

Mother-Infant Separation in Rhesus Monkey Living in Natural Environment

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ABSTRACT. Four mothers were separated from the infants in two free-ranging groups of rhesus monkeys. Infants were observed for three stages i.e. pre-separation, separation, and post-separation. Separation caused a marked decrease in play in the infant. Crying and restlessness increased. During post-separation, a significant increase in mother's approach behaviour towards the infant was observed. The results of the present field study almost resemble the results of laboratory studies done by SEAY, HANSEN, and HARLOW (1962).

INTRODUCTION

In the free-living mammals the infant is wholly dependent on mother. This dependence not only provides infant with the physical survival but also the infant develops a strong psychological attachment with the mother. The infant, if separated from the mother, would suffer from mild to very severe psychological disturbances, depending on the age of the infant. BOWLBY (1960, 1961) discussed the studies done on human subjects regarding mother-child separations and abnormal symptoms in the child produced by this separation. Studies on non-human primates are of special interest regarding this problem. SPENCE (1937) separated chimpanzee infants from mothers. The mothers exhibited severe emotional abnormalities and infant-like behaviour. In a study by JENSEN and TOLMAN (1962) on pig-tailed macaque, the separated infants went on crying and the mothers also showed severe behavioural disturbances. A significant increase in mother-infant interaction was observed after returning the infants to their mothers. SEAY, HANSEN, and HARLOW (1962) separated rhesus monkey infants from mothers and observed emotional abnormalities in infants as well as mothers.

Almost all of these studies have been conducted on laboratory subjects. There is no data available regarding this problem on non-human primates in their free-living and natural environments. Keeping this point of view, the present study was planned on rhesus monkey in its wild and urban natural conditions, where the laboratory or any other variable itself is not a factor of abnormality. The abnormalities seen in such conditions are purely because of manipulated experimental conditions.

METHOD

SUBJECTS

Subjects under study were four rhesus infants and their mothers. Two mothers and

infants were selected from a group living in a town and the rest two mothers and infants were from the forest. Both habitats were on Sivalik Hills (India).

Group 1 (Town Group)

Composition: This group consisted of 18 animals, out of which were four adult males, five adult females with their babies and four juveniles. Both infants under observation were males.

Habitat: Group was actually living in a town inhabited by dense human population. But as the town was surrounded by forest, monkeys often moved in the forest also. One more primate species, langur (*Presbytis entellus*) was also habitating the same area and langurs were often seen near the monkeys. The main source of food for monkeys was the forest nearby but many times, people fed them and monkeys also attacked some shops of fruits and vegetables etc.

Group 2 (Forest Group)

Composition: There were total of 30 animals in this group, out of which were six adult males, nine adult females with babies, one adult female without baby, two sub-adult males, and three juveniles. One infant under observation was male and the other one was female.

Habitat: This group was living in a monsoon forest on Sivalik Hills (HP). These animals were not often encountered by human population but sometimes they moved to a village nearby and a forest rest house. The home range of this group was overlapping the range of one more group of rhesus monkeys. Sources of food and water for this group were the forest flora, insects, and rivers.

DESIGN AND ACTUAL PROCEDURE

Firstly both areas were surveyed. The actual observations were taken from 9th of August to 13th of September, 1974 (in case of first infant-mother, 9th to 14th of August; in case of second infant-mother, 17th to 22nd of August; in case of third infant-mother, 29th of August to 3rd of September; and in case of fourth infant-mother, 8th to 13th of September).

Three stages were employed in this investigation. (a) *Pre-separation:* Each infant was observed for two days with the mother in the group. 10 sessions, 10 minutes each session, of observations were made each day. Observations were taken on Monkey Behaviour Inventory, with 20-sec intervals, using symbols of different behaviours. (b) *Separation stage:* The mother (in case of all four mothers) was given a drug mixed in sweets early in the morning on third day of observation. After some time, the mother became completely unconscious. Other animals were chased and made to run away. In all four separations, other group members did not see the female, when she was caught. In Group 1 (town group), when unconscious female, lying on the ground, was approached by the observer, the infant (in case of both infants) ran away towards the group and female was removed silently covered by a cloth. In the second (forest group), other animals were far away from the unconscious female but the infant (in case of both infants) was still in ventral contact with the mother. So the observer separated the infant from the mother and released it in the group. The mother was removed from the area. Again the infant was observed for 10 sessions of 10 minutes

each session, one day. Separation phase lasted for three days. (c) *Post-separation*: The mother was released in the group, and like all other days, 10 sessions of observations were made. This post-separation stage was of one day only.

Similar procedure was adopted for all four mothers and infants.

At the time of observation, all occurred behaviours were recorded. But at the time of analysis, only following significant behaviours were analysed:

I. *Mother-infant interaction*

- a) *Positive interaction with mother*—This category included mother-grooming, cradling, contact (other than nipple) with mother, ventrally carried, nipple contact.
- b) *Negative interaction with mother*—This category included four behaviours of mother i.e. punish, threat, rejection, and avoidance.

II. *Play*

- a) Self-play
- b) Play (mutual or non-contact) with other infants.
- c) Non-mutual or Avoidance play by other infants with the observed infant: A 'non-mutual contact play' is defined as wrestling, pulling, pushing, nipping the 'other' infant by an infant, whereas the 'other one' is quite passive and does not respond. In 'avoidance play,' the 'other' infant is not passive totally when play is inflicted upon him, but he avoids the playing infant, showing some behaviours like withdrawl, fear-grimace etc. and is often chased by the playing infant.

III. *Environmental exploration manipulation*

IV. *Vocalizations*

- a) Coo
- b) Screech

V. *Movements*

- a) Locomotion
- b) Sitting

VI. *Interaction by other juveniles, Adult males and females*

- a) Positive interaction i.e. approach and grooming
- b) Negative interaction i.e. neglect and threat

Total numbers of 20-sec intervals for each above-mentioned behaviour were counted differently in three stages of the study. For each behaviour, mean of the four subjects was calculated. Because each behaviour got the chances to occur in all of the 20-sec intervals, so percentages for each behaviour were drawn.

RESULTS

The mean number of 20 sec intervals of behaviours by four subjects and the percentages are shown in Table 1.

So far as mother interaction was concerned, there were only two stages i.e. pre-separation and post-separation. Hence, 't' was calculated. For all other behaviours, F-ratio was calculated. The calculations are summed up in Table 2.

Table 1. Showing mean and percentage of 20-sec intervals of behaviours by four subjects.

Behaviours	Pre-separation			Separation			Post-separation		
	Mean	Maximum inter-vals	Per-cent-age	Mean	Maximum inter-vals	Per-cent-age	Mean	Maximum inter-vals	Per-cent-age
a) Mother's positive interaction (5 behaviours)	324	600	10.8	—	—	—	288	300	19.2
b) Mother's negative interaction (4 behaviours)	152	600	6.3	—	—	—	15	300	1.2
c) Self-play	207	600	34.5	6	900	.7	21	300	7.0
d) Play with other infants	114	600	19.0	54	900	6.0	42	300	14.0
e) Avoidance play by other infants	33	600	5.5	273	900	30.4	75	300	25.0
f) Environmental exploration manipulation	327	600	54.5	276	900	30.7	128	300	42.6
g) Locomotion	194	600	32.3	523	900	58.1	105	300	35.1
h) Sitting	108	600	18.0	327	900	36.3	64	300	21.3
i) Positive interaction by other juveniles, adult males, and females (2 behaviours)	42	600	3.5	165	900	9.1	13	300	2.5
j) Negative interaction by other animals (2 behaviours)	33	600	2.7	137	900	7.4	32	300	5.3
k) Coo	15 (Total numbers were counted: irrespective of 20-sec intervals)			1944			81		
l) Screech	6			783			3		

Interpretation and discussion of results

The derived ratios and their significance levels are shown in Table 2.

Mother's positive interaction

The derived 't' for the differences between pre-separation and post-separation was 10.80, significant at .01 level. As the mean of 20-sec intervals is greater in post-separation than in pre-separation; it means that mother's positive behaviour especially grooming and cradling the infant in post-separation was increased. This finding corresponds to SEAY, HANSEN, and HARLOW's (1962) results. A significant increase in mother-infant positive responsiveness during post-separation was observed by them also.

Mother's negative behaviour

The 't' for the differences between two stages was 5.87, significant at .01 level. It shows that the negative or avoidance behaviour of mother towards the infant in post-separation was significantly decreased as compared to pre-separation. Punish, threat, and rejection were not at all observed. Simply, sometimes the mother avoided the infant.

Self-play

A marked decrease in self-play during separation was observed. The F-ratio calculated for three stages was 102.40, highly significant at .01 level. During separation, the

Table 2. Showing 't' and F-ratios of differences in behaviours among three stages of the study.

Behaviours	Derived ratio	Significance level
a) Mother's positive interaction	't' = 10.80	.01
b) Mother's negative interaction	't' = 5.87	.01
c) Self-play	F = 102.40	.01
d) Play with other infants	F = 10.10	.01
e) Avoidance play by other infants	F = 8.60	.01
f) Environmental exploration manipulation	F = 4.60	.05
g) Locomotion	F = 8.10	.01
h) Sitting	F = 10.40	.01
i) Positive interaction by other animals	F = 6.50	.05
j) Negative interaction by other animals	F = 2.60	Insignificant
k) Coo	F = 114.10	.01
l) Screech	F = 103.50	.01

separated infant almost never played. Even in the post-separation stage, the number of 20-sec intervals for play was much more lower than the pre-separation.

Play with other infants

The F-ratio calculated for 3 stages was 10.10, significant at .01 level. As the means show, play with other infants during separation was significantly decreased and even in post-separation, it could not reach the pre-separation point. The separated infant never initiated the play. He only played for rather very short periods when several times initiated by other infants to play.

Avoidance play by other infants

During separation, when other infants approached the separated one to play, the separated infant avoided them. Most of the time other infants played avoidance or non-mutual contact play with him. As shown by F-ratio 8.60, the differences among three stages are significant at .01 level. Even in the post-separation stage, the number of 20-sec intervals for avoidance play by other infants was more than the pre-separation because during this stage, infant's interaction with mother was increased. So he did not bother other infants playing.

Environmental exploration manipulation

The difference among three stages, as shown by F-ratio 4.6, are significant at .05 level only. During first day of separation, separated infant almost did not manipulate the environment. But in other two days, the number of intervals for environmental exploration manipulation was increased. Because the infant had to survive, and for that, he had to explore his food.

Positive and negative interaction by other juveniles, adult males, and females

The F-ratio 6.50 for positive interaction was significant at .05 level and the F-ratio 2.60 for negative interactions was insignificant. It shows the cohesiveness in the natural groups of rhesus monkeys. When the infant was separated from the mother, some other females and juveniles approached the separated infant, groomed him and even a female juvenile embraced the separated infant. The difference in negative behaviour is insignificant. However, he was sometimes threatened by some male or neglected by some adult female when he approached them or presented himself for being groomed.

Locomotion and sitting

When the infant was separated from the mother, he ran away here and there, searching for the mother. The difference in locomotion, as shown by F-ratio 8.10 is significant at .01 level. But it looks very strange that along with a significant increase in locomotion, a significant increase in sitting behaviour (F-ratio, 10.40) was observed as well. This simultaneous increase in two opposite behaviours was considered as *restlessness*. The subject ran, stopped at some branch, cried, and again ran to some other place.

Coo and screech

Total number of coo and screech was counted in three stages. The F-ratios 114.10 and 103.50 for coo and screech respectively, are highly significant. The infant, when was separated from the mother went on crying and running. Coos were of very high pitch and screeches were also scream like. In the first day of separation, the number of coo and screech was very high but after that, it gradually decreased.

Though this investigation was conducted on natural group where many animals of both sexes and different age-levels live together, yet the removal of mother produced a severe behavioral disturbance in the infant. This separation not only affected mother-infant interaction, but almost the very way of being of the infant was changed during separation. Even when the mother was returned to the group, other behaviours of the infant could not reach the pre-separation point. The present investigation confirms the results of previous studies regarding the 'mysterious' mother-infant relationship among mammals, especially primates.

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