress towards the researcher whenever the flight distance was exageratively reduced towards the group. This conflict ended any time the researcher made an intentional off-look against the group direction of activity while backing these flared females. The adult females also direct aggression sometimes to any group member that attempted to suppress or molest the infant juvenile into a frequent and painful squealing. Whenever this happened the entire group would be exposed to an upheaval resulting to a group scream commotion. The alpha or dominant male would emerge from his group peripheral vigilant strategic site to the centre, chasing some adult females and males that were at the verge of war a few meters off (Henzi, & Barrett, 2003). A few seconds later the animal group would return to calm then the dominant male would quietly return to his group peripheral vigilant position for defense against any foreign invasion. The dominant male was also seen in many occasion resolving conflicts between the infant juvenile and it's mother-stemmed by a deliberate refusal to yield to the suckling request tendered by the infant juvenile or refusing to give an allo-infant-groom. This conflict would always have a reverse order when approached by dominant male.

## Conclusion

A raining weather would inflict and advantage "resting" upon olive baboon group at the expense of key day activities such as feeding and movement. This ecological factor did not only minimize the animal group day feeding time but also limited its reaching other food varieties. Thus, by reaching a feeding balance the olive baboon group was observed quietly exploiting nieghbouring food resources within their shelter at a phenomenal rate whenever the rain ceased. The baboon group was observed monopolizing two sleeping sites. The olive baboon group would make more use of the ground surface than the arboreal sphere of the habitat in movement. This movement would be single-filed restricted to familiar feeding range trails, often led and tailed by the adult females and males (Henzi, et al.1997). Some juvenile would sometimes abandon feeding activity and advance towards the research student where they would manifest friendship related activities such as beating the right forelimb on either the leaves of the supporting tree branch accompanied with an instant low tone squeal or would stage a two-and-fro movement on the same tree branch directing its sight to the researcher's location.

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