Social interactions recorded in a family of captive Common Gray Langur – a case study

Primate societies are commonly structured organizations with clear social rules which determine patterns of interactions among different classes of individuals that comprise these societies (Lal & Rajpurohit 2010). The Common Gray Langur or Hanuman Langur (*Semnopethicus entellus*) is one such most widely distributed non-human primate species, found in the Indian subcontinent (Roonwal & Mohnot 1977). Langurs live in groups, numbering 40–60 **(**Roberts 1997). Known for their high adaptability, they have a highly variable social organization with social groups such as bisexual troops or all male bands (Lal & Rajpurohit 2010).

In recent years, zoological parks have added animal conservation as their renewed objective besides being centers of public recreation and education (Seidensticker & Doherty 1996). One such transformation is being attempted through enrichment (Maple & Perkins 1996) which entails changeable, interactive features facilitating foraging and other occupational activities for adult animals while stimulating appropriate play for young animals (Coe 2006). Enrichment enables recovery from behavioral problems that arise from captivity like psychological stress, lack of species-specific exploratory behaviors and development of abnormal behaviors like stereotypical pacing (Dawson 2009).

Additionally, scientific understanding of animal interactions in naturalistic environments is very limited (Stoinski et al. 2001). Alternatively, observational studies and behavioural assessments in zoo research programs provide insights into animals' habits and behaviour (Mench & Mason 1997) which collectively pave way for effective enrichment measures to achieve animal welfare.

In the present study, an attempt was made to record various interactions in a family of captive Common Gray Langurs in Padmaja Naidu Himalayan Zoological Park (PNHZP) based on different age groups. The results provide relevant preliminary insights into activity patterns and can be used to plan naturalistic and feasible enrichment measures for the animals which will contribute to maintaining a healthy population in captivity.

Methodology

Study area: Observations of the Common Gray Langurs took place at PNHZP, Darjeeling, India (27°3'N, 88°18'E). The zoo has two enclosures for the species with different total areas that are connected to each other with a small, moderately long tunnel with an area of 2.52 m^2. Enclosure-I has a total area of 55.1 m^2 and Enclosure-II has a total area of 35.5 $m^{2.}$ Enclosure-I has an inbuilt feeding house and a water source. Both the enclosures are well equipped with wooden logs as well as ropes and are 3.6 m high.

Sample size: Subject of study included a family of six langurs all of which are on display. As

the family consisted of members from various age groups, the behaviour to be observed was classified based on members of the same age groups and interactions between the age groups: (i) Young-young interaction, (ii) Young-adult interaction, and (iii) Adult-adult interaction.

Behaviour observation: The report is based on ad-libitum observations (Altmann 1974) that were carried out for 60 hours throughout a period of two months in from July to October 2018. The time period for observation was between morning and early evening. The morning observations were at 0700–1100 h (before mid-day) and the evening observations were at 1400–1600 h (after mid-day).

Frequency percentage of recorded interactions was calculated and graphically represented. Correlation was calculated among the variables to quantify the strength and direction of the interactions among the members of the langur family. MS Excel and R software were used for data analysis.

The interactions have been described in the Table. The pie charts list the percentages of all interactions in different groups. Correlation matrix is provided in the figure.

Among the young group of langurs, it was found that the juveniles and the infant (Individual 4, 5 & 6) generally actively interacted with each other in the form of chasing, wrestling and playing. Other than these, biting each other while wrestling, and swinging from the ropes and the wooden logs were observed. Playing is related to physical development, entertainment and refreshment (Alam et al. 2014). Fitriyani & Purba (2023), in their preliminary observations of the daily activities of Javan Langurs in captivity noted that playing among young individuals often occurred in the form of jumping and circling the cage, paired with chasing and biting each as well as playing with the leaves or plants in the cage.

Ren et al. (2010) in their study of the captive Snub-nosed Langur differentiated playing from chasing and biting under affiliative and agnostic behaviours respectively. Ahsan & Khan (2006) reported in their study of eco-ethology of wild Common Langur that juveniles chased and wrestled each other along with instances of mounting, embracing and greeting. Positive correlations were observed among different categories of interactions like playing & chasing and wrestling & biting.

The interactions between the adults and young ones were limited to parental care that included grooming sessions and breastfeeding. Grooming by adults and breastfeeding displayed a positive correlation (0.8) especially as the mother would also groom the infant while breastfeeding.
In a study made by Alam et al. (2014) on Hanuman Langurs residing in Jessore District of Bangladesh, it was noted that stronger relationships were made between mother and infants within a group when the infants were nursed, groomed and carried by the mother, with instances of allomothering as well. Infants travel and sleep on their mother's chest for survival as they cannot move independently (Sugiyama 1965). During the study it was observed that the adult male participated in play behaviour with the juveniles. Adult males within the group play to encourage the sub-adults to facilitate social development and

communication (Roonwal & Mohnot 1977). Grooming is an important characteristic social interaction in which hands, lips, and tongue are used to pick up ectoparasitic insect and clean debris from body for feeding and hygienic purposes (Kurland 1977). Parr et al. (1997) stated in their study that grooming results in proximity between individuals and reinforces social structures, allowing sympathy within a group.

Mutual grooming was displayed by the adults during observation period, with a higher frequency between the two adult females and showed a strong positive correlation (0.88). Ahsan & Khan (2006), in their study of the eco-ethological study of the Common Langur reported that the relationships between the females in a group were usually positive displaying behaviours like moving, resting, and social grooming.

The adult male also displayed aggression both towards the young ones and adult females, usually in the form of threat or chase during feeding and mating. Social hierarchies and aggression exist for all Hanuman langur group types (Srivastava & Mohnot 1992). Ahsan & Khan (2006) reported similar observations, stating that adult males attacked young individuals during feeding. Adult males also showed aggression when during mating they are disturbed by other adult females (Alam et al. 2014).

This study provides preliminary information on interaction recorded between members in a small group of Hanuman Langurs. The interplay among members of the captive group mirrors the behaviour witnessed in the wild groups of langurs, thus indicating presence of natural species-specific interactions. Comparative studies in the future between wild and captivity will provide comprehensive insights into the psychological status of the animals.

Additionally, studies can be undertaken to investigate activity budgets, enclosure utilisation and visitor effects. There is scope to also explore maternal behaviour and grooming patterns among troop members. These studies can provide a holistic overview of primate behaviour in captivity and in turn aid with animal enrichment and welfare in captivity.

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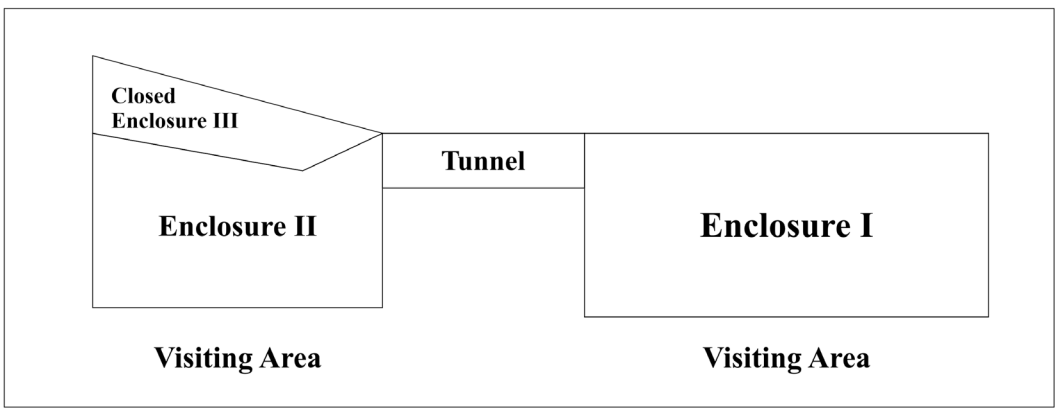
Table 1. Individuals housed at PNHZP

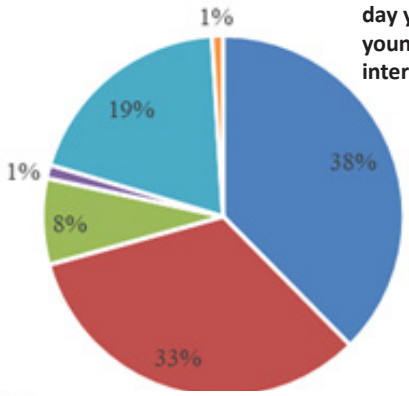
	Name	Sex	Age (as on 2018)	Category
1	Individual 1	Male	9 yr	Adult
2	Individual 2	Female	7 yr	Adult
3	Individual 3	Female	6 yr	Adult
4	Individual 4	Male	2 yr	Juvenile
5	Individual 5	Male	2 yr	Juvenile
6	Individual 6	Male	5 mt	Infant

Table 2. List of interactions recorded among members of the Hanuman Langur family.

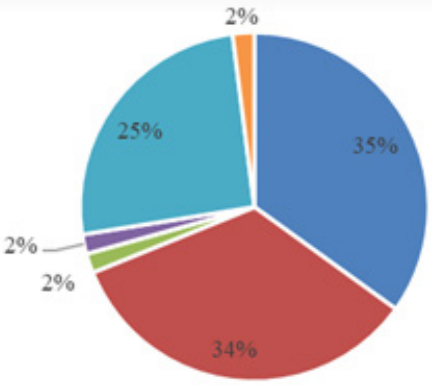
Behaviour	Description
Young-young	
Playing	Running, jumping and catching while exchanging glances between young ones and infants
Chasing	The act of one individual running behind another individual through the length of the enclosure and vice versa
Wrestling	The act of fighting between two individuals by hitting each other using forelimbs
Biting	The act of biting a body part mostly the neck region by an individual in the middle of playing or at the end of a chase
Swinging	The act of hanging from the enclosure net or ropes by their tails or arms
Mounting	The act of climbing on an individual's posterior body region
Young-adult	
Grooming	The act of taking out debris/lice from a young one's body by an adult
Breastfeeding	Feeding breastmilk by a female adult to its infant
Playing	Running, jumping and catching while exchanging glances between adults and young ones
Reverse grooming	The act of taking out debris/lice from an adult's body by a young one
Aggressive	Any act of letting out a shriek and trying to fend off the young ones
Adult-adult	
Female-female grooming	One female grooming the other female by taking out debris/ lice different parts of the body
Female-female reverse grooming	The other female now becoming the groomer to take out debris/lice from the female that groomed her
Male-female grooming	The male would get groomed by the female in the form of taking out debris/lice from different parts of the body
Reverse male-female grooming	The male would now be the groomer and repeat the same pattern
Aggression	Any of letting out a shriek and trying to fend off an adult



Common gray langur enclosure at PNHZP

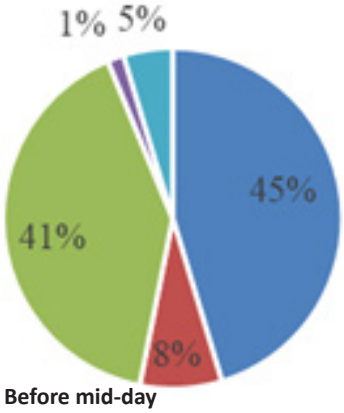


Before mid-day young-young interactions

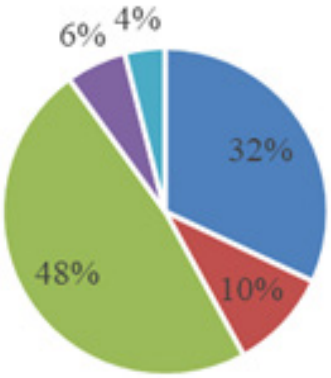


After mid-day young-young interactions

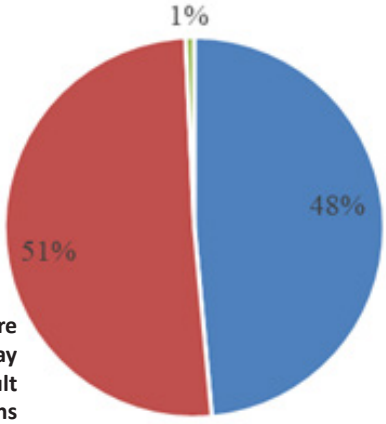
Various interactions as noted during observations



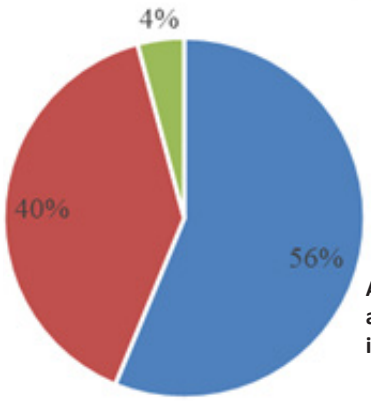
Before mid-day young-adult interactions



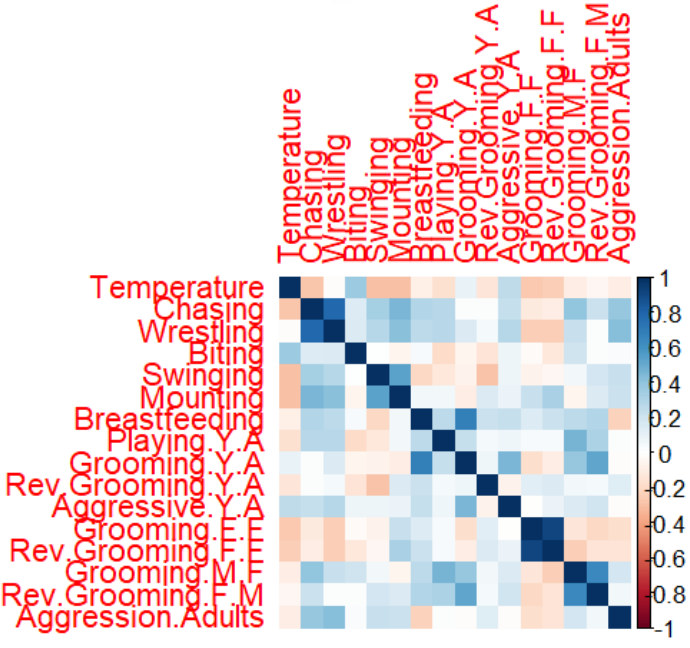
After mid-day young-adult interactions



Before mid-day adult-adult interactions



After mid-day adult-adult interactions



Correlation between the interaction.

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