

Observations on the social behaviour of free ranging groups of tame Asiatic elephant (*Elephas maximus* Linn)

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Abstract. This study is based on 645 hr of observations on the social behaviour of tame elephants maintained at three wildlife sanctuaries of Bandipur, Mudumalai and Anaimalai in South India. These elephants are wild captured adults, and their calves born in captivity. The observations were carried out when the elephants are left free for grazing in their natural habitat, where they often intermingle with wild herds. The adult females always stay together when there are calves present: while the adult males graze by themselves. The calves position themselves between adult females and juveniles closer to their mother. All females rush together when a calf sounds alarm. The adult females stand guard over calves lying down for rest thereby accepting considerable reduction in the amount of time devoted to feeding. The 'allomothers' suckle other calves when they have no calf of their own, sometimes as much as the mother herself. The acts of social communication are largely initiated by the calf touching the breast or body of an adult female with its nostril. There is much variation in the extent of communication and suckling from one allomother to another with a mother definitely preferring her own calf.

Keywords. *Elephas maximus*; social behaviour; allomaternal care; captive groups.

1. Introduction

The elephant is a creature of great fascination for the student of social behaviour. It represents a culmination of adaptations to feed on coarse plant material and achieve an adult size sufficient to withstand all predation (Eisenberg 1981). The wide range of plant material that constitutes its food is widely dispersed in space and time so that sociality is expected to confer no advantage in terms of feeding efficiency. The elephant calf, however, still remains susceptible to predation by large carnivores like the tiger (Williams 1956). The *raison-de-etre* of the elephant society is then the protection of the calves. The elephants are non-territorial and adult males wander from one group to another. Hence, males will not be associated with calves they have themselves sired with any degree of certainty. This is in distinct contrast to the adult females who will be associated with near absolute certainty with their own calves. Since the extent of parental care exhibited is expected to be proportional to the degree of relatedness between the adult and the calf, we expect elephant females, but not males to care for the calves (Trivers 1972). The elephant herd is therefore a group of related females banded together for the protection and nurture of the calves. It is a social group notable for its high degree of allomaternal care (Douglas-Hamilton 1972; Wilson 1975).

Douglas-Hamilton (1972) provided us with an excellent description of the social behaviour in the African species, *Loxodonta africana* based on observations of wild herds in the Lake Manyara National Park. The Asiatic elephant seems to closely parallel its African cousin in its behaviour patterns, although the available information

on the social behaviour of the wild herds is largely anecdotal or fragmentary (Krishnan 1975; McKay 1973; Stracey 1963; Williams 1956). The Asiatic elephant has however been domesticated for millenia, and we have much more detailed information on its behaviour (Eisenberg *et al* 1971; Kuhme 1963; Toke Gale 1974). While routinely domesticated after capture from the wild, the Asiatic elephant is rarely bred in captivity. These tamed elephants are often maintained in their native forest habitat, where they are left free for grazing with heavy chains to reduce the speed of movement. Under these circumstances they often intermingle with wild herds. These free ranging captive elephants are thus likely to retain much of their natural behaviour and therefore provide excellent material to the student of behaviour. We present here results of one such study in three wild life sanctuaries of South India carried out between 1975 and 1980 (Nair 1983).

2. Materials and methods

The subjects of this study were 37 tame elephants maintained at three elephant camps in the wild life sanctuaries of Bandipur, Mudumali and Anaimalai in the states of Karnataka and Tamilnadu in South India (figure 1). These included 17 adult females, and 2 adult males, of which only 1 adult female was born to a captive female and had never been in the wild. The rest had all been captured from the wild at ages estimated to range from 4 to 40 yr. The subjects also included 9 calves below the age of 15 months (7 females and 2 males), and 9 juveniles (6 females and 3 males) between the ages of 1.5 to 6 yr. All these calves and juveniles were born to captive females as a result of matings with wild males. The calves were still being nursed by their mothers, while the juveniles had all been forcibly weaned.

The observations were conducted for 23 months between February 1975 and March 1976 and January 1978 and August 1979. The total amount of time spent in the field,

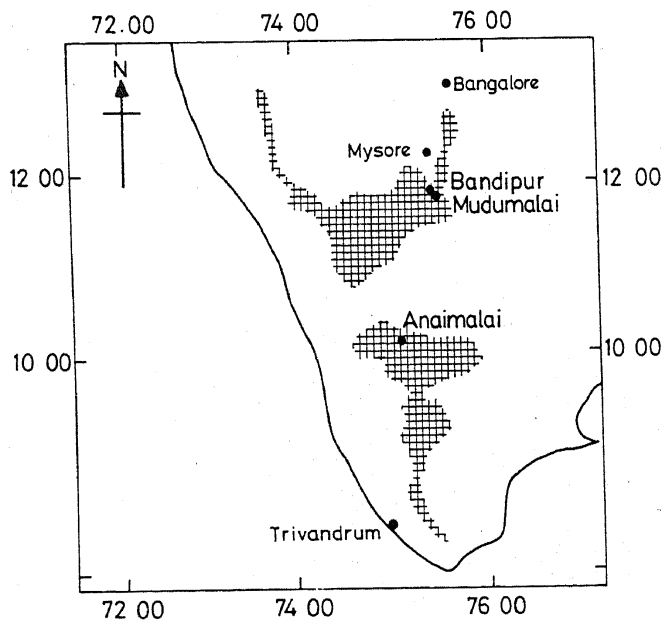


Figure 1. Location of the three study sites of Bandipur Tiger Reserve, Mudumalai Wildlife Sanctuary and Anaimalai Wildlife Sanctuary in South India. Natural elephant habitat is indicated by hatched lines.

recording behavioural details spanned 644.5 hr. An additional several hundred hours were devoted to preliminary and incidental, qualitative observations. The observations were made when the elephants were not engaged in timber or riding work, but were either being bathed or were left on their own in the forest for grazing. As mentioned above, under these circumstances they were in their natural habitat and were largely unrestrained, except that they could not move very fast. The groups so observed included as few as 2 to as many as 11 animals at a time.

While the elephants were thus observed in their natural setting, the social groups in which they found themselves were artificially constituted out of adults captured at different times and at different ages and brought together, and of offspring born to them. The assumption underlying the interpretations advanced below is that in these artificially constituted groups they behaved towards other animals as they would have behaved towards members of their own social group under natural conditions. This is a reasonable assumption to make as is suggested by studies on diverse animals ranging from the rodent *Peromyscus* to human groups in Israeli Kibbutzims (Wilson 1975).

3. Results and discussion

3.1 Defence of the calves

The spatial configuration of the group of tame elephants as they graze brings out the fact that the glue that holds the elephant social group together is the protective behaviour of females towards the calves. In wild, males do not have any degree of certainty as to the calves they have sired and hence are unlikely to display any paternal care. It is therefore expected that tame adult males will also show no care towards calves. This was indeed found to be the case, and the tame adult males positively repelled any advances by calves towards them. When left free for grazing the tame males tended to graze entirely on their own away from the other elephants, male or female.

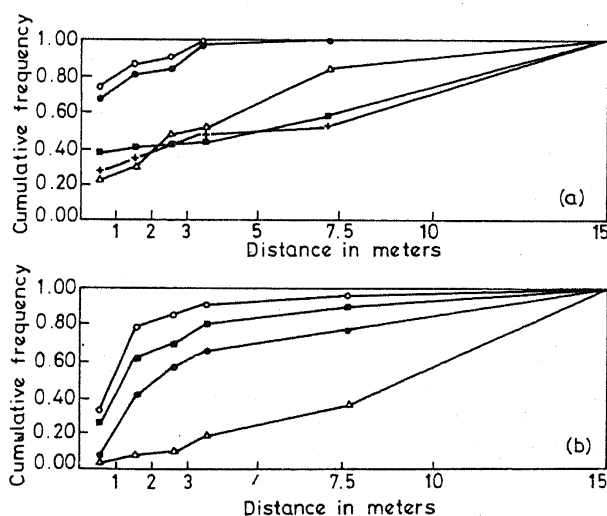


Figure 2. Cumulative frequency distribution of the distance between the calf and its mother as well as other adult females or allomothers. **a.** calf less than three months of age, **b.** calf between nine to twelve months of age. ●-calf and mother, ■-calf and allomothers 1, △-calf and allomothers 2, + -calf and allomothers 3, ○-calf and the adult female closest to it.

Contrary to this, all the tame females and calves from a camp tended to stick together when left free for grazing. The younger calves tended to remain very close to their mothers, so that a calf less than 3 months of age was within 2 m of mother, 80% of the time. The few occasions on which it drifted a little further was when it went close to another adult female. The distance maintained gradually increased with age, so that by 12 months of age the calf was within 2 m of the mother only 50% of the time (figure 2).

Not only did the calf remain close to the mother and other members of the group, but it tended to position itself towards the centre of the group. Figure 3 represents the average position of the adult females, calves and juveniles for three social groups observed by us over a considerable length of time. We further carried out specific experiments with an elephant mother, her calf and another adult female. The two adult females were ridden by mahouts while the calf was walking freely. It was found that the calf always stationed itself between the mother and the other female, closer to the former. This tendency is also evident in the track of a 12-month old calf and two other adult females grazing freely on their own (figure 4). The calf was obviously close to either the mother or one of the adult females, with a clear tendency to position itself towards the centre of the group.

The calves rest from time to time, sometimes for as much as 40–50 min. When they do so, one or all of the adult females stop moving, and stand around the calves. One of the females, generally the mother, remains very close, within a distance of about 1 m of the calf. This female also tends to position herself in such a fashion that the calf is shaded by her.

If a calf accidentally drifts more than 10–15 m from the adult females, or is alarmed by some movement or sound, it gives a squealing alarm call. The adult females immediately respond to this by rushing towards the calf and surrounding it. This once led to a dramatic incident at Bandipur. A mother and her calf were being bathed at a pond, while two other adult females were tied about 250 m away being readied for riding. The calf on being teased by the mahout's son gave its squealing alarm call. On hearing this the two adult females snapped their chains and rushed blindly towards the calf.

Since the adult females have this strong tendency of staying with the calf, taking the calf away from them for training at the age of 12 to 15 months is a very traumatic experience for them. The females are either firmly chained to a tree or pillar, or forcibly led away by tame males at the time of such separation. They try hard to get back to the calf as it is led away, and in this process one mother actually broke her leg by beating against the tree and died afterwards at Bandipur. The calf is also very much disturbed and continues to struggle for several hours after separation.

The fact that the calf is the cause of keeping the adult females together was dramatically shown when the only calf from a group of 3 adult females was thus separated at Bandipur. The calf was taken to a training camp some 40 km away. When the females were left free for grazing the next day, they did not all stay within a few tens of meters of each other as before, but drifted apart completely.

3.2 *Activity time budgets*

A total of 78 hr was spent recording the activities of all animals at 1 min interval when they were left free for grazing. Elephants spend most of their waking hours in feeding, and this study of activity time budgets showed that the adult females accept a

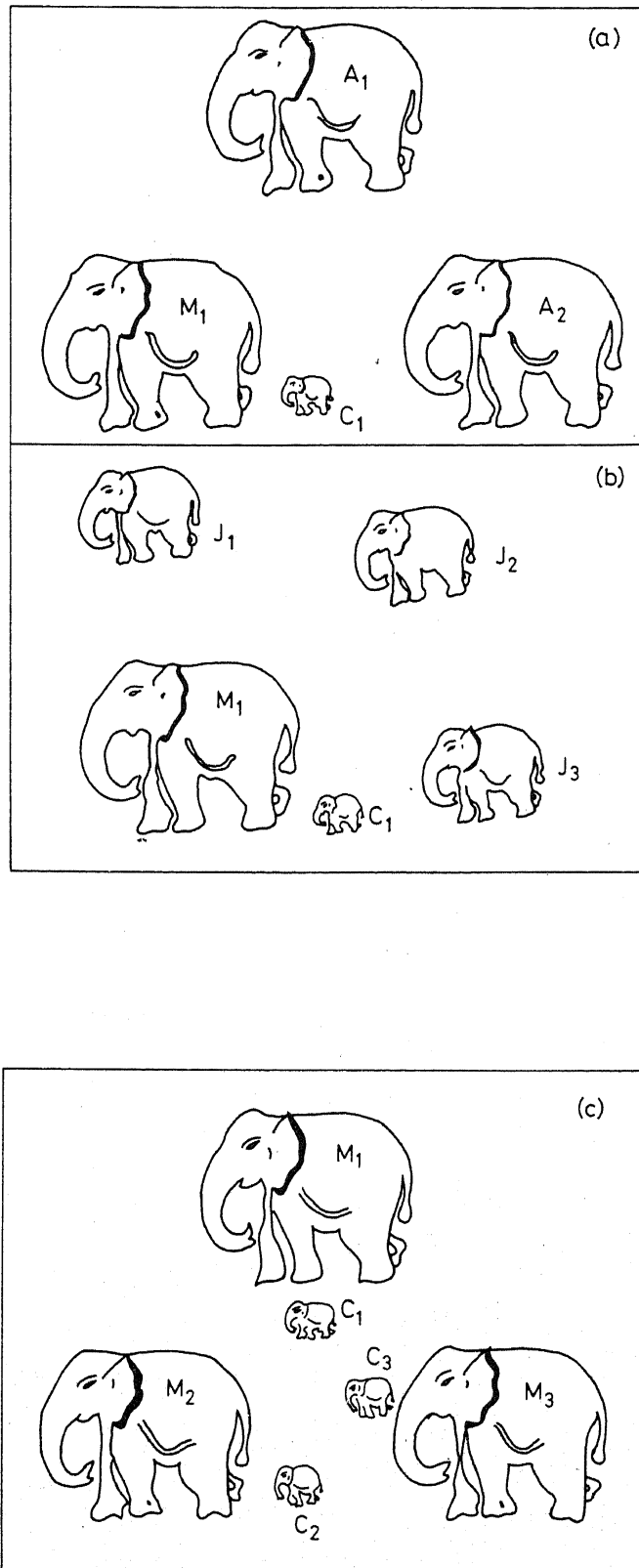


Figure 3. Average position of the calf/calves, mother, other adult females or allomothers and juveniles in three different kinds of social groupings. **a.** calf (C₁), mother (M₁) and two allomothers (A₁ and A₂), **b.** calf (C₁), mother (M₁) and three juveniles (J₁, J₂, J₃), **c.** three calves with their mothers (C₁-M₁, C₂-M₂ and C₃-M₃).

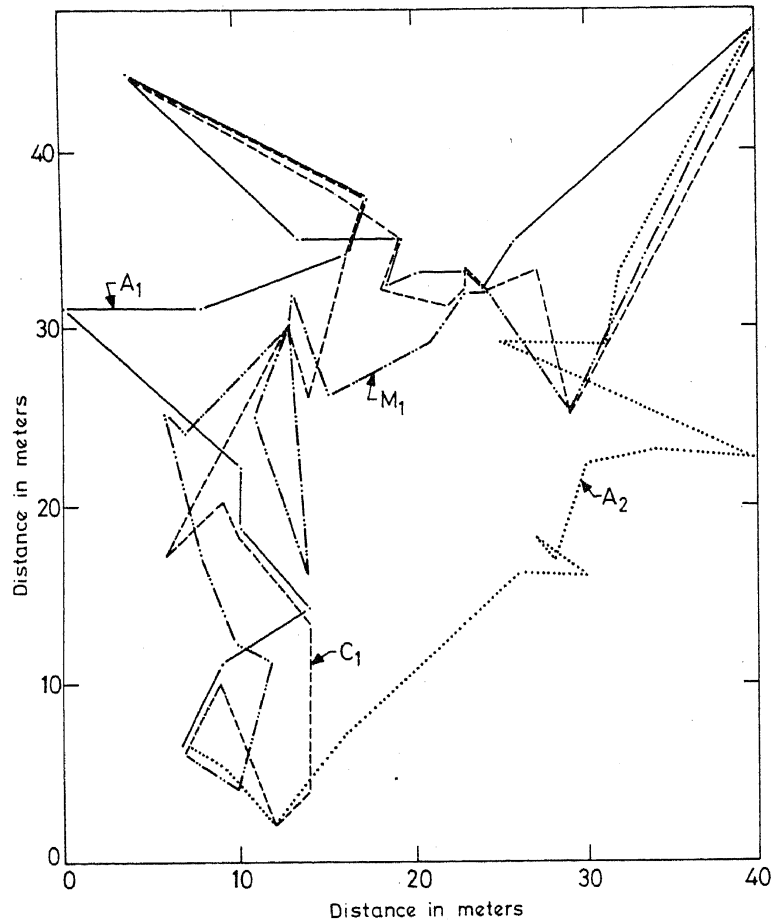


Figure 4. Track of movement of a mother (M_1), her calf (C_1) and two other adult females or allomothers (A_1 and A_2) over a 6 hr period.

considerable reduction in the amount of time devoted to feeding when they remain stationary in the presence of calves lying down to sleep. As figure 5 shows, the proportion of time that the adult females devote to feeding significantly increases as the calf grows up and spends less and less of its time in lying down and sleeping.

3.3 Social communication

Elephants have relatively poor vision, and do not seem to base much of their social communication on visual signals. We also have little information on the extent to which they depend on pheromones. They do use vocal signals, especially to communicate alarm and aggression. Tactile communication however seems to be a dominant mode of communication, especially where the calves are involved. Figure 6 shows that such communication is largely initiated by a calf towards its mother or another adult female. It overwhelmingly involves the nostril of the calf touching either the breast and other parts of the body of the females. There are relatively very few tactile contacts amongst the adults themselves. This tactile communication undoubtedly serves to ensure that the calf remains close to the adult females. If the calf strays a substantial distance away, it gives an alarm call which brings the adult females rushing to its side. Figure 6 also shows that the calf may not contact all the non-mother adult females equally, but may show very distinct preferences.

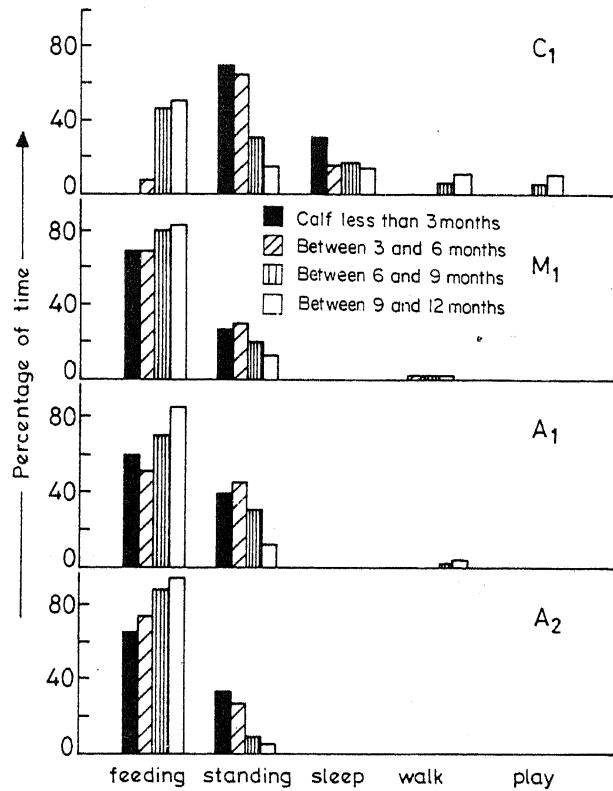


Figure 5. Percentage of time spent in different activities in a group of a calf (C₁), its mother (M₁), and two other adult females or allomothers (A₁ and A₂).

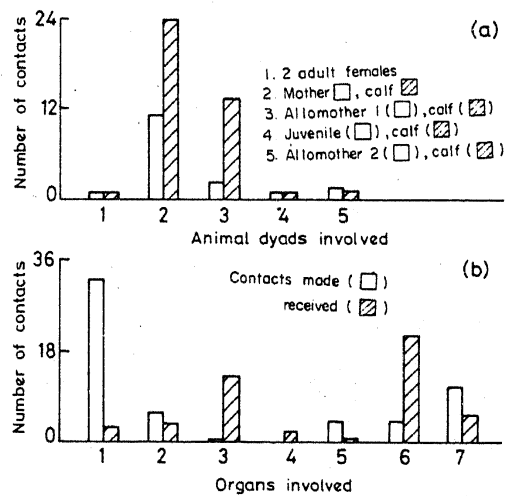


Figure 6. a. Number of contacts made per hour in different animal dyads. b. Number of contacts made or received by different organs. 1. nostril 2. trunk 3. breast 4. anogenital region 5. tail 6. body 7. mouth.

3.4 Suckling

Our studies show that elephants suckle at one of the highest recorded rates. The duration of suckling by the mother reduces from 2–1 min as the calf grows from birth to one year of age; while the frequency remains unchanged at about once every 30 min. Suckling is initiated by the calf, and unlike in other mammals is not an occasion of intense grooming. Most notably, tame elephant calves regularly suckled other adult females who had earlier given birth to calves which had been weaned away, sometimes several years earlier. Such suckling by "allomothers" ranged from a few seconds occasionally, to regular suckling of duration and frequency similar to that of the mother. Mothers with suckling calves however never permitted other calves or juveniles to suckle them.

3.5 Social conflicts

The elephants thus exhibit a number of behaviour patterns in which an adult female accepts a measure of sacrifice for the benefit of the calf. These are thus altruistic behaviour patterns in terms of kin selection theory (Hamilton 1964; Wilson 1975). Such altruistic behaviour will however be favoured only so long as:

Cost to donor < Benefit to recipient \times degree of relatedness between donor and recipient.

We therefore expect that there would be definite limitations to such altruistic behaviour, and that conflicts may arise from time to time. We observed three kinds of conflicts of this type. The adult females had to stop feeding when they stood guard over sleeping calves, often for as long as 40 to 50 min. When this stretched on, some of the females other than the mother would begin to move away. Under these circumstances, or even otherwise, the mother woke the calf up with a mild kick and resumed feeding and walking.

When a female has her own calf, she is generally expected to give it preferred treatment over other calves as these will have a lower degree of relatedness. This was clear in two contexts. An adult female often suckled another calf till her calf was born, but then ceased to do so immediately on the birth of her own calf. Females with their own calf exclusively nursed these. The calves and juveniles often bully each other while in play. When a calf thus bullied gives an alarm call, its mother invariably rushes to it and may kick or push the other calf away.

3.6 Social preferences

There were marked differences in the extent of altruistic behaviour exhibited by the adult females in the groups observed by us. Specific pairs of adult females had a tendency to remain closer to each other. Further if there was more than one calf in a group, a non-mother adult female often stayed closer to and suckled one of the calves significantly more often than the other. Similarly, if there was more than one non-mother adult female, a calf often contacted one of them more often than the other (figure 6). It is possible that in a natural elephant herd, such preferences may be related to the degree of relatedness, and Douglas-Hamilton (1972) suggested that this may eventually lead to herds splitting along kinship lines. One may also consider the

possibility that these preferences may be related not just to degree of relatedness, but to ties of reciprocity established amongst different individuals (Trivers 1971; Packer 1979).

4. Conclusions

We expect captive animals to exhibit behaviour patterns appropriate to the natural circumstances closest to the artificial regime they find themselves in. The elephants we observed were thus expected to react to members of their group as if they were other members of a natural herd. The observations recorded above clearly fulfill these expectations, with adult males exhibiting indifference and adult females considerable investment in protection and nurture of the calves. It is notable, however, that there are definite limits to the extent of such altruistic behaviour by the females, and that they always tend to discriminate in favour of their own calves.

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