



A Preliminary study on Activity Budgets of Asian Elephant (*Elephas maximus* Linn.) at Elephant Orphanage

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ABSTRACT

*The activity budgeting of Asian Elephant (*Elephas maximus*) at Elephant Orphanage, Sri Lanka was studied. A total number of 6 elephants including 2 adult males, adult females and calves in each were observed during the present study. Recordings were made between 10:00 and 16:00 hr. The elephants exhibited variation in activity depending on their sex. The study identified 09 different behaviors for the animals observed during the observation. Behaviours were observed in all types (male, female and calf) was significant difference between types for Feeding, Rubbing, Tail Swiveling, Greetings, Dancing and Stealing others food. No behaviours were observed in male and female was significant difference between genders for Feeding, Dust bathing, Rubbing, Trumpeting, Tail Swiveling, Ear shaking, Dancing and Hind leg scratching (Two sample T-Test). Amongst these behaviors, feeding was dominant followed by walking in male, female and calves elephants. In male, feeding dominated (46.78% of the time) followed by flapping ear 20.74%, tail swiveling 18.06%, dancing 10.20% and other behaviours. Female shown feeding 50.59%, flapping ear 23.45%, tail swiveling 15.20%, Rubbing 2.10% and other behaviours. Calves showed feeding (43.65%), flapping ear 21.10%, tail swiveling 16.36%, dancing 3.84% and other behaviours.*

Keywords: Asian elephant, Activity budgeting, Captivity, Conservation, Behavior patterns.

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INTRODUCTION

Elephant activity budget can be defined as "different activities an elephant is involved in or exposed to in a given unit of time"[1, 2, 3, 4]. The budgeting of different activities within a specified period of time provides an opportunity to compare the behaviours exhibited by wild and captive elephants, to highlight the differences observed, to determine the cause of such differences, and to analyses their strategies of behavioral patterns and survival[5].

The activity patterns of animals combines with energy costs of various activities can provide energy expenditure estimates for the species. It varies according to the habitat and environmental factors such as temperature and rainfall. Several studies on activity pattern of mammals have suggested that the activity pattern and time budget of different species should be studied in detail[6, 7, 8]. The activity time budgeting studied for African elephant [9, 10, 11, 12]and Asian elephant [1, 13, 3, 14, 5, 4, 15, 16]. But it had been investigated well and comparatively in very few studies on the activity pattern of Asian Elephants[5].

MATERIALS AND METHODS

Study Area

Pinnawala Elephant Orphanage (7°18'2"N, 80°23'18"E) is an orphanage, nursery and captive breeding ground for wild Asian elephants located at Pinnawala village, 13 km Northeast of Kegalle town in Sabaragamuwa Province of Sri Lanka. The orphanage was originally founded in order to afford care and protection to many of the orphaned unweaned wild elephants found wandering in and near the forests of Sri Lanka. It was established in 1975 by the Sri Lanka Department of Wildlife Conservation (DWC).The Pinnawala Elephant Orphanage (PEO) was established in 1975 by the Department of Wildlife Conservation (Lair 1997). The facility was primarily designed to provide care and protection to baby elephants orphaned in the wild. It was subsequently taken over by the Department of National Zoological Gardens in 1978 [17].

Data collection

Behavioral observations were carried out during day time from 0800 to 0900 and from 1500 to 1600 hrs. Data were collected via direct observation by using focal sampling for 120 minutes per animal, including 2 male adults (Jayathu and Meega), female adults (Mauri and Thammenni) and calves (Anuthara and Bharathi) each. Total observations were conducted for 840 minutes. The behavioral activities of elephants were categorized. The following behavioural patterns were recorded in the study. A comprehensive ethogram was developed (Table. 1)

Data analysis: The observations were classified into different behavioural patterns. For each behavior, total duration and percentage of mean duration associated of respective mean were calculated, and placed in tabular form and were represented graphically wherever possible. A one way ANOVA and Two-sample T-Test were done (SAS, System for Windows 9.0).

Table 1. Ethogram of Asian Elephant and definition (After [18, 19]).

S.No	Behaviour	Definition
1.	Dust Bathing	Elephant takes mud or loose earth in its trunk and sprays it on its body.
2.	Ear-flapping	To and fro movement of ears;
3.	Feeding	Elephant uses trunk to pick up food, puts food in mouth and moves in relation to feeding.
4.	Greetings	Elephant with handler, raises trunk on command from handler, touches head of stranger, and drops trunk to normal position
5.	Hind leg scratching	Hind limb scratch each other.
6.	Stealing	Food is usually from their mother, allomothers and others.
7.	Tail swiveling	The tail goes stiff and normally held out to one side.
8.	Trumpeting	Elephants with raised trunk, makes vocal calls, then trunk drops down and stops calling.

RESULTS AND DISCUSSION

The study identified 09 different behaviors for the animals observed (Table 1) during the observation, in which adult males exhibited all the behaviours except greetings and tail swiveling. Females and calves showed all behaviours

a. Behaviours observed in male, female and calf.

There was significant difference between types for Feeding (One-way ANOVA $F_{2,3}=25.75$, $p=0.01$); Rubbing ($F_{2,3}=13.12$, $p=0.03$); Tail Swiveling ($F_{2,3}=9.42$, $p=0.05$); Greetings ($F_{2,3}=11.02$, $p=0.04$); Dancing ($F_{2,3}=57.14$, $p=0.004$); Stealing others food ($F_{2,3}=10.79$, $p=0.04$).

b. Behaviours observed in male and female.

There was significant no difference between genders for Feeding (two sample t-test, $t(5) = 295.64$, $p=0.07$); Dust bathing $t(5)=1.47$, $p=0.87$); Rubbing $t(5)=8.59$, $p=0.42$); Trumpeting $t(5)=120.03$, $p=0.11$); Tail Swiveling $t(5)=6.25$, $p=0.48$); Ear shaking $t(5)=1.40$, $p=0.89$); Dancing $t(5) = 382.12$, $p=0.06$); and Hind leg scratching $t(5) = 10.51$, $p=0.38$)

Amongst these behaviors, feeding was dominant followed by walking in male, female and calves elephants. In male, feeding dominated (46.78% of the time) followed by flapping ear 20.74%, tail swiveling 18.06%, dancing 10.20% and other behaviours. Female shown feeding 50.59%, flapping ear 23.45%, tail swiveling 15.20%, Rubbing 2.10% and other behaviours. Calves showed feeding (43.65%), flapping ear 21.10%, tail swiveling 16.36%, dancing 3.84% and other behaviours.

Table 2. Type of behaviors, total duration, mean durations (%) for observed for time activity budget for male (M), female (F) and calf (C) elephants.

S.No	Behavior	Duration/ animal (min)			Mean (%)		
		M	F	C	M	F	C
1	DN	17.52	2.71	3.97	10.20	1.87	3.84
2	DT	3.19	2.92	2.74	1.86	2.02	2.65
3	FD	80.37	73.25	45.13	46.78	50.59	43.65
4	FE	35.64	33.95	21.81	20.74	23.45	21.10
5	GR	0.00	1.02	2.53	0.00	0.71	2.45
6	HL	2.29	1.96	3.79	1.33	1.35	3.67
7	RB	0.81	3.04	3.73	0.47	2.10	3.61
8	ST	0.00	1.57	1.80	0.00	1.08	1.75
9	TR	0.96	2.35	0.96	0.56	1.62	0.93
10	TS	31.04	22.01	16.92	18.06	15.20	16.36

Many studies evidenced that the wild elephants spent much of the time for feeding (68% in Nilgiri[15]65% in Parambikulam[3], 74%in Mudumalai[14],and in 65.45 – 80.77% in Idukki [5], 60%[4] wildlife sanctuaries in India and 75% in Sri Lanka [1, 13]. Feeding was similar to the pattern observed on African elephants [9, 10, 11, 12,]; Because Both the Asian and African elephant thus live in tropical regions of the worldTherefore, a considerable portion of their time (60 - 80% of waking hours) must be spent feeding in order to fulfil their nutritional requirements. Elephants in the wild feed variety of natural foods, such as variety of grasses, twigs, bark, roots, and leaves and they spend a lot time preparing their food.[20, 21, 22, 23].It is suggested that the availability of food and water drives elephant movement in the wild. Elephants will typically travel farther during the dry season,when resources are depleted, to obtain sufficient food and water[24, 25, 26, 27].

In a housing environment, elephants are not under pressure to seek food or water, and instead are more prone to obesity due to the high quality of feed and the addition of enrichment foods [21]. It was reported, the majority of a housing elephant's day should be spent on feeding activities,

40% [28](Posta), 27.4 – 41.4% [19]in which the animals must manipulate and work for food.

The results are compared with studies carried out in the wild and found that in the wild elephants spent about 65% time for feeding, drinking 1.4% and other behaviours (communication, signal, rubbing the body against trees or rock, defecation, nursing calves and playing) 2% in Parambikulam National Park in southern India [3]. It was found elephant spending 20% for resting, and moving (without feeding) was 14% and other behaviours (including drinking, salt licking, playing, dust bathing, rubbing, vocalization, vigilance, defecating and urinating) was 6% [4]. It was observed in a wild population of Asian elephants, neonates and infants spent 17% of time in social behaviour and play and juveniles 10% [30]. Activity budgets were studied in eight Asian elephants (*Elephas maximus*) at Chester Zoo (UK) The six adult elephants spent, 22.9–42.0% standing still, 6.1–19.2% walking and 3.9–9.6% dusting [19].

In conclusion, the budgeting of different activities within a specified period of time provides an opportunity to analyse their strategies of behavioural patterns and to compare the behaviours exhibited by wild and captive elephants, thus welfare of caged Asian elephants will be improved.

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REFERENCES

1. McKay, G.M. (1973). Behavioural ecology of the Asiatic elephant in southern Ceylon. *Smithsonian contribution to Zoology*. **125**: 1-113.
2. Guy, P.R. (1976). Diurnal activity patterns of elephants in the Sengwa area, Rhodesia. *East African Wildlife Journal*. **14**: 285-295
3. Easa, P. S. (1988). Certain aspects of ecology and ethology of the Asian elephant (*Elephas maximus* Linn.) in Parambikulam Wildlife Sanctuary, southern India. Ph.D thesis submitted to the University of Kerala, Trivandapuram.
4. Baskaran, N. (1998). Ranging and resource utilization by Asian elephant (*Elephas maximus* Linn.) in Nilgiri Biosphere Reserve, South India. Ph.D. Thesis, Bharathidasan University, Tiruchirapalli, India.
5. Vinod, T.R, and Cheeran, J.V. (1997). Activity time budget of Asian elephants (*Elephas maximus* L.) in Idukki Wildlife Sanctuary, Kerala, South India. *Indian Forester*. **123**: 948-951.
6. Irby, R.L. (1982). Diurnal activity and habitat use patterns in a population of Chanler's mountain reedbuck in the Rift Valley of Kenya. *Afr. J. Ecol.* **20**: 169-178.
7. Deag JM (1985) The diurnal patterns of behaviour of the wild Barbary macaque *Macacasyllvanus*. *Journal of Zoology*, London **206**:403-413
8. Chattopadhyay, B. and T. Bhattacharya. 1986. Basic diurnal activity pattern of Black buck, *Antilope cervicapra* Linn. of Ballavpur Wildlife Sanctuary, W.B. and its Seasonal variation. *J. Bombay nat. Hist. Soc.* **83**: 553-561.
9. Dougall, H. W. 1964. The chemical composition of a day's diet of an elephant. *East African Wildlife Journal*. **2**:51-59.
10. Wyatt, J.R. and Eltringham, S.K. (1974). The daily activity of elephants in Rwenzori National Park, Uganda. *East African Wildlife Journal*. **12**: 273-289.
11. Hanks, J. (1979). *A Struggle for Survival: The Elephant Problem*. C. Struik Publishers, Cape Town.
12. Kalemera, M.C. (1987). Dry season diurnal activity of elephants in Lake Manyara, National park, Tanzania. *African Journal of Ecology*. **25**:255-264.
13. Vancuylenberg, B.W.B. (1977). Feeding behaviour of the Asiatic elephants in the South-east Sri Lanka in relation to conservation. *Biological Conservation*. **12**: 33-53.
14. Sivaganesan, N. and Johnsingh, A.J.T. (1995). Food resources crucial to the wild elephants in Mudumalai Wildlife Sanctuary, Tamil Nadu, India. *In: A week with elephants*. Proceedings of the International Seminar on the

- conservation of Asian Elephant. Mudumalai Wildlife Sanctuary, June 1993, (ed. Daniel, J.C. and Datye, H.S). Bombay Natural History Society, Oxford University Press, Bombay, India. 405-423.
15. Baskaran, N., A. Udhayan & A.A. Desai (2010a). Status of Asian Elephant (*Elephas maximus*) in Mudumalai Wildlife Sanctuary, Southern India. *Gajah* 32: 6–13.
 16. Ahamed, R. (2015). Activity time budget of the Asian Elephant (*Elephas maximus* Linn.) in the wild.
 17. Pinnawala Elephant Orphanage". *Elephants in Sri Lanka*. My Sri Lanka Tourism. Archived from the original on January 21, 2016. Retrieved 2012-02-20.
 18. Varma, S., Rao, S., Ganguly, S. and Bhat, H. (2008). Identification of an effective and robust model of elephant keeping and keeper welfare; Insights based on the activity budget of elephants in captivity and mahout-elephant interaction in Karnataka. Compassion Unlimited Plus Action (CUPA) and Asian Nature Conservation Foundation (ANCF), Bangalore, India.
 19. Rees, P.A. (2009). Activity budgets and the relationship between feeding and stereotypic behaviors in Asian elephants (*Elephas maximus*) in a Zoo. *Zoo Biol.*
 20. Carrington, R. (1958). *Elephants. A short account of their natural history, evolution and influence on mankind*. London: Chatto and Windus.
 21. Hatt, J. M., & Clauss, M. (2006). Feeding Asian and African elephants *Elephas maximus* and *Loxodonta africana*. *International Zoo Yearbook*, 40, 88-95.
 22. Laws, R.M. (1970). African elephants. *Scientific Progress*, 58, 251-262.
 23. Shepherdson, D. J. (1999). Environmental enrichment for elephants: Current status and future directions. *Journal of the Elephant Managers Association*, 10(1), 69-77.
 24. Viljoen, P. (1989). Spatial distribution and movements of elephants (*Loxodonta africana*) in the northern Namib Desert region of the Kaokoveld, South West Africa/Namibia. *Journal of Zoology*, 219, 1-19.
 25. Whitehouse, A. M., & Schoeman, D. S. (2003). Ranging behaviour of elephants within a small, fenced area in Addo Elephant National Park, South Africa. *African Zoology*, 38, 95-108.
 26. Wittemyer, G., Getz, W., Vollrath, F., & Douglas-Hamilton, I. (2007). Social dominance, seasonal movements, and spatial segregation in African elephants: A contribution to conservation behavior. *Behavioral Ecology and Sociobiology*, 61, 1919-1931.
 27. Wittemyer, G., Polansky, L., Douglas-Hamilton, I., & Getz, W. (2008). Disentangling the effects of forage, social rank, and risk on movement autocorrelation of elephants using Fourier and wavelet analyses. *Proceedings of the National Academy of Sciences*, 105, 19108-19113.
 28. Posta, B, Huber, R and Moor, D.E. 2013 The Effects of Housing on Zoo Elephant Behavior: A Quantitative Case Study of Diurnal and Seasonal Variation. *International Journal of Comparative Psychology*, 2013, 26, 37-52.
 29. Veasey, J. (2006). Concepts in the care and welfare of captive elephants. *International Zoo Yearbook*, 40, 63-79.
 30. Kurt, F. and Garai, M.E. 2007. The Asian elephant in captivity a field study. Foundation books, Cambridge University press, New Delhi

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