
The Training of Cynomolgus Monkeys and How the Human/Animal Relationship Improves with Environmental and Mental Enrichment*

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INTRODUCTION

This paper will attempt to show the marked improvement in behaviour of a small group of female cynomolgus monkeys, after a period of routine training and human interaction.

A relatively short, but predictable, course of routine handling and feeding enabled the monkeys to operate with their handlers and made working practices a lot easier, quicker and safer for both the animals and technicians.

Over a period of 2-3 months, we worked with seven young female cynomolgus monkeys, which were previously difficult to handle (necessitating full protective clothing and sedation of the animals), and in time through daily contact, were able to change their behaviour markedly.

Our objectives were to gain the animals' confidence, to give them an environment in which more of their natural social behaviour could develop and to build up trust between the monkeys and humans.

ANIMALS

A selection process was initiated to choose females, and handle them daily to enrich their environment and to re-socialise them as a group.

From our stock of animals, we selected seven female cynomolgus monkeys, between two and three years of age and 1.7-2.5 Kilogrammes in weight. The animals were chosen because of their known parentage and good temperament.

These monkeys came from a colony that had been closed since 1979 and was free of virus B (Herpesvirus simiae infection), Tuberculosis and Shigella.

The monkeys were born within the colony and weaned at 4-10 months of age. They were housed together for a further year and then separated into single cages. This measure was necessary as the animals were to be used in dental research requiring singly housed monkeys.

Young animals were chosen because it was assumed that they would adapt better to living in social groups as little hierarchical development had yet taken place. It would have been unwise to work with older monkeys as fighting would probably have occurred and serious injury might have resulted.

ACCOMMODATION

A large animal room, 7.31 m (long) x 3.9 m (wide) x 2.87 m (high), had been chosen for redecoration and the installation of eight new monkey cages (supplied by Modular Systems Development, Woolwich) and automatic watering (supplied by Edstrom Ltd). The new caging only occupied space on one side of the room, but the automatic watering system was available on both sides of the room.

It was only required to use eight drinking nipples supplying the eight cages; the rest were unused and were ideal for incorporation into a playpen (described).

The room itself had previously been painted a dull light blue colour with glass bricks at one end to allow in daylight. After redecoration the room was a bright sand colour with a white ceiling, making it much brighter and giving the impression of more space.

The original caging confined the monkeys singly, although cages could be linked up by the removal of side panels. These cages measured 88 cm (high) x 71 cm (wide) x 72 cm (deep) and were made from aluminium, mounted on wall racking in a two-tier system. They had a stainless steel grid floor with 4 cm x 4 cm mesh, suspended over a tray which had a flushing water system along its entire length of eight cages, and no bedding or substrate was used. The doors to the cages were of the 'guillotine' type, which made removal of the monkeys difficult without first having to inject a suitable anaesthetic (Ketamine hydrochloride 100 mg/ml—Parke Davis).

The new caging was of a larger design, 98 cm (high) x 88 cm (wide) x 75 cm (deep) and had two centrally opening doors with a crushback system operated by a centrally positioned arm at the front of the cage (Modular Systems Development). These cages also had removable side panels, thereby enabling the cages to be linked when required, making a tunnel configuration. Again these cages had grid floors suspended over a flushing tray, which was washed down daily.

PLAYPEN

The playpen was designed as an adjunct to the cages. The monkeys could leave their cages and enter the playpen at will. It was constructed so that there was plenty of space to move around and ample height but also so that it was accessible to the technicians for routine husbandry by a means of a door at one end (Figure 1, not reproduced). The whole playpen could be viewed from the outside by means of a one-way viewing panel situated in the door of the animal room.

The dimensions of the playpen (Figure 2, not reproduced) measured 2.4 m (high) x 3.75 m (wide) x 1.5 m (deep). Materials consisted of 5 cm x 5 cm soft wood sections in 2.44 m lengths and 5 cm x 5 cm galvanised weldmesh sections, all cut to fit our requirements and ensuring that there were plenty of supporting struts to take up any movement caused by the monkeys swinging on it.

It was constructed in sections in one corner of the room, incorporating the eight spare drinking nipples of the automatic watering system. Around the bottom edge was a skirting 10 cm high which prevented substrate in the playpen getting wet when the rest of the floor outside was washed. A tunnel was connected linking the last cage to the playpen; with a shutter system at each end enabling us either to contain the monkeys (in the playpen or in their cages) or to leave it open so the monkeys could choose for themselves (Figures 3 and 4, not reproduced).

Inside the playpen, ropes were attached from the ceiling and walls, a wooden pallet was placed on the floor surrounded by a substrate of woodchips 4 cm deep and covered with fresh straw (Figure 5, not reproduced). The substrate of woodchips and straw enabled the monkeys to forage for food—(sunflower seeds and peanuts)—which provided the monkeys with some natural behavioural patterns (Figure 6, not reproduced).

STAFF

Before the project commenced, we thought that it would be wise to restrict the number of technicians participating because:

- (a) The monkeys would become accustomed to humans quicker if the handlers were the same people.
- (b) The same technicians could work better as a team, an important consideration when handling conscious primates.
- (c) Tasks would be carried out in the same way each time.

We therefore initially decided that only two technicians would work with these monkeys on a daily basis and a third person would deputise if for any reason one of the designated technicians was unavailable.

TRAINING OF THE MONKEYS

Prior to the training programme, the monkeys were only handled irregularly and then only under anaesthesia because there were large numbers of animals in the colony and only a limited amount of time could be spent on each animal and also that the animals had to be anaesthetised for dental examinations for purposes of safety and restraint.

To make this project work in the interest of both the monkeys and humans, we needed the animals:

- a) To be trained so that they could be handled without anaesthetic.
- b) To go willingly into the transport cage so they could be weighed.
- c) To associate the experience with pleasant stimuli and thus be willing to repeat the task when necessary.

Seven animals in the group were chosen for training. Four were born in 1983/4 and three in 1985. Although these animals were of different ages, their body sizes were comparable.

The monkeys were first placed in the new aluminium cages, linked together in a new room away from the rest of the colony, in an effort to prevent any distraction by other monkeys and staff. The cages were linked together during the day so that the animals could socialize. The monkeys were housed singly at night until they became used to each other and could be left without constant supervision. The monkeys were observed very closely for signs of fighting as this was their first experience as a social group. One common reason that primates are kept singly is because primates are aggressive and will fight if mixed with strange individuals of the same or different species,¹ however we found that they all seemed to interact with each other extremely well even despite differences in age and size.

On day two we decided to let the monkeys loose into the room to observe their reactions to more spacious surroundings. The cage doors were opened and the monkeys emerged of their accord and in their own time; two came out straight away while the rest remained inside for a few minutes. Eventually they all came out except one, who remained inside performing stereotypic circling around the inside of the cage.

This pattern of behaviour is a functionless activity which is repeated regularly and not observed in the wild. Such behaviour may indicate that the animal is developing an alternative ethogram.²

With the monkeys loose in the room, we were not surprised to find that they had difficulty in judging distance and height when jumping from one object to another. Their timing was completely out, falling to the floor or bumping into the wall as they jumped towards a pipe, their intended target. We decided not to let them out into the room again until they were more accustomed to their new environment, cage mates and human presence.

For the purposes of weighing, the side panels were placed back into the cages, so that the monkeys were singly housed, and they quickly learned this routine. The weighing was carried out before they were fed, thus encouraging anticipatory co-operation.

The monkeys were removed in turn from their cages and placed in a smaller aluminium weighing box. The monkeys were caught by bringing the back of the cage forward, which carefully brought the monkey to the front where they could be handled and removed from the cage without anaesthetic. At this point, full protective clothing was worn by handlers, comprising leather gauntlets, helmet and visor as well as gown and boots.

Once in the weighing box the monkey was taken into another room and placed on an electronic balance and weighed. During this process the animal was offered rewards of banana, sugar lump or peanuts. Once it had been weighed it was returned to its cage and given another reward. When they all had been weighed, they were again allowed to run as a group.

The reason for giving rewards was so that the monkeys associated coming out to be weighed and being handled, as a pleasant experience and not one to be feared.

The intention was to train the monkeys to enter the weighing box on their own accord, just by holding up the box to the cage. Thus they would accept being handled daily, reduce resistance, and gradually learn to co-operate with their handlers.

At no stage were the monkeys forced to enter the box and no procedures such as injections or blood sampling were performed on them.

As the weeks passed, it became increasingly obvious that the monkeys looked forward to being weighed, and it was observed that they ran into the weighing box without hesitation.

During the first two weeks we had been removing the monkeys from the cage by hand and putting them into the weighing box. We decided to hold the weighing box up to the cage to see if they would freely enter this container. The results were quite surprising; after only seven days using this method, most of the monkeys went into the box confidently and without help. Two animals needed coaxing for a few days more, and this was carried out by slowly moving the crushback forward to persuade them to come to the front of the cage.

At this stage there was only one monkey which was still biting the leather gloves when being handled, however this behaviour gradually ceased as time went on.

At this point, a decision was made to add some sort of environmental stimulation, in order to minimize boredom. We placed cardboard boxes and wooden broom handles in the cages for the monkeys to sit and perch on.

After 3 to 5 weeks of daily handling and weighing we could detect a difference in the monkeys' attitude towards the technicians. They were gradually becoming more predictable and it did not take long for them to learn how to obtain free food.

From week six onwards, we decided to weigh the monkeys weekly instead of daily. We felt that weighing was not necessary every day and it was clear that the monkeys were now confident of the weighing box.

At this stage we were still handling the monkeys to get them used to human contact. They no longer resented being handled and there was less need for so much protective clothing. However, caution was observed at all times in case of any unpredictable reactions by the monkeys such as might be caused by fire alarms.

By week ten, although we were still weighing at weekly intervals, it was clear that the monkeys readily accepted being handled and offered little resistance when being taken from the protection of their cage environment. They could be removed from their cages without any anaesthetic and with ease. So evident was the trust between the handler and the monkey that the leather gloves, helmet and visor were no longer necessary. The monkeys could now be held without any restraint and would sit quite contentedly in the arms of the technician. As was emphasised earlier, care was taken in case of any unexpected noise (Figure 7, not reproduced).

INTRODUCTION TO PLAY PEN

When the monkeys first entered the playpen via the tunnel (which was higher than floor level), they were very cautious and hesitant. Having no previous experience of woodchips or straw, they climbed to the top of the playpen and stayed there until the alpha dominant female eventually came down and cautiously touched the substrate.

After an hour or so, the other monkeys realised that there was food hidden in the substrate and started to forage around for it (Figure 8, not reproduced).

They quickly became more familiar with the playpen and their more spacious surroundings. The alpha female continued to dominate the group and choose her position in the playpen.

The previous handling routine and training had proved beneficial as evidenced by the way the monkeys allowed the technicians to enter the playpen while they were still in it, without running away. They appeared perfectly content to be with the technicians, sharing the playpen together.

As time went on, more items were added to the playpen to make the environment more interesting for example: branches from trees, walkways, more ropes and a second tunnel to link to the cages at a new point.

GENERAL OBSERVATIONS

During this project we made some interesting observations on the behaviour of the monkeys. These are listed below:

1. The monkeys were not very vocal inside their new cages, but vocalization outside, whilst being handled, was pronounced.
2. Generally, the monkeys tended to become quieter when in the weighing box. However, their temperament seemed to change when they were placed back in the cage and housed singly for example: stereotypic movements returned and they became less responsive to staff.
3. When running in groups in linked cages, they ran to the opposite ends if a person entered the room or moved nearer to the cages.
4. When a new handler (the third designated person) was involved, he had to work much harder to gain the confidence of the monkey. It appears that monkeys became accustomed to their usual technicians and their methods of working. It was advantageous to limit the number of technicians working with them.
5. It must be questioned as to whether the monkeys willingly go into the weighing box because they feel more secure. It may be because they know that they will receive a reward if they do so and will then be allowed to run as a group again.
6. Again, the question should be asked as to whether they regarded the weighing routine as a change of visual stimuli (that is by being weighed in a different room with different surroundings), when they are taken away from their home environment for weighing.
7. When the monkeys ran as a group in linked cages, one animal appeared to be alone giving the impression that she was the lowest member of the social group. However, on closer observation this proved to be the complete opposite. She sat high up on the wooden perch while the others sat below her. She dominated their movements and was clearly therefore the alpha female of the group.
8. Within the seven animals in the group, there were two clear subgroups—the three born in 1985 and the other four born in 1983/4. These subgroups were quite distinct and moved around separately, although there was one overall dominant alpha female.

9. A hierarchical system clearly developed over the weeks. One animal became the lowest member of the group and this manifested itself as a stress-related chronic diarrhoea and loss of condition; her hair was being pulled out and she appeared harrassed. For these reasons she was separated from the group for a few days and given treatment.

On return to the group it was clear that her previous lowly status had been reestablished, and her condition deteriorated again as follows:

- (i) Bruises and cuts to the face
- (ii) Loss of hair, especially on the back
- (iii) Persistent diarrhoea.

A longer period of separation proved necessary as the diarrhoea persisted. She was treated and ultimately permanently separated from the group.

10. Because the last monkey had been removed, another member became bottom of the pecking order. In fact two monkeys appeared to occupy this position. They showed some hair loss and a few scratches around the face. These monkeys coped well and no action was necessary. These two monkeys were the youngest of the group but not the smallest. "

PROBLEMS ENCOUNTERED

If primates are to be kept in laboratories, they present unique problems. They are highly active, arboreal animals and because of their high level of intelligence they suffer if they do not have the opportunity to carry out a wide range of adaptive behaviours.²

Several problems were encountered in this study and a note of these may prove useful to others who may wish to embark on a similar project.

(a) If a different person, unfamiliar to the monkeys, entered the room, the monkeys would react adversely and sometimes fail to cooperate with their normal handlers.

(b) Weekends posed a problem, as the weekly routine was interrupted and they were not handled or tended by the usual technicians.

(c) It was not always possible to utilise the same handlers every day, due to the holiday periods, sickness or pressure of work.

(d) The monkeys had previously been used to drinking from waterbottles on the front of the cage (North Kent Plastic Cages Ltd). They therefore had to accustom themselves to the automatic watering system situated at the rear of the cage.

(e) Some days were busier than others; therefore the length of time that the animals could be handled varied.

(f) Although the monkeys had free run of the linked cages, they soon had clearly outgrown their cage environment. Weaker members of the group were unable to escape from the more dominant ones —hence the need to run the monkeys into the playpen.

DISCUSSION AND CONCLUSIONS

The results of this project were apparent when the animals were observed in their new environment. Behaviour patterns had changed dramatically. The monkeys had become more docile, easier to handle, more content, apparently more stimulated and had accepted human contact.

The most distinctive characteristic of primates is the size and complexity of the brain,³ which increased intelligence and therefore the need for external stimulus.

Devices which increased the time captive primates spend foraging have proved highly effective; using a woodchip substrate and scattering small food items in it increases foraging time and reduces aggression.²

Objects or devices which can be manipulated provide novelty and stimulation, but are most effective when linked with a food reward.⁴

Use of the full height of the room and the ability to link up with the caging, proved very successful. The system had the added benefit that it could be changed or added to at a later date if required.

The playpen provided escape routes for less dominant females, allowed social interaction and, probably more importantly, offered mental stimulation for the monkeys.

The wellbeing of these monkeys, as judged by their behaviour, greatly improved. More 'natural' behaviour patterns were seen and undesirable traits declined. The body weights recorded indicated that no adverse affects resulted from the monkeys being grouped together and housed socially.

The use of primates should be restricted to institutions which provide facilities of a very high standard for their husbandry and welfare, including provision for general health care, social contact, exercise, recreation and privacy. Primates should not be kept in isolation (that is without aural and visual contact) with other members of the same species and that long term caging should be regarded as acceptable only for special reasons. Indeed wherever practicable, animals maintained singly should be allowed regular periods in communal recreation and/or given suitable in-cage inclusions to provide them with entertainment.⁵

We have shown that if primates are handled regularly and with sensitivity, they can prove pleasant to work with and remain in good health, both mentally and physically. Contact with staff is extremely important and should include handling and also training primates to co-operate in procedures, such as weighing, injections and being moved from place to place.² The programme described also allowed a close human/animal relationship to develop with all its ensuring benefits. The project gave the staff involved a great deal of satisfaction since it was clear that we had, in a small way and on a limited budget, improved the lives of these intelligent animals.

Daily contact and an understanding of basic needs, can help achieve much needed improvements in primate welfare, an aim which primates need and surely deserve.

Finally, much of the work described here could be adapted to many different species. Why not make environmental changes to improve the quality of life of all laboratory animals?

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