

A QUANTITATIVE ANALYSIS OF THE CHEWING PERFORMANCE OF RHESUS MONKEYS¹

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The purpose of this investigation was to study the chewing performance of rhesus monkeys on wooden blocks presented under a condition of spaced practice. Studies by McDowell (5) and Cho (1) have demonstrated that the rhesus monkey prefers wooden objects over other kinds of inanimate objects ordinarily accessible to the caged monkey. These studies both found extensive oral manipulation of wooden objects, but did not measure the amount of oral manipulation.

METHODS

Subjects

Sixteen rhesus monkeys, (nos. 1-16), three males and 13 females, were used as subjects in this investigation. All animals had nearly identical taming and training histories and each of the animals had previous experience in chewing wooden parts of the cage.

Apparatus

Figure 1 shows a typical wooden block after the completion of the present experiment. A cigarette lighter and an unchewed block are included to indicated the size of the stimuli and the gross amount of chewing that occurs.

The blocks are constructed of two 3.25 x 3.25 x 1.0 in. pieces of soft pine bolted loosely together by means of a large eyebolt. Before the experiment began the average weight of each unit, including the two pieces of wood and the bolt, was 149.69 grams. Each block is attached to an identifying tag by means of an 18 in. length of plumber's chain. The blocks are presented to the animals by placing the block inside the living cage and lowering the cage door on the plumber's chain near the end attached to the identifying tag.

Procedure

All animals were given a battery of three tests. The Wood Chewing Block Test was given to each animal in his living cage and the other two tests were presented to the animals in the South Dakota Modification of the Wisconsin General Test Apparatus. The procedures and results of the latter two experiments are reported elsewhere (2). The Wood

¹ This investigation was supported in part by a research grant (Grant M-530) from the National Institutes of Mental Health.

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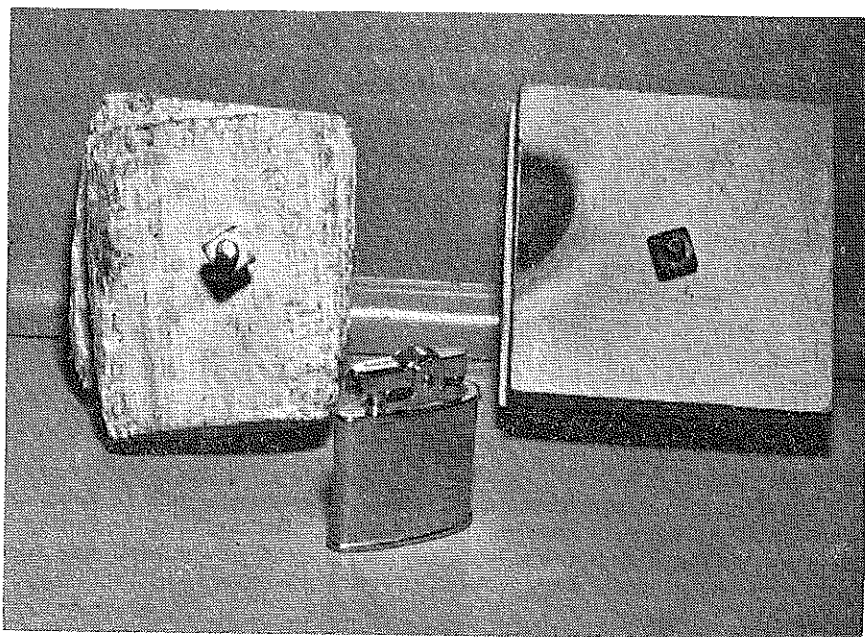


Figure 1. Wooden Chewing Blocks. Left hand block after 400 minutes of presentation to Monkey No. 12

Chewing Block Test was given to each animal 20 minutes a day, during the time the animal's cage mate was being given the other problems, for 20 days. The chewing performance of each animal was scored by recording the gram weight loss of the wooden blocks on each evening after block presentation.

Following the above original training period a new wooden block was introduced to each animal and the Wood Chewing Block Test was given along with the other two tests in this training battery once every four days for eight four day periods. On the remaining three days of each four day period tests of three other training batteries were presented. The massed training on the eleven tests in the three training batteries continued after the animals in this experiment were split into experimental and control groups and the animals in the experimental group were each given a large single dose of X-radiation. The latter procedures are described elsewhere (3).

RESULTS

The number of grams of wood chewed by each animal during each four days of the original training period and during the eight days during massed training when the wooden blocks were presented, is shown in Table I. During the first four days of practice each animal chewed

TABLE I
Performance of Monkeys on the Wood Block Chewing Test
Grams Chewed

Days of practice	Original Training Period					Pre-X-radiation training period	
	1-4	5-8	9-12	13-16	17-20	1-4	5-8
Calendar days	1-4	5-8	9-12	13-16	17-20	1-16	17-32
Animal							
1	10.7	3.8	4.7	2.5	2.0	4.6	2.0
2	7.4	1.5	1.0	0.4	0.6	1.4	1.0
3	6.0	1.0	1.0	0.0	0.3	3.0	1.0
4	14.5	7.2	4.3	2.5	3.0	7.3	4.3
5	9.0	3.3	0.7	3.5	1.6	1.7	3.5
6	6.0	5.2	2.0	0.0	2.0	6.2	3.8
7	15.5	1.9	1.6	1.5	0.0	2.5	1.8
8	11.0	2.0	2.0	0.5	0.5	3.5	2.5
9	8.2	1.0	1.5	0.0	0.0	0.5	1.3
10	10.9	1.0	2.5	0.5	1.5	2.5	0.0
11	14.2	1.7	4.8	0.5	0.5	1.7	1.5
12	15.8	10.0	4.5	3.5	3.0	8.2	4.0
13	9.5	2.0	2.0	2.5	0.5	4.6	2.0
14	11.5	6.0	2.0	3.0	0.5	1.0	3.0
15	3.9	2.5	3.5	2.5	0.0	4.3	3.0
16	2.3	4.5	3.5	2.0	0.0	4.0	9.0
\bar{x} (per day)	2.44	.85	.65	.39	.25	.89	.68

an average of 2.44 grams per day. At this rate of chewing the blocks would have been consumed in approximately 60 days. However all animals chew less in the second four days of block presentation, and this drop in level of performance continues throughout the period of original training.

During the first four days of pre-radiation training every animal showed an increase in amount of chewing, but only 12 of the 16 animals showed a decrease in chewing during subsequent four days of wooden block presentation. The difference between the last period of original training and the first period of the pre-radiation period was the spacing between trials and the introduction of a new block at the beginning of the latter period. In the pre-radiation period blocks were presented only once every four days whereas in the original training period the blocks were presented every day. The level of chewing by animals during the post-radiation training period equalled or excelled the level of chewing during the pre-radiation period, and no apparent satiation of the chewing

response occurred during the five 4-day periods of post-radiation stimulus presentation (covering the 80 days following X-radiation). A small transitory drop in the chewing by the animals in the X-radiated group has been reported elsewhere (3).

DISCUSSION

Two hypotheses are immediately apparent to explain the renewed vigor of chewing of all of the animals at the beginning of the pre-radiation period of training. Chewing behavior may satiate faster under greater massing of practice, and or the introduction of new blocks may renew interest in chewing. The former hypothesis is likely since the animals only satiated in response when practice was given every day but did not satiate when practice was given in spaced intervals.

Although there is evidence that this chewing response may satiate under certain conditions of practice, it is a very durable response and probably should be included among those externally elicited manipulation drives identified by Harlow and co-workers (4).

An explanation of these responses based upon secondary reinforcement might be made, but the continuation of this response after 960 minutes of block presentation without any food reward suggests that an hypothesis of an oral manipulation drive or drive component would be more tenable.

SUMMARY AND CONCLUSIONS

Wood chewing blocks were presented to each of 16 rhesus monkeys 20 minutes a day for a 20 day period of continuous block presentation, and 20 minutes a day on every fourth day of 32 days pre- and 80 days post-X-radiation training periods.

1. All animals chewed vigorously in the early part of the original training period, but this response satiated with practice.
2. The chewing response was augmented with the introduction of new blocks and the massing of trials.
3. This wood block chewing response was regarded as the manifestation of an oral manipulation drive.

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