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Observation of different behaviours of Tufted Capuchin, *Sapajus apella* (Primate: Cebidae) under captive conditions at Sri Chamarajendra Zoological Gardens, Mysuru, Karnataka, India

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Abstract: The tufted Capuchin, *Sapajus apella* (Primate: Cebidae) is commonly called 'Black-capped Capuchin' or 'Brown Capuchin' different behaviours were recorded using standard methods at Sri Chamarajendra Zoological Gardens, Mysuru (Latitude: 12.3028° N, Longitude: 76.6552° E) in Karnataka, India during 2025 after obtaining permission from the higher authority. Systematic planning was made in consultation with Range Officer, Animal Caretaker, Education Officer and Biological Scientist to record the behaviours of *S. apella* during morning, afternoon and evening hours in its enclosure. *S. apella* was observed by distance without creating any disturbance for its normal activity. Observations were made two times in a week from morning (10.00 AM), afternoon (01.00PM) and evening (04.00 PM) hours for a period of 56 days i.e., from 4th April to 31st May, 2025 using the focal animal sampling method with each session lasting for a period of 20 minutes. Total 17 behaviours were observed and observations were non-invasive and no interaction or interference with the *S. apella*. The study was conducted under the awareness of Zoological Gardens Authorities and aligned with the ethical standards for observational studies in Zoological Gardens. Results revealed that *S. apella* species exhibited a clear biphasic activity pattern, with increased physical and social activities during morning and evening periods, and a considerable drop-in activity during afternoon period. Analysis of variance of different behaviors of *S. apella* did indicate significant variation ($F=7.814$; $P<0.05$) under captive conditions. This clearly indicated that *S. apella* is active during most of the day and not demonstrated any stereotypic or abnormal behaviours that indicated the overall good welfare of the animal under captive conditions of Sri Chamarajendra Zoological Gardens.

Key words: Tufted Capuchin, *Sapajus apella*, captive conditions, Sri Chamarajendra Zoological Gardens, India

I. INTRODUCTION

In the nature, all wild animal species exhibit diverse type of activities based on their requirements to have normal survival. However, animals held in captivity may exhibit significant alterations in their natural behaviour perhaps due to restricted space, repetitive routine activity and human presence. Such behavioural modifications may reduce the activity levels, which could develop a stereotypic behaviour (Mason *et al*., 2007). Thus, captivity impacts the natural behaviours of wild animal species in a considerable way. Notwithstanding to the human captive conditions, more emphasis is given to ensure wild animal safety, food security and medical care for wild animals. Despite, the captivity may create stress that would affect feeding behaviour, sleep cycles, social interaction and reproductive success due to human presence. Understanding such behavioural shifts is essential to elevate the vitality for improving the welfare of animals in Zoological Gardens to refine the conservation practices. Since ancient times, Zoological Gardens were considered as recreation centres, but in modern times, Zoological Gardens have developed into *ex-situ* conservation hubs (WAZA, 2020). Thus, modern Zoological Gardens act as rescue centres for trafficked or injured animals (Reade and Waran, 1996), rehabilitation centres for orphan wild animals. Zoological Gardens are considered as important centres to keep certain wild animal species for public display, education, conservation, research, scientific studies and create public awareness to understand their role in the ecosystem (WAZA, 2020). Hence, Zoological Gardens help protect the endangered or threatened or vulnerable wild animal species of exotic or indigenous origin that contribute to scientific research and education. Further, Zoological Gardens functions under the guidelines of the Central Zoo Authority (CZA), India which ensures scientific management and animal welfare activities.

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While, captive settings offer safety from predators/ enemies, regular food availability, good environmental conditions, natural and man-made conditions help stimulate caged wild animals to show normal social behaviours. In this regard, modern Zoological Gardens contribute to global conservation efforts by allowing exotic and indigenous species breeding in captivity, working towards genetic diversity, reintroduction and public education (Carlstead and Shepherdson, 2000). However, in Indian Zoological Gardens, visitor's related stress is a major concern, presence of noisy visitors reduce play and increased pacing in captive animals (Mallapur *et al*., 2005). This observation highlights the need for better visitor's management, installing noise barriers and establish privacy zones inside the Zoological Gardens. Hence, it demands the need for regular analysis of captive animal's status and their social behaviours in Zoological Gardens (Pratyusha *et al.*, 2006). Captive animals exhibit different behaviours during different hours of the day (Saito *et al.*, 2011; Racevska *et al*., 2018; Albuquerque *et al*., 2020; Carrasco *et al*., 2023). Further, various researchers (Carlstead *et al.*, 1991; Visalberghi and Anderson, 1993; Blaney and Wells, 2004; Stoinski *et al*., 2004; Hosey, 2005; Sellinger and Ha, 2005; Shepherdson *et al*., 2006; Ross *et al.*, 2008; Wells and Irwin, 2008 and Saito *et al.*, 2011) have studied social behaviour and assessed the status of different species of captive wild animals (e.g. Bears, Gorillas, Jaguars, Chimpanzees, Orang-utans, Squirrel Monkeys and Lemurs) at different Zoological Gardens around the world. Enriched environments in a captive enclosure help reduce the abnormal behaviours and better social interaction in captive Capuchins (Brent and Eichberg, 1991). Capuchins require cognitive enrichment to avoid behavioural frustration (Visalberghi and Anderson, 1993). Physical enrichment using bark, toys and manipulables increased the exploratory behaviours in captive tufted Capuchins (Ludes and Anderson, 1995 & 1996). Boinski *et al.* (1999) have evaluated the use of enrichment items like puzzle feeders in captive brown Capuchins. Thus, enrichment and appropriate social grouping are essential in reducing the stress in captive animals (Carlstead and Shepherdson, 2000).

Young (2003) has emphasized that enrichment is crucial to preventing behavioural abnormalities and ensuring captive animals' mental stimulation. Fragaszy *et al.* (2004) have documented the learning and social behaviour in tufted Capuchins due to the use of advanced tools and highlighted their cognitive complexity. Hosey (2005) has observed the sensitivity to environmental and social stressors, requiring well-designed enclosures for wild animals welfare. Mason *et al*. (2007) have observed the stereotypic behaviours in captive zoo animals. Meunier *et al.* (2007) have recorded the decision-making in wild Capuchins and cognitive flexibility relevant to social management in captive conditions. Pizzutto *et al.* (2007) have reported elevated cortisol levels in Capuchins under poor management and linked enrichment to physiological stress reduction. Captive animals show stress-related behaviours when they are exposed to dense or noisy crowds and often display increased vigilance (Davey, 2007). Hosey (2008) has demonstrated a model of human–animal relationships in Zoological Gardens, advocating for structured, predictable human interactions to improve captive animals welfare. Leonardi *et al.* (2010) have studied the mixed-species housing for Capuchins and observed that enriched social environments encouraged the natural behaviours of captive wild animals without aggression. Polizzi-di-Sorrentino *et al.* (2014) have recorded the Capuchins learning behaviour and showed strong cognitive behaviour. Racevska *et al.* (2018) have suggested that regular, calm zookeeper-animal interactions reduce stress and promote natural behaviours particularly in primates and carnivores. Albuquerque *et al.* (2020) have recorded the behavioural responses of robust Capuchin, *Sapajus* species in Brazilian Zoological Gardens. Further, various researchers have observed the tool use task by capuchin monkeys. Izawa and Mizuno (1977) have recorded the Palm fruit cracking behavior of wild black-capped Capuchin, *Cebus* . Fragaszy and Adams-Curtis (1991) have studied the manipulation behaviour in tufted capuchin monkey, *Cebus* . Fragaszy and Boinski (1995) have studied the patterns of individual diet choice and efficiency of foraging in wedge-capped Capuchin monkeys. Ludes and Anderson (1995) have recorded the peat-bathing behaviour in captive white-faced capuchin monkey, *Cebus capucinus*. Cummins (1999) has published report on environmental constraints in a tool-use task by tufted capuchins monkey, *Cebus* . Fujita *et al.* (2003) have recorded how tufted capuchin monkey, *Cebus* understand causality involved in tool use. Resende *et al.* (2003) have recorded the interaction between social play and nutcracking behavior in semi-free tufted Capuchin monkey, *Cebus* . Fragaszy *et al.* (2024a) have studied the anvils and stone pounding tools use in wild Capuchin monkey, *Cebus libidinosus*. Fragaszy *et al*. (2004b) have provided the information on Capuchin biology. Fragaszy and Cummins-Sebree (2005) have recorded the relational spatial reasoning behaviour in Capuchin monkeys. Visalberghi *et al.* (2007) have studied the characteristics of hammer stones and anvils used by wild bearded capuchin monkey, *Cebus libidinosus* to crack open palm nuts. Sherwen *et al.* (2015) have reported the effects of visual contact with zoo visitors on black-capped capuchin welfare. Above mentioned published reports clearly revealed that research on captive animals in Indian Zoological Gardens, research on captive animals is incomplete. Although, India possess good number of Zoological Gardens, only few Zoological Gardens have tufted Capuchins in their premises. Published reports on the behaviour and status of tufted Capuchins in the Zoological Gardens of India are sparse and fragmentary. Sri Chamarajendra Zoological Gardens in Mysuru is one of the major Zoological Gardens in India, it has very good number of visitors across India and abroad due to its exotic and indigenous wild animal species and good infrastructure. It is maintained well with utmost care, but captive animal's behaviour and their status is not available to public (Pratyusha *et al*., 2026). Record of different behaviours using standard methods

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would help create suitable facility and encourage further to undertake good healthy maintenance of captive animals. Hence, the present investigation was undertaken.

II. MATERIALS AND METHODS

Study area: The investigation was conducted at Sri Chamarajendra Zoological Gardens Mysuru (Latitude: 12.3028° N, Longitude: 76.6552° E) (Kamath, 2001). It is popularly called 'Mysuru Zoo' in Karnataka, India. Sri Chamarajendra Zoological Gardens is one of the India's oldest and most well managed Zoological Gardens, spread over 157 acres amidst Mysuru city. It is housed with <150 species of mammals, reptiles and birds, and is recognized for its naturalistic enclosures, scientific animal care, conservation and breeding programs.

Methodology: During the present investigation, permission from the higher authority of Sri Chamarajendra Zoological Gardens Zoological Gardens, Mysuru obtained vide Official Order No. MZA/Edu-internship/084/2024-2025, dated 28.03.2025. Proper planning was made systematically in consultation with Range Officer, Animal Caretaker, Education Officer and Biological Scientist to record the behaviours of non-human primate, tufted Capuchin, *Sapajus apella* (Primate:Cebidae) during morning, afternoon and evening hours in its enclosure. The *S. apella* was observed by distance to record its behaviours without creating any disturbance for its normal activity. Observations were made two times in a week from morning (10.00 AM), afternoon (01.00PM) and evening (04.00 PM) hours for a period of 56 days i.e., from 4th April to 31st May, 2025 using the focal animal sampling method with each session lasting for a period of 20 minutes. A standardized ethogram was used to categorize observed behaviours as follows. Locomotion (e.g. Walking, climbing, jumping), feeding and drinking, resting (e.g. Sitting or lying inactive), sleeping, vigilance (e.g. Alert posture, scanning surroundings), vocalization, positive social interaction (e.g. Grooming, playing) and negative interaction or aggression (e.g. Threats, chasing, hitting). Total 17 parameters namely: animal name, no. of individuals in the cage, age, diet, stratum, weight, habitat, type of enclosure, area of the enclosure, activity of the animal, time and date of observation, number of visitors in front of animal cage, weather conditions (e.g. Temperature, RH), opinion of visitors about the activity of the animal in the cage/enclosure, name of visitor, age of visitor, native place of visitor, purpose of visit, opinion of the animal caretaker, name of animal caretaker, relationship with captive animal, feeding habits of captive animal, medical history of captive animal were recorded in a well-designed and prepared questionnaire by following standard methods. All these observations were non-invasive and no interaction or interference with the *S. apella*. The study was conducted under the awareness of Zoological Gardens Authorities and aligned with the ethical standards for observational studies in Zoological Gardens. Collected data was systematically compiled and analysed using standard methods as per Saha (2009).

III. RESULTS

Table 1 shows the different behavior of tufted Capuchin, *Sapajus apella* during morning, afternoon and evening periods of the day under captive conditions at Sri Chamarajendra Zoological Gardens, Mysuru. Altogether, 17 different behaviors were recorded, of which 16 behaviors (except chasing Plate 1C) were recorded during evening hours. However, during morning and afternoon hours, all the 17 behaviors shown by *S. apella* (Table 1). The results revealed clear variations in its activity across different periods of the day such as morning, afternoon and evening. The species showed high levels of energy, complex motor activities and a range of social and environmental interactions (Table 1; Figure 1 and Plates 1 & 2). During the morning period, *S. apella* exhibited its highest activity levels, with locomotion (18.8%), jumping (18.2%) and hanging (18.8%) (Plate 1D) being few of the most prominent behaviours. These values reflect the intense movement and exploratory activity. Vigilance (8%) (Plate 1A), scratching (8.2%) (Plate 2A) and grooming (6.4%) were also observed with considerable frequency, indicating alertness and social maintenance. Mild sunbathing (7.0%) (Plate 1B) was recorded, while other behaviours like depart (2%), approach (7.2%) and chasing (3.0%) (Plate 1C) highlighted the group dynamics. Positive interactions (1.2%) and vocalization (2.4%) were low, but were exhibited during the present study (Table 1 and Figure 1). The incidence of abnormal behaviour was minimal (0.3%), showing good environmental adaptation to captive conditions. Sleeping (0.5%) (Plate 2B), resting (1.5%) and eating (1.5%) (Plate 2C) were moderate, indicating high arousal levels. During the afternoon, activity levels dropped noticeably. Locomotion declined to 10.7% and jumping fell to 12.4%, while hanging behaviour reduced sharply to 7.6%. In contrast, resting (9.0%) and sleeping (3.0%) (Plate 2B) increased, showing signs of decreased energy or heat-related fatigue. Scratching (15.4%) (Plate 2A) was the most frequent behaviour during afternoon, possibly indicating irritation, boredom or mild stress. Drinking (3.8%) (Plate 2D), eating (2.6%) (Plate 2C) and sunbathing (8.5%) (Plate 1B) were moderately recorded. Vigilance (7.3%) (Plate 1A) and grooming (6%) remained steady, while positive interaction (1.3%) and vocalization (1.3%) stayed low. Depart (4%) and approach (3%) behaviours were minimal. Notably, abnormal behaviours were not observed during afternoon period. However, during the evening, the Capuchin showed a resurgence in its activity. Locomotion increased again to 16.7%, and jumping peaked at 17.0%, nearly matching morning levels. Hanging behaviour (12.4%) (Plate 1D) and

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approach behaviour (8.2%) were also prominent. While resting (3.0%), sleeping (1.0%) (Plate 2B), eating (1.0%) Plate 2C) and drinking (3.0%) (Plate 2D) remained low, vocalization increased significantly to 5.9%, suggesting increased social expression. Wrestling (3.3%) and positive interaction (0.6%) occurred at low levels. Scratching dropped to 7.2% (Plate 2C), and sunbathing decreased to 4.3% (Plate 1B), consistent with lower heat. Interestingly, chasing behaviour (Plate 1C) was absent in the evening. Grooming (4.9%) continued but at a reduced rate. Analysis of variance of different behaviors of *S. apella* did indicate significant variation ($F=7.814$; $P<0.05$) under captive conditions. This clearly indicated that *S. apella* is active during most of the day (Table 1). Figure 1 shows the per cent occurrence of different behaviors of *S. apella* during different hours of the day under captive conditions in Sri Chamarajendra Zoological Gardens, Mysuru.

IV. DISCUSSION

The tufted Capuchin, *S. apella* is commonly called 'Black-capped Capuchin' or 'Brown Capuchin' due to its tufts of dark fur on its head that give a 'cap' like appearance. *S. apella* is a highly intelligent New World monkey, native to the forests of South America including Brazil, Venezuela, Colombia, Peru and the Guyana. As per the IUCN Red List, *S. apella* is enlisted as 'Least Concerned' species (IUCN, 2014). It is an arboreal, diurnal and highly social animal, often live in group. Each group consists of 8 to 30 individuals and they are known for remarkable tool use and problem-solving abilities. *S. apella* showed highest physical activity (jumping, hanging and locomotion) during morning and evening hours, reflecting natural diurnal activity cycles. Afternoon its behaviours were characterized by increased resting, sleeping and scratching it was likely due to fatigue or heat-related discomfort. Abnormal behaviour was not recorded during the present study that indicated the overall positive welfare, though scratching peaked in the afternoon, which may warrant enrichment review. Social interactions like grooming, vocalization and wrestling were present but relatively low, showing moderate social engagement. Feeding-related behaviours (e.g. Eating and drinking) were consistently low across morning, afternoon and evening periods during the present study, possibly due to scheduled feeding times outside observation windows. Further, *S. apella* is considered as one of the most cognitively advanced monkeys in the Neo-tropical regions. It uses sticks, stones and leaves in the wild to access food, crack nuts or defend itself against any predators or enemies under natural conditions (Albuquerque et al., 2020; Polizzi-di-Sorrentino *et al*., 2014). However, during the present study, observations was made under captive conditions, such type of behaviours were not observed. Further, *S. apella* is an omnivore with a flexible feeding habits that include fruits, seeds, leaves, insects, spiders, bird eggs and small vertebrates. Moreover, it is an opportunistic foragers and play an important role in seed dispersal in tropical ecosystems (Fragaszy *et al*., 2004). Thus, under captive conditions in Zoological Gardens, *S. apella* displayed active and exploratory behaviours. Maintenance of different behaviours such as grooming, scratching, and vigilance are exhibited during specific time schedules. Morning grooming was prominent among Capuchins, reinforcing the social bonds crucial for group cohesion. During afternoon, scratching behaviour was common, possibly in response to high temperature and perhaps this might have created a little discomfort. Vigilance and alertness were common during morning period, possibly reflecting a reassessment of territory and surroundings after the inactive night phase. Interestingly, social interactions were more common in the evening suggesting a period of social bonding or conflict resolution before rest. Surprisingly, negative interactions remained low overall, reflecting a relatively stress free captive environment is an indicator of good animal welfare activities in Zoological Gardens. Further, *S. apella* highly curious and responsive to visitors, capable of manipulating feeding and enrichment devices, sensitive to monotony and overcrowding. *S. apella* exhibited grooming, vocal outbursts. Similar type of observations were made by Mallapur *et al*. (2005), Visalberghi and Anderson (1993). Interestingly, *S. apella* benefit from interactive enrichment such as puzzle feeders, hanging ropes, climbing structures and rotating object-based tasks under captive conditions. At Sri Chamarajendra Zoological Gardens, animal caretakers and Zoo staff are taking more care to maintain the wellbeing of *S. apella*, as it display high levels of energy in the morning and become restless during weekends when the crowd size increases. To make more active, animal caretakers/zoo staff use hidden food items, climbing poles and visual barriers to maintain animal well-being (Young, 2003). Our observations are on par with the observations of earlier works such as Izawa and Mizuno (1977), Fragaszy and Adams-Curtis (1991), Fragaszy and Boinski (1995), Ludes and Anderson (1995), Cummins (1999) Fujita *et al*. (2003), Resende *et al*. (2003), Fragaszy *et al*. (2004), Fragaszy *et al.* (2004a &b), Fragaszy and Cummins-Sebree (2005), Visalberghi *et al*. (2007) and Sherwen *et al*. (2015) and others. The present study throw a light on the behavioural rhythms of non-human primate, *S. apella* at Sri Chamarajendra Zoological Gardens, Mysuru. These observations help understand that how during different periods of a day, prevailed local temperature, activity of *S. apella* behaviour under controlled human captive conditions.

V. SUMMARY AND CONCLUSION

During the present study, *S. apella* species exhibited a clear biphasic activity pattern, with increased physical and social activities during morning and evening periods, and a considerable drop-in activity during afternoon period. The afternoon mid-day lull is likely a behavioural adaptation to avoid heat stress and conserve energy consistent with findings in other

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studies of primates both wild and captive settings. Moreover, *S. apella* showed early day bursts of locomotion and social interaction, suggesting territorial or hierarchy based behaviours after waking. Afternoon feeding and resting patterns align with energy conservation strategies. Capuchins mirrored this pattern with morning peaks in movement and play, and a reduction in energy demanding behaviours by mid-day. Thus, tufted Capuchins demonstrated high cognitive and social complexity, suggesting a need for varied enrichment, especially during high activity hours. The behavioural pattern of non-human primate tufted Capuchin, *S. apella* across different periods of the day at Sri Chamarajendra Zoological Gardens provided an insight into animal welfare and good enclosure management. Moreover, absence of stereotypic or abnormal behaviours indicated the overall good welfare of the animal under captive conditions of Sri Chamarajendra Zoological Gardens, Mysuru, Karnataka.

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REFERENCES

[1]. A. C. Albuquerque, L.N. de-Souza and R.M. de-Almeida. Environmental and management influences on the behaviour of robust Capuchins, *Sapajus* spp., in Brazilian Zoos. Zoo Biology. 2020. Vol. 39. No. 4. P. 248–257.
[2]. S. Boinski, S.P. Swing, T.S. Gross and J.K. Davis. Environmental enrichment of brown capuchins: Behavioural and physiological effects. American Journal of Primatology. 1999. Vol. 48. No. 1. P. 49–68.
[3]. L. Brent and J.W. Eichberg. The effects of environment on captive Capuchin, *Cebus apella* behaviour. Zoo Biology. 1991. Vol. 10. No. 2. p. 95–102.
[4]. K. Carlstead and D. Shepherdson. Alleviating stress in zoo animals with environmental enrichment. In: The Biology of Animal Stress. (G. P. Moberg & J. A. Mench Edn.). CABI Publishing Co. Delhi.2000. p. 337–354.
[5]. K. Carlstead, J. Seidensticker and R. Baldwin. Environmental enrichment for zoo bears. Zoo Biology. 1991. Vol. 10. No.1. p. 3–16.
[6]. M. Carrasco, M. Díaz and P. Herrera. Effects of play therapy and reinforcement-based training on behaviour in western lowland Gorillas (*Gorilla gorilla gorilla*). Journal of Zoo and Aquarium Research. 2023. Vol. 11. No. 2. p. 101–109.
[7]. S.E. Cummins. Detection of environmental constraints in a tool-use task by tufted capuchins monkeys (*Cebus*). Master's thesis, University of Georgia, Athens, Greece. 1999. p. 1-10.
[8]. G. Davey. Visitor's effects on the welfare of animals in the Zoo: A review. Journal of Applied Animal Welfare Science. 2007. Vol. 10. No.2. p. 169–183.
[9]. D. Fragaszy, E. Visalberghi and L. Fedigan. The Complete Capuchin: The Biology of the Genus *Cebus*. Cambridge University Press, London, UK. 2004. p. 356.
[10]. D.M. Fragaszy and L.E. Adams-Curtis. Generative aspects of manipulation in tufted capuchin monkeys (*Cebus*). Journal of Comparative Psychology. 1991. Vol. 105. p. 387-397.
[11]. D. Fragaszy and S. Boinski. Patterns of individual diet choice and efficiency of foraging in wedge-capped capuchin monkeys. Journal of Comparative Psychology. 1995. Vol. 109. p. 339-348.
[12]. D.M. Fragaszy and S. Cummins-Sebree. Relational spatial reasoning by a nonhuman: the example of capuchin monkeys. Behavioral and Cognitive Neuroscience Reviews. 2005. Vol. 4. p. 282-306.
[13]. D. Fragaszy, P. Izar, E. Visalberghi, E. Ottoni and M. Gomes-de-Oliveira. Wild capuchin monkeys (*Cebus libidinosus*) use anvils and stone pounding tools. American Journal of Primatology. 2004a. Vol. 64. No. 359-366.
[14]. D. Fragaszy, E. Visalberghi and L. Fedigan. The Complete Capuchin: The Biology of the Genus *Cebus*. Cambridge University Press, Cambridge, London, UK. 2004b. p. 1-10.
[15]. K. Fujita, H. Kuroshima and S. Asai. How do tufted capuchin monkeys (*Cebus*) understand causality involved in tool use? Journal of Experimental Psychology. 2003. Vol. 29:233-242.
[16]. G. Hosey. How does the zoo environment affect the behaviour of captive primates? Applied Animal Behaviour Science. 2005. Vol. 90. No. 2. p. 107–129.
[17]. G. Hosey. A preliminary model of human–animal relationships in the Zoo. Applied Animal Behaviour Science. 2008. Vol. 109. No. 2–4. p. 105–127.
[18]. G.A. Hosey. A preliminary model of human–animal relationships in the zoo. Applied Animal Behavioral Science. 2008, 109, 105–127.
[19]. G. A. Hosey. How Do Zoo Animals See Us? Journal Applied Animal Welfare Science. 2013, 16, 338–359.

DOI: 10.17148/IARJSET.2026.13161

[20]. K. Izawa and A. Mizuno. Palm fruit cracking behavior of wild black-capped capuchins (*Cebus*). Primates. 1977. Vol. 18. p. 773-792.
[21]. U.S. Kamath. Karnataka State Gazetteer. Government of Karnataka, Bangalore. 2001. P. 1-500.
[22]. R. Leonardi, H.M. Buchanan-Smith, V. Dufour, C. MacDonald and A. Whiten. Living together: Behaviour and welfare of Capuchins, *Cebus* and squirrel monkeys, *Saimiri sciureus* in mixed-species groups. American Journal of Primatology. 2010. Vol. 72. No. 1. p. 33–47.
[23]. E. Ludes and J.R. Anderson. Peat-bathing by captive white- faced capuchin monkeys (*Cebus capucinus*). Folia Primatology. 1995. Vol. 65. p. 38-42.
[24]. E. Ludes and J.R. Anderson. Effects of physical enrichment on the behaviour of captive tufted Capuchin monkeys, *Cebus* . Animal Welfare. 1996. Vol. 5. No. 2. p. 151–161.
[25]. G. Mason. Stereotypic behavior in captive animals: Fundamentals and implications for welfare and beyond. In: Stereotypic Animal Behavior: Fundamentals and Applications to Welfare. (Mason, G., Rushen, J. Edn.). CABI Publishing Co., Wallingford, UK. 2006; pp. 325–357. 60.
[26]. G.J. Mason, R. Clubb, N. Latham and S. Vickery. Why and how should we use environmental enrichment to tackle stereotypic behaviour? Applied Animal Behaviour Science. 2007. Vol. 102. No. 3–4. p. 163–188.
[27]. E.P. Polizzi-di-Sorrentino, F. Amici, F. Aureli and J. Call. Exploring the exploratory mind: Capuchin monkeys learn about object function through exploration. Animal Cognition. 2014. Vol. 17. No. 5. p. 1081–1088.
[28]. K.S. Pratyusha, C. Nayana and S. Basavarajappa. Recording different behaviours of ring-tailed Lemur, *Lemur catta* (Primate:Lemuridae) under captive conditions at Sri Chamarajandera Zoological Gardens, Mysuru, Karnataka, India. International Advanced Research Journal in Science, Engineering and Technology. Vol. 13. No. 1. 2026. p. 398-405.
[29]. L.S. Reade and N.K. Waran. 1996. The modern zoo: how do people perceive zoo animals? Applied Animal Behavioral Science. Vol. 47. p. 109–118.
[30]. B. Resende, P. Izar and E. Ottoni. Interaction between social play and nutcracking behavior in semi-free tufted capuchin monkeys (*Cebus*). Revista de Etologia. 2003. Vol. 5. p. 198-199.
[31]. E. Racevska, S. Kalvane and K. Polakovs. Studying human-animal relationships in a zoo environment. Proceedings of the Latvian Academy of Sciences, Lativa, Northern Europe. 2018. P. 1-100.
[32]. S.R. Ross, K.E. Lukas and E.V. Lonsdorf. The influence of zoo visitors on the behaviour of captive Chimpanzees and Gorillas. Applied Animal Behaviour Science. 2008. Vol. 111. No.3–4. p. 201–212.
[33]. T.K. Saha. Biostatistics in Theory and Practices. Emkay Publications, Delhi. 2009. p. 1-99.
[34]. D.J. Shepherdson, J. D. Mellen and M. Hutchins. Foraging enrichment in captive western lowland Gorillas: Effects on behaviour and welfare. Zoo Biology. 2006. Vol. 25. No. 6. p. 379–393.
[35]. R.L. Sellinger and J.C. Ha. The effects of visitor density and intensity on the behaviour of two captive Jaguars, *Panthera onca*. Journal of Applied Animal Welfare Science. 2005. Vol. 8. No. 4. p. 233–244.
[36]. S.L. Sherwen, T.J. Harvey, M.J. Magrath, K.L. Butler, K.V. Fanson and P.H. Hemsworth. Effects of visual contact with zoo visitors on black-capped capuchin welfare. Applied Animal Behavioral Sciences. 2015. Vol. 167. p. 65–73.
[37]. C. Saito, *et al*. Influence of visitor presence and enclosure type on stress responses in lemurs. Zoo Biology. 2011. Vol. 30. No. 3. p. 281–293.
[38]. T.S. Stoinski, H.F. Jaicks and L.A. Drayton. Visitor effects on the behaviour of captive western lowland Gorillas. Zoo Biology .2004. Vol.23. No. 5. p. 365–385.
[39]. E. Visalberghi, D. Fragaszy, E. Ottoni, P. Izar, M.G. de-Oliveira and F.R.D. Andrade. Characteristics of hammer stones and anvils used by wild bearded capuchin monkeys (*Cebus libidinosus*) to crack open palm nuts. American Journal of Physical Anthropology. 2007. Vol. 132. p. 426-444.
[40]. D.L. Wells and R.M. Irwin. The influence of zoo visitors on the behaviour of Orang-utans, *Pongo pygmaeus*. Applied Animal Behaviour Science. 2008. Vol. 90. No. 2. p. 131–141.
[41]. World Association of Zoos and Aquariums (WAZA). WAZA Guidelines for Animal-Visitor Interactions. 2020. April-2020.pdf accessed on 5 July 2020. p. 16.
[42]. R.J. Young. Environmental Enrichment for Captive Animals. Blackwell Publishing Co. London, UK. 2003. p. 1-100.

Websites visited:
[43] https://doi.org/10.1002/zoo.21548
[44] https://www.iucnredlist.org
[45] https://doi.org/10.1007/s10764-021-00247-y
[46]https://www.waza.org/wp-content/uploads/2020/05/ENG_WAZA-Guidelines-forAVI._FINAL.

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Table 1. Analysis of variance of different behaviours of Tufted Capuchin, *Sapajus apella*

Sl. No.	Type of behaviour	Observation of different behaviours during			Total
		Morning	Afternoon	Evening	
1.	Locomotion	62	25	57	144
2.	Drinking	17	9	11	37
3.	Eating	5	6	3	14
4.	Resting	5	21	9	35
5.	Sleeping	1	7	3	11
6.	Vigilance	26	17	20	63
7.	Vocalization	8	3	18	29
8.	Positive interaction	4	3	2	9
9.	Depart	6	10	7	23
10.	Approach	24	7	25	56
11.	Jumping	60	29	52	141
12.	Hanging	29	18	38	85
13.	Grooming	12	14	15	41
14.	Scratching	27	36	22	95
15.	Sunbathing	23	20	13	56
16.	Wrestling	9	4	10	23
17.	Chasing	10	5	-	15
Total		328	234	305	855
'F' value		7.814^{S}			-

Note: S: Value is significant at 5% level.

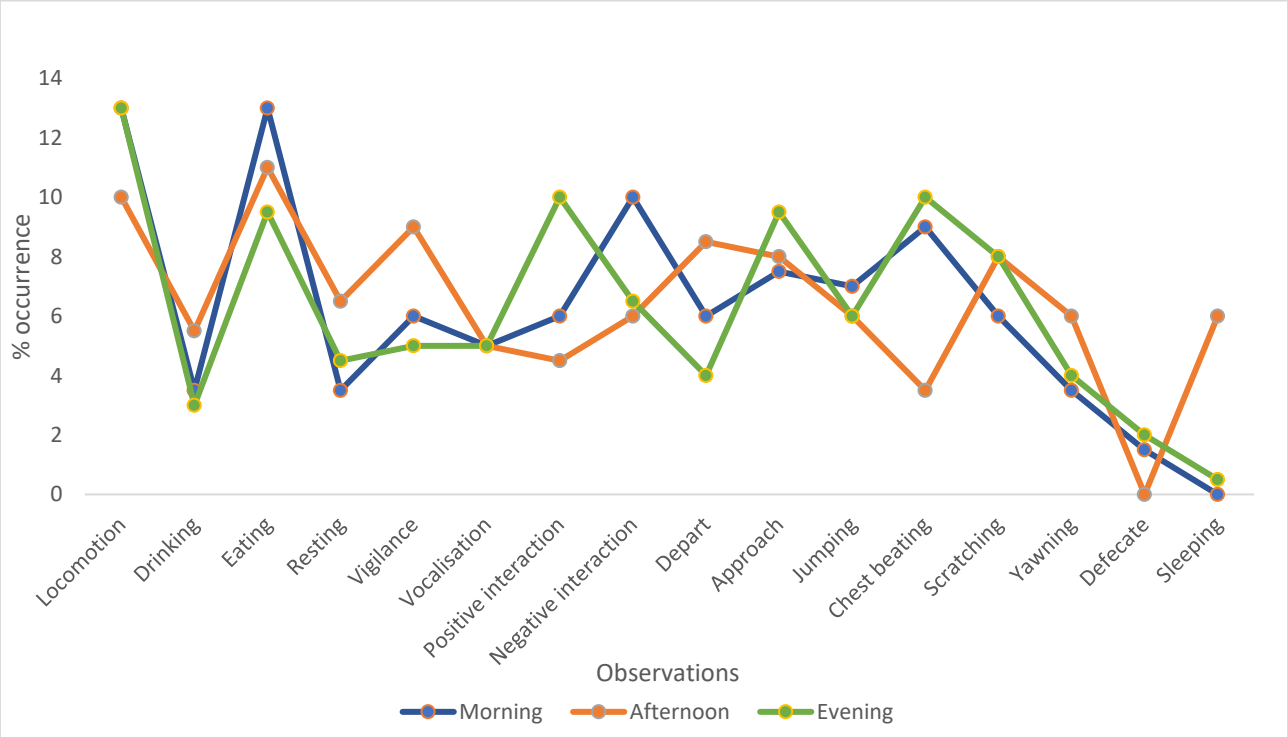

Figure 1. Per cent occurrence of different behaviours of Tufted Capuchin, *Sapajus apella*

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A. Staring at visitors

B. Sunbathing

C. Chasing

D. Hanging

5. Climbing

6. Running

Plate 1. Different behaviors of Tufted Capuchin recorded during different periods of the day

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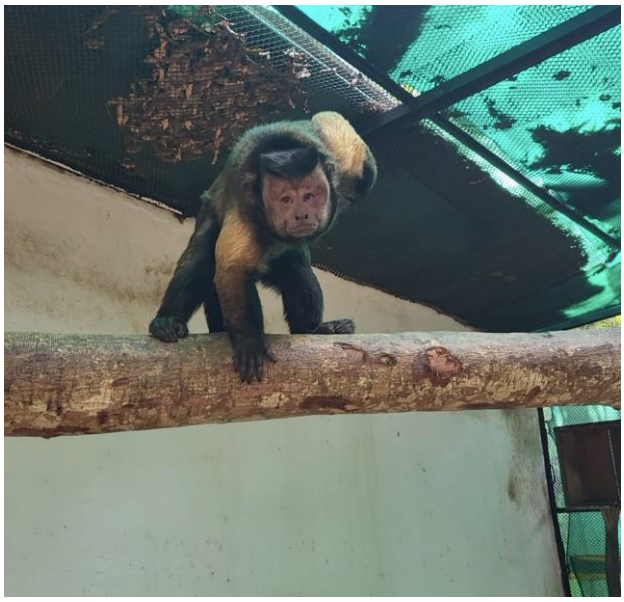
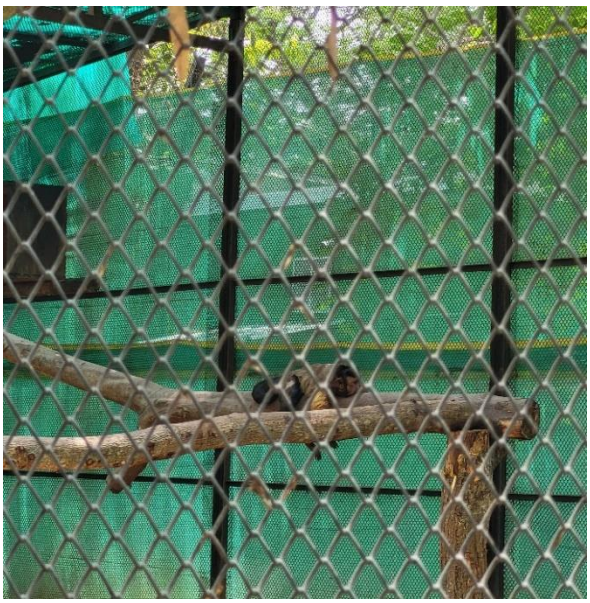


A. Scratching



B. Sleeping

C. Eating

D. Drinking

Plate 2: Tufted capuchin different behaviors and foraging activity recorded during different periods of the day