

## EFFECT OF ENVIRONMENTAL ENRICHMENT ON BABOON'S BEHAVIOUR AND ACTIVITY IN T. A. AFOLAYAN WILDLIFE PARK, AKURE, NIGERIA

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### Abstract

Effect of environmental enrichment on the activity and behavioural pattern of Olive Baboon (*Papio anubis*) at T.A. Afolayan Wildlife Park, Federal University of Technology, Akure, Nigeria was studied. An ethogram with behavioural description was developed for the study which was conducted in two phases; enrichment and non-enrichment phase. Each of the two male baboons were observed independently for consecutive three days per week between 8:00am and 12:00pm using instantaneous scan sampling at 10min interval for 12weeks (six weeks each for the enrichment and non-enrichment phase) through direct observation. Different enrichment devices: cartoon boxes, bamboo stuffed with different fruit items, tyres, mirror, hard ball, polyvinyl chloride with honey were used in alternative days during the enrichment phase. Data were analyzed using descriptive and inferential statistics. Seven behavioural categories (locomotion, social, aggressiveness, inactive, communication, stereotypes and maintenance) were observed. Results showed that Baboon A exhibited stereotypic behaviour (42%) without enrichment while after introduction of enrichment the Baboon exhibited more of socializing behaviour (49%). Furthermore, the non-enrichment phase for Baboon B shows that inactive behaviour (58%) was the highest while after introduction of enrichment the Baboon exhibited more of socializing behaviour (37%). The mean difference of the time spent on activities during the introduction of enrichment for Baboon A was not significant ( $t=2.232$   $p=0.067$ ) while the time spent on activities during the introduction of enrichment for Baboon B was significant ( $t=2.469$   $p=0.049$ ). The wildlife park was enjoined to establish a regular and diverse enrichment regime that minimizes boredom and reduces abnormal behaviours for its primates.

**Keywords:** Primate, Stereotype, Welfare, Ethogram, Enrichment devices

### Introduction

Zoological institutions have made significant efforts to promote positive animal welfare over the last decades. Good animal welfare can be defined as a balance of positive and negative experiences, with the positive experiences dominating and the animal exerting control over the negative experiences (Mellor, 2016). The environments which offer complexity, novelty, choice, and an impression of control provide animals with many kinds of possibilities to experience various levels of comfort, interest, and confidence, ultimately contributing to the animal's welfare. Environmental enrichment is one-way zoos strive to create stimulating and complex environments for the animals in their care. There are many definitions of environmental enrichment, but they all include the idea that the animal's environment is improved by varying stimuli or providing opportunities for choice while taking into account the species' behavioural biology and natural history (Hoy, 2010). Environmental enrichment is thus an encompassing term that entails a variety of activities such as olfactory, visual, feeding, tactile, social, structural, auditory, human-animal, and/or cognitive enrichment (Maple and Perdue, 2013). Consequently, enrichment has become one of the most important topics in the field of animal welfare (Binding *et al.*, 2020). Enrichment goals typically include, but are not restricted to increasing the diversity and performance of species-appropriate behaviours, increasing positive environmental utilization, reducing the presence of and preventing the development of abnormal behaviours, and increasing the ability to cope with difficulties. By focusing on these goals, efficient and effective management practices for zoo animals can be established (Buchanan-Smith, 2011).

Enriching the environment is an important aspect of animal care. Enrichment are items offered to animals to help them with their behavioural needs. It enables animals in captivity

to functionally simulate their natural environment, thereby increasing opportunities for display of species-specific behaviours while decreasing the incidence of abnormal behaviours. Environmental enrichment also refers to changes that improve the physical and social stimulation provided by the captive environment. Zoos commonly use this method because it benefits both an animal's behaviour and physiology, basically through stress reduction. Chronic stress is linked to decreased immune system function, stunted growth, and poor reproductive outcomes. Several studies in the zoo literature show that environmental enrichment (such as adding climbing structures, hiding places, and foraging tasks) improves animal health and behaviour. Environmental enrichment, in addition to improving the well-being of captive animals, ensures that an animal's behaviour and gene are conserved. Therefore, enrichment can be broadened to express a species' behavioural repertoire in captivity and potentially improve the success of a captive breeding and reintroduction program. While environmental enrichment is the most commonly used method for reducing the incidence of abnormal behaviour, it is only 50% effective. Additional options to minimize the prevalence of abnormal behaviours in captive animals include genetic selection and the use of drugs. However, enrichment is the most basic and commonly used method, and any alternative/complementary strategy should, if possible, be based on an in-depth knowledge of the species' natural history (Maple and Perdue, 2013).

Non-human primate requires a physical and social stimulating environment to develop properly and behave in a species appropriate fashion. Studies of monkeys and chimpanzee clearly show the consequences of rearing in isolation or in a restrictive environment. These animals develop bizarre self-directed behaviours, fear of novelty and inadequate social functioning. These behaviours are sometimes referred to as "cage stereotypes" for example, chimpanzees move from group to single cages displayed significantly more repetitive stereotyped behaviours, such as rocking, pacing and flipping. One of the most effective tools an animal caregiver has for improving an individual's welfare is enrichment. Environmental enrichment has been described in a variety of ways, it generally relates to the addition of sensory stimuli or the inclusion of options in the environment for the provision of stimuli that promote the expression of species-appropriate behavioural and mental activities in an under stimulating environment. Environmental enrichment is a set of procedures that alter the physical or social environment of captive animals in order to improve their quality of life by meeting their ethological needs. Well-being, environmental enrichment and stress are all related concepts in terms of techniques, physiology and behaviour. Enrichment has been shown to reduce stress and improve animal well-being and health in captivity (de Azevedo *et al.*, 2007).

Animal care in biomedical facilities housing nonhuman primates has changed dramatically over the last two decades, with a greater emphasis on animal welfare, behavioural management and psychological well-being. The importance of maintaining laboratory animal welfare was largely overlooked in the early twentieth century. This scenario changed when scientists realized that non-human primates and other animals have many behavioural needs that if not met, can negatively affect the animals' behaviour, physical health, and research utility. Prior to the year 1985 amendments of the Animal Welfare Act (AWA), also referred to as the Improved Standards for Laboratory Animals Act, the term "animal" was not commonly used. However, the academic roots for the empirical evaluation of the welfare of captive primates were evident many years earlier. Much of the early research on behavioural management and enrichment took place in zoos and included both non-primates and primates. Specialized behavioural management positions are now common in research facilities, significant budgets are allocated to non-human primate behavioural management, and commercially available products have been developed and marketed to foster the psychological well-being of non-human primates.

However, animal welfare or well-being is a multidimensional construct that is difficult to quantify. Welfare exists on a scale from bad/poor to good. An inappropriate social behaviour,

restricted behavioural repertoire, an abnormal time budget, increased aggression toward conspecifics, and other abnormal behavioural patterns are all possible signs of poor/bad welfare. As a result, this study looked into the effect of environmental enrichment on the activity and behavioural patterns of Olive Baboons (*Papio anubis*) in T.A. Afolayan Wildlife Park, Federal University of Technology, Akure, Nigeria.

## Materials and Methods

### Study Area

The research was conducted at T.A. Afolayan Wildlife Park, Federal University of Technology, Akure (FUTA), in Akure South Local Government Area of Ondo State, Nigeria. The University is one of the Federal Universities of Technology founded by the Federal Government of Nigeria in 1981 in order to promote technological advancement. The University is situated between latitudes 07° 16' and 07° 18' N and longitudes 05° 09' and 05° 11' E along the Akure-Ilesa expressway, FUTA is spread across 640 ha of land.

### Futa Wildlife Park

The conservation area within the Federal University of Technology, Akure is called T. A. Afolayan Wildlife Park named after a renown late Professor of Wildlife Management in Nigeria. The Park lies between latitudes 7.2935°N and 7.2963°N and longitudes 5.1425°E and 5.1445°E (Figure 1) with a total area of 89,100 m<sup>2</sup> (8.91 ha), it is a lowland tropical rainforest with an average rainfall of 1650 to 1700 mm annually (Oguntuase and Agbelusi, 2013). The wildlife Park's terrain is undulating, with small outcrops strewn about. The park's elevation ranges between 215 and 320 meters. Apart from displaying animals for teaching, research, and visitor entertainment, the FUTA Wildlife Park is also dedicated to the conservation of various animal species, both *in-situ* and *ex-situ*. The park is home to a diverse range of animals, including mammals, birds, reptiles, and amphibians (Idowu, 2010).

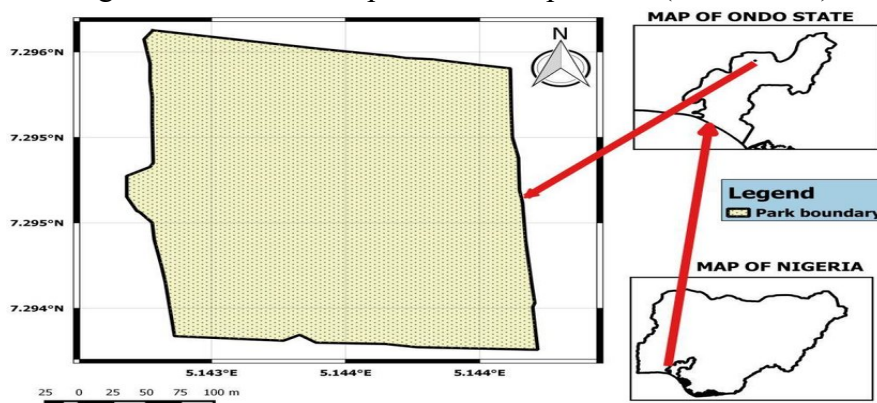


Figure 1: Map of T.A. Afolayan Wildlife Park, FUTA

Source: Olaniyi *et al.* (2016)

### Flora and Fauna

*Tetrapleura tetraptera*, *Trichilia emetic*, *Newbouldia laevis*, *Jatropha gossypifolia*, *Aframomum melegueta*, *Elaeis guineensis*, *Diospyros spp*, *Khaya ivorensis*, *Milicia excelsia*, *Aspilia africana*, and others in the combination of herbaceous plants, shrubs and tropical trees make up the vegetation (Abu, 2010). The wildlife park is characterized by a wide variety of birds, rodents, and insects, primates, bush buck, duicker, grasscutter, giant rat, squirrel, and rock python are among the fauna resources (Idowu, 2010).

### Procedure for Data Collection

The two subjects (A and B) are male Olive Baboons (*Papio anubis*), housed separately in different enclosure made with fortified steel bar, an uncemented floor; natural bare ground with grasses. The primate housing in the park is divided into four compartments, each compartment is 9.7m (31.10ft) in length, 6.38m (20.11ft) in breadth and 2.45m (8ft) in

height. Inside each confinement is an indoor pen with one window and two doors serving as shelter for sleeping, and protection from excessive rain and sun as well as restraining the baboon when activities such as cleaning and handling is to be carried out.

Different devices for exploratory/manipulatory, physical and feeding enrichment devices (Plates 1-4) were provided for the baboons (*Papio anubis*) and their behavioural pattern was observed and recorded. The two baboons were observed for 360 hours independently for three months between October and December 2020. A three-day pilot study was conducted to pre-determine the behaviours and an ethogram containing behavioural descriptions was established (Table 1). During the study, each baboon was observed for consecutive 3 days per week between 08:00am and 12:00pm using an instantaneous scan sampling at 10 minutes interval as described by (Altmann, 1974). Observed behaviour with their respective time were documented in a data sheet. The study was conducted in two phases, each lasting six weeks: the control period without enrichment and the enrichment phase. Thirty-seven different behaviours were recorded, these were grouped into seven major behavioural categories including locomotion, social, aggressive, inactive, maintenance, stereotypic and communication behaviour (Table 1). Enrichment devices used for the study in phase 2 are presented in Table 2. Data was gathered for each animal on daily basis for six weeks each for both the enrichment and non-enrichment phases to record their activity. Every week, a fresh batch of enrichment devices was introduced in alternate days, with the feeding enrichment leftovers from the previous days being retired, as described by (Félix *et al.*, 2011). On a daily basis, the frequency of each behaviour and behavioural category was summed up for each baboon and then compiled into an activity budget using the categories described in the ethogram.

**Table 1: Ethogram with Defined Behaviours of the Baboon and the Categories**

Category	Behaviour	Definition
Locomotion	Walking	Baboon move its forelimb and hindlimb in front of the other and supports the body weight on both arms and legs.
	Climbing	Moving its body vertically upwards or downwards in the same directing
	Walking upright	Putting all of its body weight on its feet
	Running	To move very fast using one feet and hand and one foot and hand off the ground
	Brachiation	Moving horizontally above ground by holding trees/enclosure
	Running	Moving fast by using one feet and hand, with one foot and hand off the ground
	Forage	Consume, manipulate or search for food or digs in the dirt in search for food
Social	Self-grooming	Plucking in the fur with its fingers, occasionally lip, teeth
	Playing	Moving of object or apparently purposeless and non-threatening movement
	Masturbation	Manipulation of its own genital organ
	Submission	Swiveled its hips towards another individual and held

		the posture, with its tail flattened against its back.
	Smile	The lips are closed over the incisors and retracted over the canine
	Display yawn	Mouth is open wide, head is tilted back, the lips are retracted to expose the teeth
	Sexual/mating	Displaying having a sexual intercourse
Aggressive	Throwing	Throw faeces to the visitor or staff
	Jaw chopping	Chopping of jaw quickly
	Staring	Raises of eyebrow and staring at person aggressively
	Ground slap	threat lunge without the forward motion in which the ground is slapped
	Rail pulling	Pulling the enclosure with both hands angrily
Inactive	Resting/sleeping	The position of sitting or lying down with eyes closed
	Lying	Supporting the majority of its body weight on body parts other than its hands, feet, or tail
	Sitting	Sitting upright on its bottom, either with or without tail or hands support
	Standing	Using its hands and feet to support its body weight, with or without holding on to something with its tail
Abnormal/stereotype	Digit sucking	Dipping the fingers inside the mouth
	Pacing	Walk in a steady speed without a particular destination expressed in anger
	Rocking	move backward and forward under violent impact
	Self-biting	Biting of the body repeatedly
	Wall licking	Licking of the enclosure wall
	Hair pulling	Removal of the fur
Communication	Tooth grind	grinding of teeth
	Vocalization	Produce speech or sound
	Teeth display	Opening of the mouth to show its teeth
Maintenance	Urinating	Voiding of urine
	Defecating	Voiding of faeces
	Drinking	Obtaining water into its mouth and swallowing

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Eating	Obtaining food into its mouth and swallowing
Not visible	Out of view

Table 2: Environmental enrichment provided in baboon's pen in six weeks

Weeks of enrichment	Description of enrichment devices
Week 1	Closed cartoon filled with wood chips, newspapers, papers, dried grapefruits, dates, fruits, vegetables, peanuts and several other seeds
Week 2	Polyvinyl chloride (PCV) tubes with honey, dried grapefruits and different seeds inside
Week 3	Hard balls with small holes filled with peanuts
Week 4	Mirror (90 X 40cm)
Week 5	Bamboo with holes and stuffed in different sections with vegetables, grapefruits, seeds and peanuts
Week 6	Hanging tyres with ropes and bamboo for climbing

Source: Field survey, 2020

### Data Analysis

Descriptive and inferential statistics were used to analyze the data gathered from the enrichment and non-enrichment phases using Microsoft excel and the results were presented in tables, percentage, frequency, means, standard deviation and charts. T-test was used to compare the significant differences using Statistical Package for Social Sciences version 21.

### Results

#### Behavioural Responses and Activities of Baboons in T.A. Afolayan Wildlife Park, Futa

The activities of the two baboons for the study are represented in Figure 2 for Baboon A after different kinds of enrichments were supplied to the animal within cage environment. It was found that 25% of its time was spent on locomotion, 49% on social behaviour, 7% on aggressiveness, 3% for inactivity, 3% on communication, 6% on maintenance and 8% on stereotypic behaviour. Figure 3 also reveal the activities of Baboon A in the non-enrichments phase, 4% of its time was spent on locomotion, 3% on social activity, 3% on aggressiveness, 23% on inactive behaviour, 9% on communication, 17% on maintenance, and 42% on stereotypic behaviour.

Moreover, Figure 4 show the activities of the Baboon B after the introduction of different enrichments devices, 36% of the time were spent on locomotion, 37% on social behaviour, 3% on aggressiveness, 7% on inactive behaviour, 6% on communication, 11% on maintenance, and 2% on stereotypic behaviour while in Figure 5 the activity of the Baboon in the non-enrichment phase shows that 14% of its time were spent on locomotion, 3% on social activity, 15% on aggressive, 58% inactive behaviour, 3% on communicating behaviour, 7% for maintenance, and 1% showing a stereotypic behaviour.

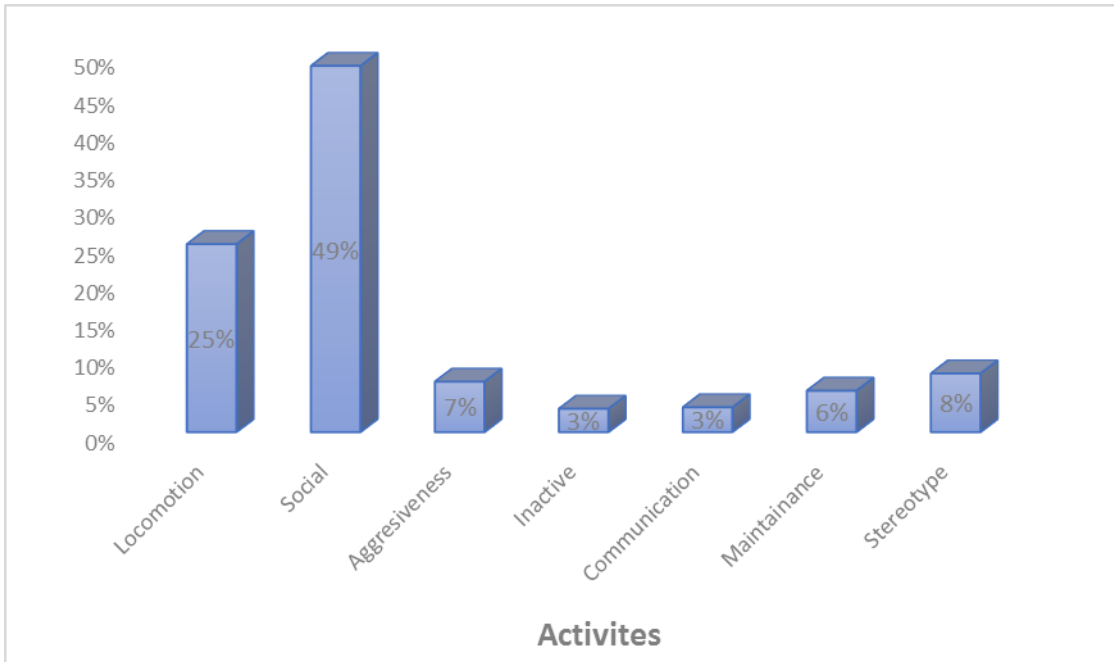


Figure 2: Activities of Baboon A during the enrichment phase

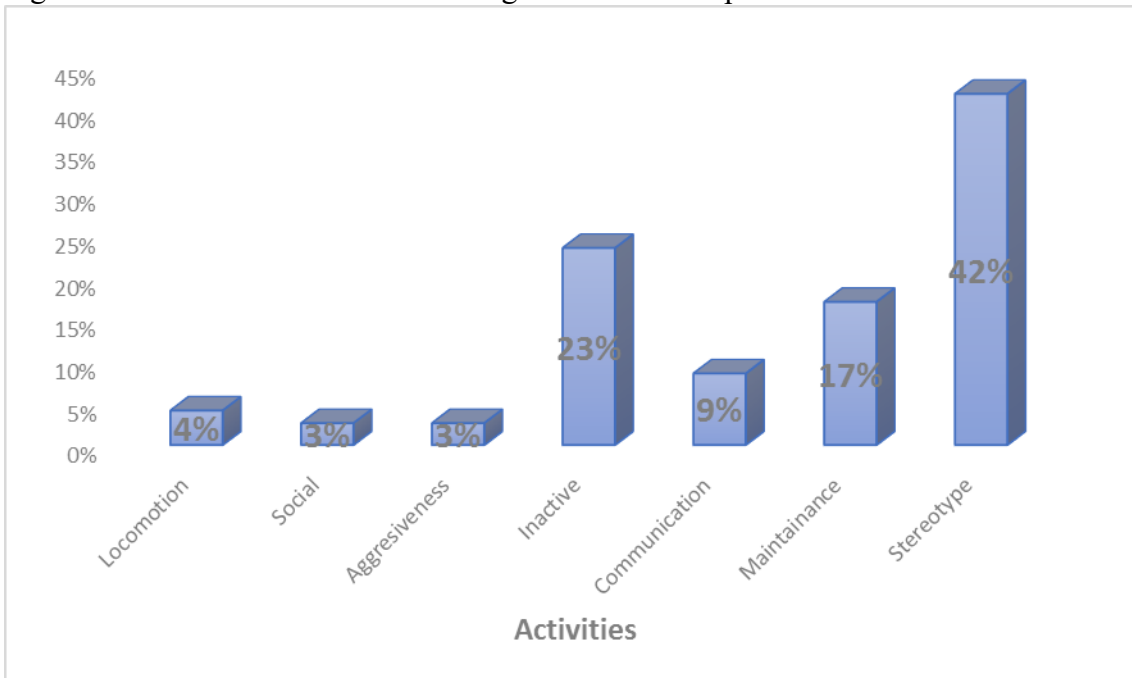


Figure 3: Activities of Baboon A in the non-enrichment phase

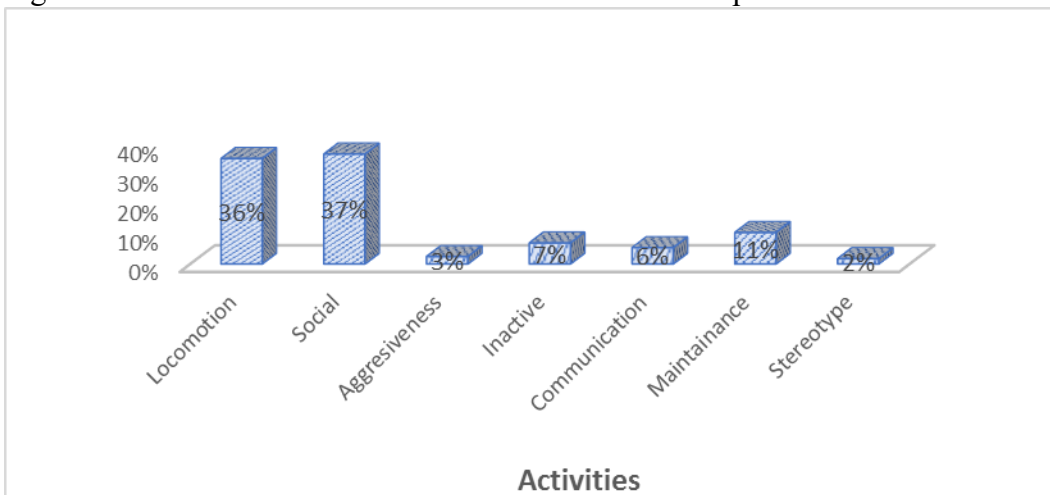


Figure 4: Activities of Baboon B during the introduction of enrichment

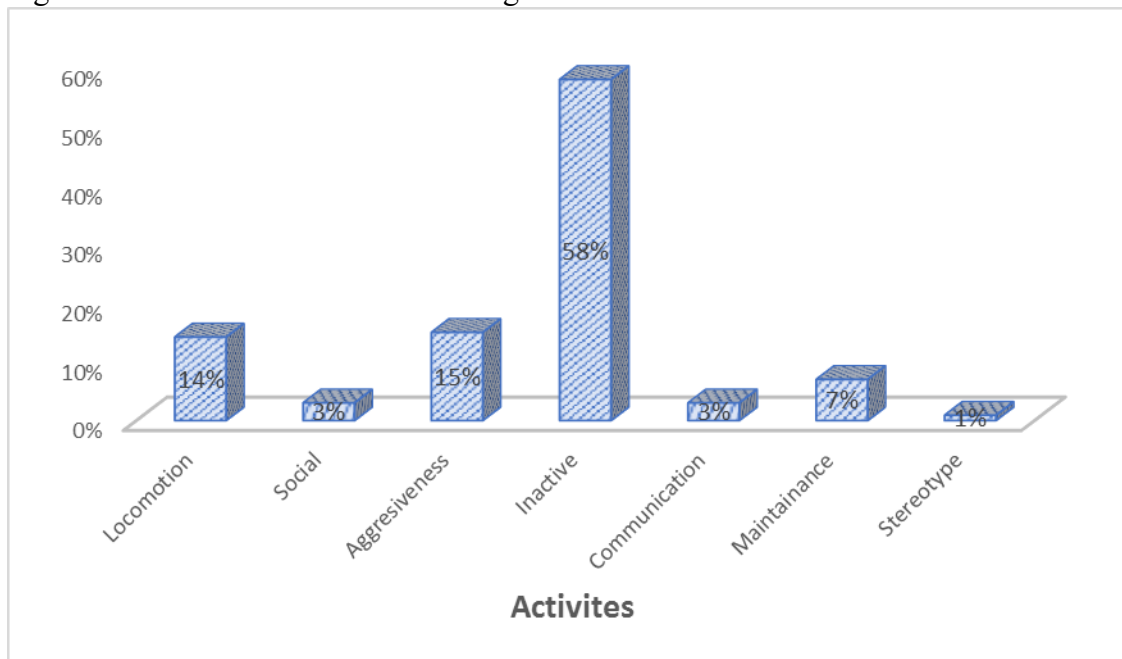


Figure 5: Activities of Baboon B without enrichment



### Duration of Time That Baboons Spent On Activities per Day

The average daily activities of the baboons are shown in Table 3. It was observed that during the enrichment phase of Baboon A, the average daily duration spent on locomotion is was  $5.8 \pm 0.2$  hours, social behaviour ( $11.4 \pm 0.1$  hours), Aggressive behaviour ( $1.6 \pm 0.1$  hours), inactivity behaviour ( $0.7 \pm 0.07$  hours),  $0.8 \pm 0.1$  hours were spent on communication, maintenance daily duration was  $1.3 \pm 0.2$  hours while stereotype was  $1.8 \pm 0.2$  hours. Table 3 also revealed that during the non-enrichment phase of Baboon A, the animal was observed to spend its average daily duration in the following behaviour  $1.1 \pm 0.7$  hours for locomotion,  $0.7 \pm 0.1$  hours for social behaviour,  $0.7 \pm 0.2$  hours for aggressiveness,  $5.9 \pm 0.3$  hours for inactive,  $2.2 \pm 0.3$  hours for communication and  $10.6 \pm 0.4$  hours for stereotypic behaviour.

Moreover, for baboon B shown in Table 4, the average daily duration spent on locomotion was  $7.8 \pm 0.2$  hours, social behaviour was  $8.2 \pm 0.4$  hours, Aggressive behaviour was  $0.6 \pm 0.01$  hours, inactivity behaviour was  $1.6 \pm 0.1$  hours,  $1.2 \pm 0.2$  hours were spent on communication, maintenance daily duration was  $2.3 \pm 0.2$  while stereotype was  $0.4 \pm 0.2$ . Also, during the non-enrichment phase of Baboon B, the animal was observed to spend  $3.3 \pm 0.2$  hours for locomotion,  $0.7 \pm 0.07$  hours for social behaviour,  $3.4 \pm 0.7$  hours for aggressiveness,  $13.6 \pm 0.7$  hours for inactive,  $0.7 \pm 0.1$  hours for communication while  $1.7 \pm 0.1$  hours and  $0.2 \pm 0.04$  hours for stereotypic behaviour.

**Table 3: Duration of Time Baboon A Spent On Each Activity per Day**

Activities	Average daily duration (hours)	
	With Enrichment	Without Enrichment
Locomotion	$5.8 \pm 0.2$	$1.1 \pm 0.7$
Social	$11.4 \pm 0.1$	$0.7 \pm 0.1$
Aggressiveness	$1.6 \pm 0.1$	$0.7 \pm 0.2$
Inactive	$0.7 \pm 0.07$	$5.9 \pm 0.3$
Communication	$0.8 \pm 0.1$	$2.2 \pm 0.3$
Maintenance	$1.3 \pm 0.2$	$4.3 \pm 0.3$
Stereotype	$1.8 \pm 0.2$	$10.6 \pm 0.4$

**Source: Field survey, 2021**

**Table 4: Duration of time Baboon B spent on each activity per day**

Activities	Average daily duration (hours)	
	With Enrichment	Without Enrichment
Locomotion	$7.8 \pm 0.2$	$3.3 \pm 0.2$
Social	$8.2 \pm 0.4$	$0.7 \pm 0.07$
Aggressiveness	$0.6 \pm 0.01$	$3.4 \pm 0.7$
Inactive	$1.6 \pm 0.1$	$13.6 \pm 0.7$
Communication	$1.2 \pm 0.2$	$0.7 \pm 0.1$
Maintenance	$2.3 \pm 0.2$	$1.7 \pm 0.1$
Stereotype	$0.4 \pm 0.2$	$0.2 \pm 0.04$

**Source: Field survey 2021**

**Test for significance**

The test of significant is shown in table 5 with the mean difference of each baboon for the two phases of enrichment and non-enrichment. Table 6 also revealed the paired samples t- test statistics of the time budget per activity of the baboons between the enrichment and non-enrichment phases.

**Table 5: Mean differences in duration spent on activities by baboon A and baboon B**

Activities	t value	p value
Baboon A (With enrichment)	2.232	0.067 <sup>ns</sup>
Baboon A (Without enrichment)	2.619	0.040 <sup>*</sup>
Baboon B (With enrichment)	2.469	0.049 <sup>*</sup>
Baboon B (Without enrichment)	1.908	0.105 <sup>ns</sup>

Source: Field survey, 2021

**Table 6: Paired samples t statistics of the time budget per activity during the two phases**

Activities	t value	p value
Baboon A with and without enrichment	-0.120	0.909 <sup>ns</sup>
Baboon B with and without enrichment	-0.098	0.925 <sup>ns</sup>

Source: Field survey, 2021



Plate 1: Activities of baboons during the box enrichment



Plate 2: Activities of baboons A and B during PVC enrichment



Plate 3: Activities of the baboons during Ball enrichment



Plate 4: Activities of baboon during mirror

## Discussion

Findings from the present study aimed at investigating the effects of environmental enrichment on the activities and behavioural pattern of baboons in the ex-situ conservation area at the Federal University of Technology Akure (FUTA), Nigeria revealed that all the enrichments that were tested influenced the behaviour of the baboons positively. When the different enrichments were introduced, stereotypic behaviour such as pacing, hair pulling drastically reduced in Baboon A from 42% to 8%. Baboon B was seen engaging in self-directed behaviours in front of the mirror and lip masking, and was able to touch those areas of his body he was not able to see without reflective object. Baboon A at first was aggressive while looking at the mirror by

producing a grunt sound, throwing himself up and hitting his body on the ground but later show submission and started lip masking and grooming self in front of the mirror. Moreover, the behaviour exhibited by both Baboons A and B were good indication that each individual is self-aware. In addition, they both played with the ball when introduced to them, most especially the baboon A, rolling the ball on the ground, throwing the ball and using hand to kick the ball. The average duration that baboon A spent displaying socializing behaviour per day was more than baboon B. The baboons in the wildlife Park also spent most of their time on locomotion such as walking, running, brachiating, climbing when enrichment was introduced. This is inconsistent with the findings of Sha *et al.* (2016) on ring tailed Lemur that showed locomotion was in general higher in the outdoor enclosure, but tended to decrease when enrichment was provided, regardless of enclosure type. This could reflect a tradeoff between the time spent locomoting and interacting with the enrichment items, Similarly, exploration also decreased when enrichment was given in the indoor enclosure. Outdoors, this effect was not present, and levels of exploration behaviour were generally higher than indoors. At first when no enrichment was introduced, aggressiveness was more with baboon A such as rail pulling, throwing sand, pulling the vegetation with annoyance and sometimes try to fight the other Baboon, but introduction of enrichment, aggressiveness became less and although aggression posture was initially displayed in order to scare intruders near the enrichment spots whereas in Baboon B, stereotypic behaviour reduced during the enrichment phase.

Inactivity behaviour (non-locomotive) not being active include resting, sleeping, sitting lying down. This is mostly the behaviour of the baboon B most especially during the control phase. This was in support of Okekedunu *et al.* (2014) who observed that most of the resting behaviour in *Cercopithecus mona* occurs when food sources appear limited, spending most of the time lying down, or sleeping. However, during the enrichment phase baboon B was very active by exploring, manipulating and playing with the items, inactivity reduces drastically also in Baboon A. A good indication that the animals respond positively to the enrichment devices.

The primates were observed to produce vocal sounds, bark and/or communicate while eating, stressed or when their names were mentioned. This observation supported the report of Moore (2013) who stated that chimpanzees deliberately address their signals to a given receiver as a means of indicating their communication. The activity was seen to be higher when there was enrichment than when no enrichment was placed in Baboon B while in Baboon A the reverse was the case. This could be connected to the fact that vocalization was usually produced during agonistic interaction and food competition. Furthermore, the percentage of time spent during maintenance activities in baboon B when enrichment was introduced was higher than when no enrichment was not used but it was opposite for Baboon A.

Stereotypies have been observed in a variety of nonhuman primate species and Apes. Stereotypic behaviour which is defined as repetitive, unvarying and unseemingly functionless behavioural pattern such as bouncing, rocking, flipping, swinging, digit sucking, hair pulling (Vandeleest *et al.*, 2011). Stereotypic behaviours was noticed mostly in baboon A most especially when the enrichment was not placed, the animal pace around the enclosure, sometimes running to and fro, biting itself, pulling his hair. But when the different enrichment devices were placed the animal respond positively and this make a drastically reduction in stereotypic behaviour from 42% to 8% in Baboon A, while Baboon B shows little stereotype behaviour both in the enrichment and non-enrichment phases.

Without enrichment, the two Baboons were found to majorly display inactive and stereotypic behaviours while at the introduction of enrichment devices they showed a significant increase in their normal behaviour, this indicates that the enrichment have a positive effect on the activities of baboon in captivity. This is in accordance with Alejandro, (2020) who studied the effect of environmental enrichment on the behaviour of meerkats, banded mongooses and dwarf

mongooses in human care. It was revealed that all three species spent more time interacting with the enrichment when placed in the tube. Animals in captivity can be deprived of performing some of their natural behaviours while using enrichments may allow them to express a larger part of species-specific behaviour repertoire and with a better frequency distribution. Environmental enrichment can increase the animals' ability to manage challenges and their positive use of the environment and decrease frequencies of abnormal behaviour. Alejandro (2020) revealed that offering captive animals' different types of enrichments in their exhibits will promote certain behaviours and this will improve the biological functioning of these captive animals.

### **Conclusion**

It can be concluded from the study that environmental enrichments influenced the behaviour of baboons in T.A. Afolayan Wildlife Park, Akure, Nigeria positively. The duration of time engaged in the enrichment was higher when food and fruits were provided in the devices and when reflective object (mirror) was used; which shows effectiveness of the devices as being more successful and impactful. From an environmental enrichment perspective, the enrichment materials used apparently have several advantages. Introduction of the materials/devices and task increased cage complexity, opportunity for social behaviour, diverse activity and served as cognitive stimulation, changes in these features are considered reasonable options for the promotion of psychological well-being in non-human primates. The study provided a satisfactory ground for an increase in the quality and variety of activities the baboons were able to engage in, they spent a lot of time locomoting and exploring the enclosure. The task represents an opportunity to acquire and perform a species-typical behaviour, approximating the repertoire of wild baboons. Whereas, there was a drastic reduction in abnormal behaviour, the subjects spent more time foraging and manipulating tools and less time being inactive.

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