Journal of the Department of Wildlife Conservation 2006-1: 59-66

SOCIAL RELATIONSHIPS OF WILD JUVENILE ASIAN ELEPHANTS (*Elephas maximus*) IN THE UDAWALAWA NATIONAL PARK, SRI LANKA

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ABSTRACT

Social relationships of juvenile elephants (3-6 years old) in the Udawalawa National Park were studied. Focal animal sampling was employed to quantify behaviour of 450 individuals. Nearest neighbour (NN) and nearest neighbour distance (NND) were recorded to analyse social relationships. Adult females and juveniles were the NN of the study group during 50.67% and 37.55% of the total observed time respectively. The mean NND was 1.62m (SD±2.8) while it was less than 5m in 98% of the time. 33% of the time the study group was touching (NND<1m) the NN. There was a significant difference between NND categories ($p<0.05$). Being the NN, 80% of the infants stayed at a touching distance and was cared or allo-mothered by the juveniles under discussion. Time allocated for different behaviour pattern by the study group varied with the NN. When the study animals were accompanied by age-mates, they spent 17% of time for social playing and another 3% for non-play social contacts. It was only 1% for each behaviour pattern when the adult females were in close proximity. Maximum social contacts were observed between study animals and infants. The findings suggest that juvenile elephants more frequently associate adult females and near–age mates while they show social relationships in a varying degree with different associates. High play and social contacts of juveniles provide a great opportunity to develop skills and social confidence well needed for the survival in future.

KEY WORDS: Social Relationships, Juvenile Elephants, Udawalawa National Park, Sri Lanka

INTRODUCTION

Mammals that live long have a lengthy childhood and adolescence. It is perceptible extended childhood is necessary for learning and development of the growing animal. The fact is observed in the elephant society, which is one of the most advanced mammalian social organizations (Sukumar, 2003). Young elephants spend long years in physical and behavioural development and diverse behaviours exhibited by adult elephants reflect their long history of social interactions and learning (Sukumar, 2003).

Social interactions or social relationships among elephants are maintained by communication, behaviour and proximity (Sukumar, 2003). Nearest neighbour (NN) of an individual and distance to the nearest neighbour (DNN) are some of the parameters of proximity (Garai, 1997). Elephants show particular relationships with group members; for an example, juvenile African elephants under eight years old in the Amboseli national park, Kenya were within 5m distance from their mothers 80% of the observed time (Lee, 1986). In spite of biological need of suckling in young calve, juvenile interactions with their associates provide an opportunity for learning and thereby cognitive and motor skills of the individual is improved (Sukumar, 1994).

Different behaviours expressed by social animals also contribute for the long run learning process. Playing is one such behaviour pattern restricted to higher form of life and frequently observed in juvenile age. It is a training programme for the strength and skills that youngers will require in adult life (Morris, 1990). Sukumar (1994) states that playing helps to accelerate the development of brain and nervous system.

Many of other interactions describe social relationships of elephants. Juvenile as well as adult animals communicate by entwining trunks and inserting trunk tip to each others mouths when they are under stress. A calf would show the same behaviours to learn about feeding from its mother. Continual contacts between mother and calf reassure the psychological well being of the growing animal Sukumar (2003 & 1994). Such interactions among elephants invariably increase the social bonding which will help in better survival.

In this context, it is important to study the way juvenile Asian elephants establish relationships with its group members. This will help to understand the social skillfulness and confidence of a particular juvenile compared to age mates which will then explain the social health of the animal.

A study was conducted in the Udawalawa national park, Sri Lanka with the objective of describing social relationships of juvenile elephants

METHODOLOGY

Study area

The Udawalawa national park (UNP) is in the intermediate zone of the Southern Sri Lanka (N 06^0 24'-06^0 35' E 080^0 45'- 081^0 00') and currently it has 30, 821 ha of scrublands, grasslands and dry-mixed evergreen forests as dominating vegetations (Department of Wildlife Conservation, 2005). Extensive areas of *Panicum maximum* dominated savanna type grasslands (Jayantha *et al*, 2005) have been resulted from shifting cultivation practiced before declaration in 1972. Along with seasonal grasslands adjoining the Udawalawa reservoir, elephants of UNP heavily utilize savanna grasslands. The authors believe that UNP harbors a healthy breeding population of elephants exceeding 500 individuals (Jayantha & Dayawansa, 2006).

Study group

Juvenile animals of estimated age 3-6 years old were observed in the study. This age group is partially parallel to 'young juveniles' as explained by Santiapillai in 2004. Based on Sukumar, (1994) the elephant population in the UNP was categorized into eight different groups in the field level. (Figure 1)

1. **INF** : Infants – animals of shoulder height up to the level of ventral abdomen of an average adult female; approximately day 1-1 ½ years old.
2. **JVI** : Juveniles (Class I) - shoulder height varying between ventral abdomen and neck level of the adult female; approximately 1 ½ -3 years old.
3. **JVII** : Juveniles (Class II) - shoulder height varying between neck and eye level of the adult female; approximately 3-6 years old.

4. **JVIII** : Juveniles (Class III) - shoulder height varying between eye and dorsal canthus of ear opening of the adult female; approximately 6-10 years old.
(juvenile males would be slightly taller than juvenile females of the same age)
5. **SAF** : Sub adult females - shoulder height varying between dorsal canthus of ear opening and shoulder level of the adult female; approximately 10-12 years old.
6. **SAM** : Sub adult males - shoulder height is just below or as the same that of the adult female; approximately 10-15 years old.
7. **AF** : Adult females – grown females pregnant, lactating or weaned; appearance of mammae (whether suckled or not) is considered when needed in deciding this.
8. **AM** : Adult males – grown males of shoulder height more than that of an average adult female; approximate age more than 15-20 years.

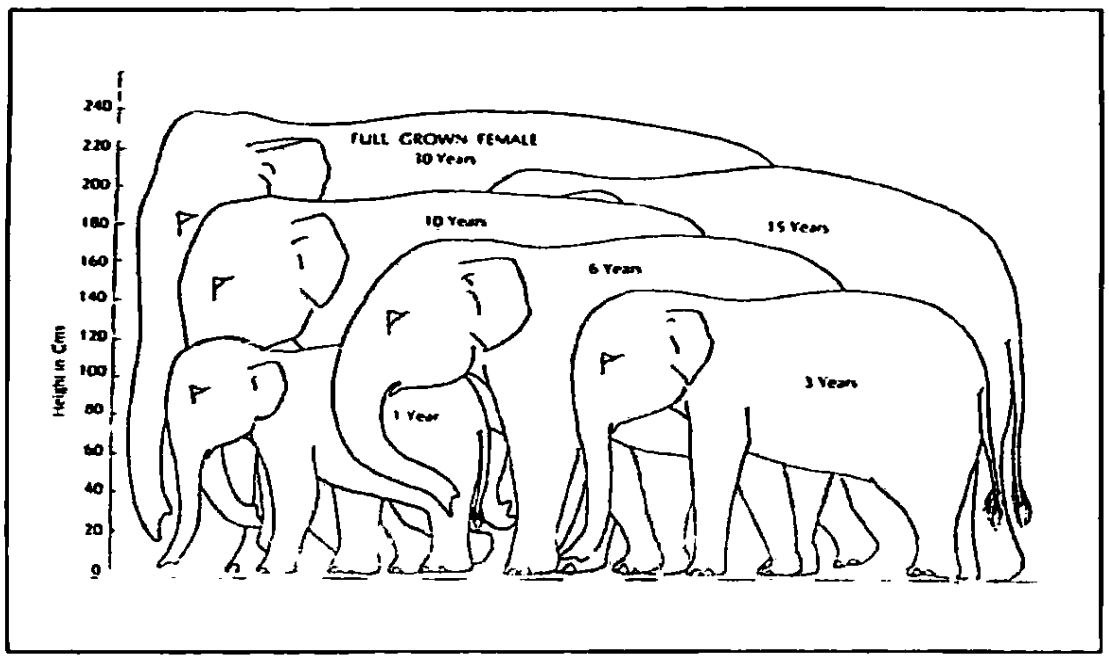

Figure 1. Relative height of young female elephants in relation to full grown female. (Sukumar, 1994)

Study protocol

Selected animal group was observed in UNP from April 2004 to March 2005. Focal animal sampling and continuous recording (Martin & Bateson, 1993) were conducted every other week to quantify behaviour of the juveniles encountered at 450 different occasions. Total sampling time was 4500 minutes. Hides and distant observation (using 8x40 binoculars) were employed to minimize Hawthorn effect (Jayantha & Dayawansa, 2006). Nearest neighbour (NN) of the focal animal and distance to the nearest neighbour (DNN) was recorded together with different behaviours expressed. Descriptive statistics was used to describe the findings.

RESULTS

1. Nearest Neighbour Frequency

Juveniles of age 3-6 years old were observed almost half of the time (50.67%) with adult females, possibly their mothers. They spent 37.55% of the time collectively with juveniles showing no affiliation towards a particular age or size group. Sub adult females and sub adult males were the NNs of the focal group nearly at the same frequencies, 4.22% and 4.00% respectively. Infants were seen near to the study group

3.11% of the total occasions and it was the adult males that made least NN frequency (0.44%) (Figure 2).

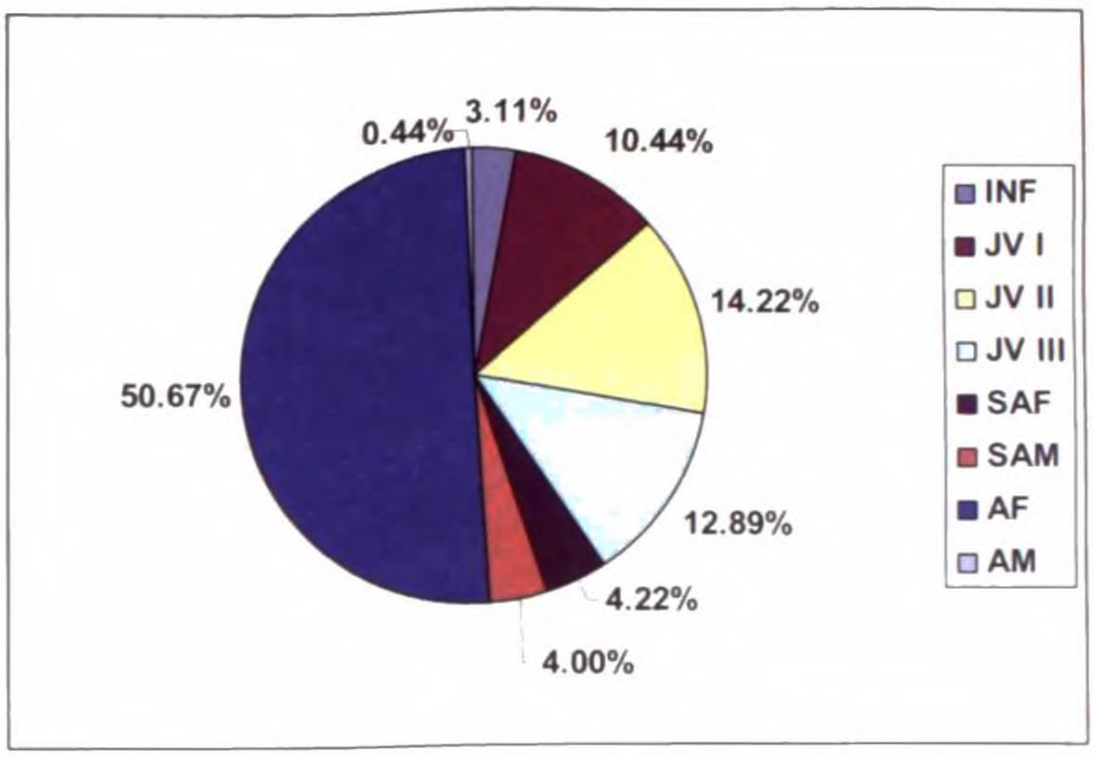

Figure 2. NN frequencies of different categories as a proportion of the total encounters.

2. Nearest Neighbour Distance

Mean NND was 1.62m (SD±2.8, range 0-40m). Mean NND for different NN categories varied significantly (ANOVA, one-way, $p<0.05$). A clear pattern of mean NND was evident when young animals (0-10 years old) considered as the NN collectively; with increasing age (and body size) NND increased (Figure 3).

Out of total encounters, at 98% times the NN was within 5m away from the focal animals and during 33% of the encounters they were touching the NN (NND<1m). Out of their total associations with the study group, infants stayed in close proximity (NND<1m) 80% of the time. It is <2% of the observations that study group stayed between 5-10m away from the NN and stayed very rarely at a distance >10m (Figure 4).

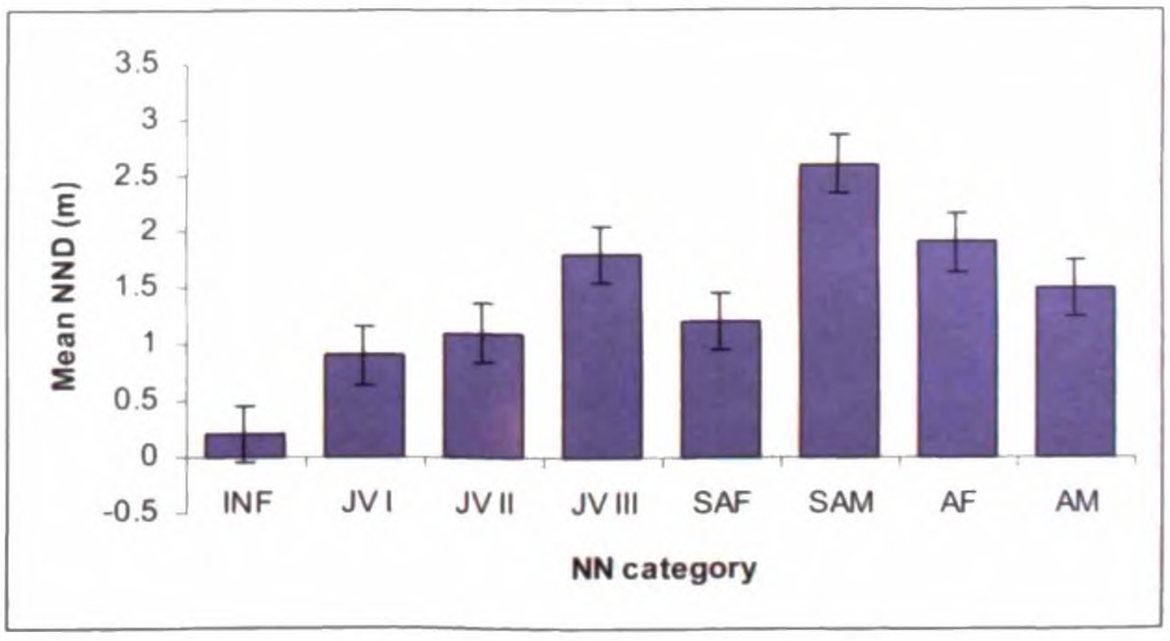

Figure 3. Mean NND of different NN categories

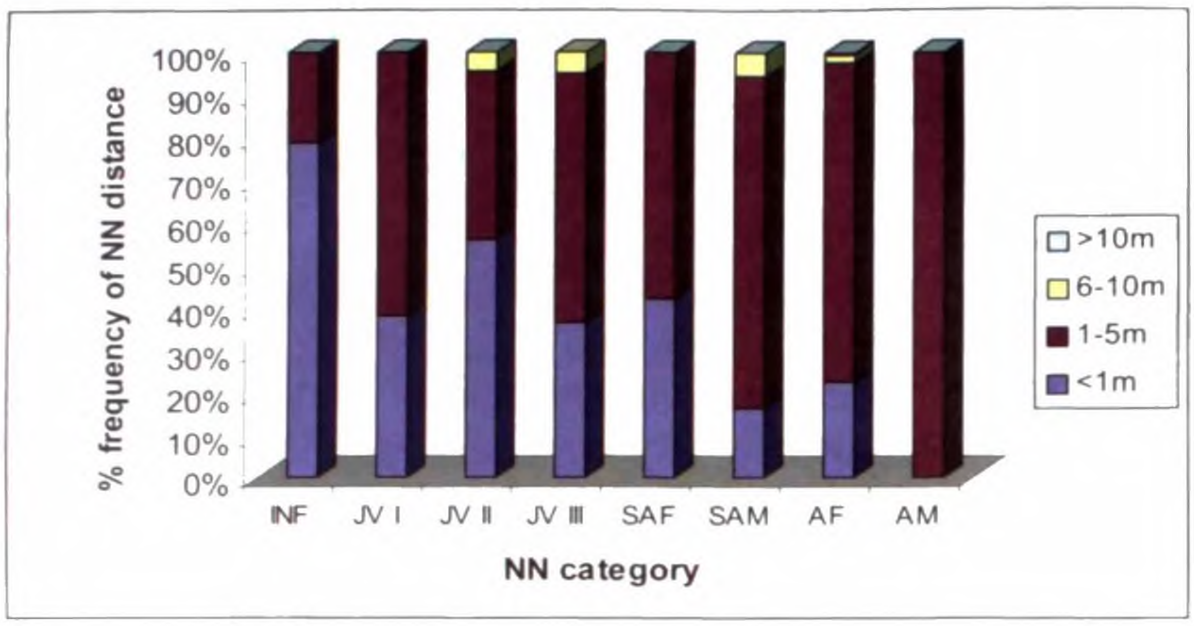

Figure 4. Percentage frequency of NND in relation to NN categories

3. Social behaviours in relation to the Nearest Neighbour

The juveniles under discussion expressed different behaviour patterns; only three patterns were directly related to current context i.e. social play, non-play social contacts and agonistic interactions. Since only four occasions were recorded (hit by adult females twice, hit a sub adult female and a Class II juvenile) for the total of 450 encounters, agonistic behaviour pattern is not considered here.

Several elements were described under social play and non-play social contacts (Annexure 1).Time allocated for each pattern calculated as a proportion of the total time the focal animals spent in association of different NN categories (Figure 5).

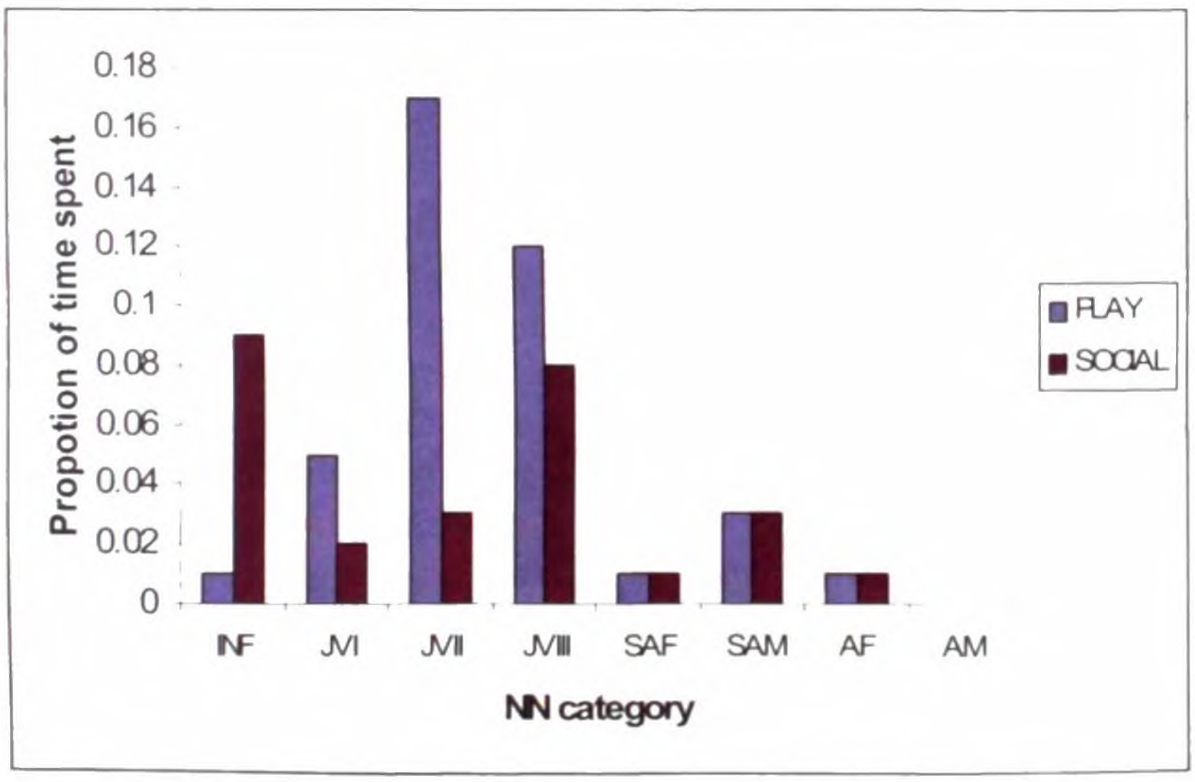

Figure 5. Proportion of time spent in relation to NN category

Social play is generally high when the study group had juveniles as the NN; the time spent was maximum with the age mates (17%). Non-play social contacts were high between infants and the study animals. Focal animals shared the same lesser amount of

time for social play and non-play social contacts when the NNs were sub adult females, sub adult males and adult females. They had no social contacts with adult males.

DISCUSSION

Young juveniles of elephants spend more time with the adult females, particularly with their mothers (Kurt, 2002; Lee, 1986; McKay, 1973 & Sukumar, 2003). The fact is further emphasized by the current study. The association must have more relationships in social context other than the mere biological need of suckling as only six encounters were there on suckling focal animals during the study period. Apart from that, they had substantial associations with near-age juveniles (1-10 years old) next to the adult females proportionately. This can be clarified by 'peer socialization', during which much of the juvenile contacts made with members of the group other than the mother (Sukumar, 2003 & Moss, 1998). It was observed during the study that juveniles of 1-10 years old forming social groups within the cow-calf units. Infants were also recorded to accompany the study group parallel to Lee's (1983) and Moss's (1998) observations of how juvenile females accompany younger siblings. The term allo-mothering (Santiapillai, 2004) would describe this association when the juveniles take care of its youngers. Gunawardene *et al* reported in 2004 that nursing infants stay with their mothers 100% of the time; it is worthwhile to note the possible overlapping of age & size categories of the two studies.

The focal animals stayed in close proximity with their nearest neighbours. However, the mean nearest neighbour distance for different age & size categories varied showing a particular trend among growing animals. From infant to sub adult age or size, the distance increased gradually. This observation indirectly explains how young elephants move away from their nearest neighbours with increasing age and explore its environment (Sukumar, 2003 & Gunawardene *et al*, 2004). According to Garai (1997), close proximity of juvenile elephants is a sign of less social confidence to spend a solitary or independent time.

Out of the social relationships of a juvenile, playing is an important aspect of learning. Playing in general is acrobatic (primates), exploratory (felids) or social ((Morris, 1990). Social play in juvenile elephants allows them to recognize kin and formation of social bonds useful in future (Sukumar, 2003). Juveniles of 3-6 years old spent most of their play time with near-age animals. The same observations have been made on Amboseli elephants (Lee, 1986). With infants, they allocated more time for non-play social contacts which supports the association of allo-mothering. Focal animals had less social interactions with sub adults and adult females compared to young animals.

CONCLUSIONS

Close proximity of juvenile elephants of 3-6 years old with the adult females and near- age juveniles coincides with social interactions. Majority of the time they stayed within 5m distance from their nearest neighbours showing a less social confidence to do so. Social play and non-play social contacts were the behaviour patterns of interest regarding social relationships. The first pattern was frequent among

near-age juveniles and the second was predominantly between infants and the juveniles under discussion. Young animals form juvenile groups of near-age members and young juveniles sometime play allo-mothering role for infants. Play and other social interactions experience by juvenile elephants would help in acquiring social skills expressed in later life.

ACKNOWLEDGEMENTS

The authors extend their sincere gratitude to the Department of Wildlife Conservation. specially to the staff, Udawalawa national park. The Born Free Foundation, UK is acknowledged for the financial support.

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