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THE EFFECTS OF EARLY HANDLING
ON BEHAVIOR IN THE ALBINO RAT

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William Reed Tucker

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The Effects of Early Handling
on Behavior in the Albino Rat

by

William Reed Tucker

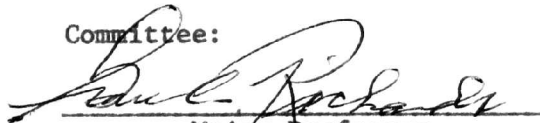
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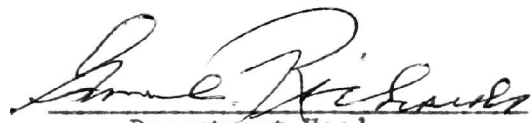
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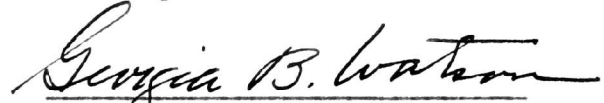
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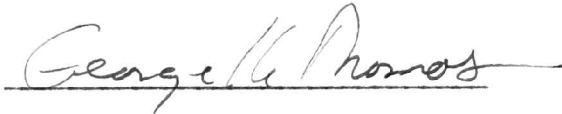
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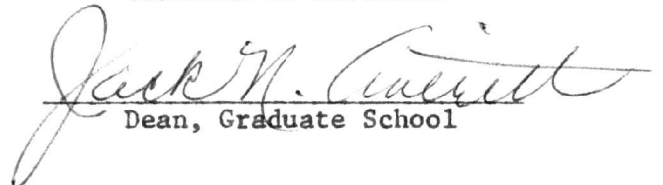

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The hypothesis that experiences in the life of young organisms affect their later behavior has been subjected to various experimental tests. Some studies have taken the Freudian approach, which suggests that the treatment of an infant can arrest or fixate the development at an early age (King, 1959; Hall & Whiteman, 1951). Some investigators have taken an approach which emphasizes the importance of early perceptual experiences on later performance in a learning situation (Hebb, 1949). Still others have looked for a critical period in which certain experiences have different effects depending on the age of the subject (Gertz, 1957).

The handling of young rats has often been the independent variable in experiments designed to investigate the effects of experiences in the early life of organisms. Several experimenters have investigated the effects of gentle treatment such as stroking on later behavior. Weininger (1956) handled one group of rats and did not handle a similar group. He reported that the handled subjects gained more weight over a given period than did the nonhandled rats. Berstein (1952) reported that rats which had been handled in a gentle manner made fewer errors in a T-maze than did subjects which had not been handled.

Some studies have suggested that handling of rats during infancy resulted in a difference in emotional behavior. Levine (1957) found that rats previously handled showed a more rapid release of the adrenocorticotrophic hormone when placed in a stressful situation than did nonhandled subjects.

Hunt and Otis (1955) gently handled an experimental group of rats from the seventh day after birth until the twenty-first day. A control group was not handled. Following the handling period, both groups were tested in an open field situation. The authors found the nonhandled subjects made fewer movements in an open field test than did handled rats indicating an emotional difference.

A study by Barry (1957) indicated that gentle handling may have an effect on performance in a learning situation. He trained two different age groups of rats to escape from a water maze, using a different escape route for each trip. After the training phase each group was divided into experimental and control groups. The experimental subjects were stroked daily for 75 days and the control rats were not handled. Following the 75 day period each group was tested in an escape route that had not been used in the training phase. Barry reported that the handled subjects made fewer errors in the test period than did the non-handled rats.

Other studies have indicated that gentle handling of rats during early life will increase exploratory behavior and decrease emotional reactions as measured by urination and defecation whenever they are placed in an open field test situation (Levine, 1958; Denenberg, 1963; Weininger, 1956). Based on the results of these investigations it is generally concluded that nonhandled animals will exhibit less mobility and more emotional responses when placed in an open field situation.

The effects of early mistreatment such as application of electric shock have been investigated and they appear to be similar to the results of gentle treatment. Baron, Brookshire, & Littman, (1957) used electric shock to investigate its effects on later behavior in a learning situation. In the Baron, et. al., study rat pups were shocked at two different ages and later tested in an avoidance learning situation. The shocked subjects had a shorter response latency than did the non-handled control animals.

It would appear that some of the same effects are observed in shocked subjects as are found in subjects handled in a gentle manner. The effects of both gentle treatment and mistreatment (Berstein, 1957; Hall & Whiteman, 1951; Levine, 1957; Weininger, 1956) may be summarized as: (1) an increase in body weight and skeletal length, (2) increased ambulatory activity, and (3) a decrease in emotionality as measured by urination and defecation.

Research on the effects of inconsistent treatment of young animals has been sparse. Berstein (1952) reported that subjects exposed to interrupted handling made more errors in maze learning than did subjects receiving no handling. Eells (1961), using rats, investigated the effects of four handling conditions: gentling, mistreatment, inconsistent handling, and no handling. Gentle treatment consisted of stroking. Mistreatment consisted of rough handling (subjects were slapped, tossed in the air, dropped, and held by their tails). The subjects in the inconsistent group received gentle treatment on one day and mistreatment on the following day.

In an open field type test subjects that had received gentle treatment exhibited fewer signs of emotionality such as defecation and more activity as compared to the other groups. The mistreated and inconsistent groups exhibited the same behaviors as the gentle group although to a lesser degree. Eells study indicated that different types of handling resulted in different levels of activity and that no handling of subjects resulted in the lowest level of activity.

The purpose of the present study was to explore the effects of different handling procedures, including no handling, on operant behavior of rats in an operant conditioning chamber. The specific hypotheses of the current study are: (1) rats handled during early life in any manner: gently, harshly, inconsistently, will after a 24 hour deprivation period make more bar presses in an operant conditioning chamber than will rats that have not been handled; (2) gently treated subjects will make more bar presses in the operant conditioning chamber than will either harshly or inconsistently treated subjects, (3) nonhandled subjects will show more emotionality in the operant conditioning chamber, as measured by defecation than will subjects that have been handled in any manner; and (4) gently treated subjects will gain more weight over the treatment period than all other groups.

Method

Subjects

The subjects were 32 albino rat pups, 8 from each of 4 litters born the same day. From each mother 2 pups, a male and a female, were randomly selected for each of 4 groups, 3 experimental and a control group.

Apparatus

The apparatus consisted of two operant conditioning chambers and two control units manufactured by the Lehigh Electronics Company, Models 1578D and 1579A. A Triple Beam Balance, manufactured by the Ohaus Scale Corporation, was used for weighing subjects.

Procedure

On the 10th day after birth the 32 subjects were weighed. On the 16th day the subjects were randomly divided into 4 groups with 2 males and 2 females from each litter, each subject marked according to group assignment. Subjects remained with their mothers in home cages during the experiment and were fed and watered on an ad libitum schedule. The experimental subjects were handled according to group assignment 5 minutes per day for 20 consecutive days. After the 20 day handling period, all subjects were weighed again.

The daily handling was accomplished during the late afternoon. Each subject was returned to its home cage immediately after its 5 minute handling treatment. No particular schedule was followed in the treatment order as each subject was handled according to its group assignment whenever he was taken from his home cage.

The 5 minute daily handling procedure was as follows:

Group G (gentled group): Each subject was stroked for the first 30 seconds of each minute. The last half of each minute the subject was permitted unrestricted movement about the experimenter's arms and shoulders.

Group M (mistreated group): Each subject was lifted from his home cage and thrown into the air and caught; his fur was rubbed from the base of the tail to the head 10 times; air was then blown into its face 10 times; the subject was picked up by the fur on the nape of the neck, dropped a distance of 3 feet and caught; the subject's nose was tapped 10 times with a finger, and finally the animal was lifted by the tail and shaken 5 times. The mistreatment procedure lasted for one minute and repeated five times each treatment period.

Group I (inconsistent group): Beginning on the first day with gentle treatment, the subjects in Group I received gentle treatment and mistreatment on alternate days.

Group C (control group): The control subjects remained in the home cages and were not handled. Care was taken to avoid touching the control subjects during the treatment periods.

Testing

On the day after handling was completed (20 days) the subjects were weighed and placed on a 24 hour water deprivation schedule. At the end of the deprivation period each subject was placed in the operant conditioning chamber for a period of 40 minutes, with continuous

water reinforcement contingent on bar presses. The number of bar presses was recorded for the last 30 minutes, the first 10 minutes being an adaptation period. The number of defecation boluses were counted for the entire 40 minute testing period.

Results

The number of bar presses and number of defecation boluses are shown in Table 1. Both the bar press and defecation rates were analyzed with one factor analyses of variance shown in Tables 2 and 3 respectively.

The weights of the experimental groups and the control group are shown in Table 4. Group G gained more weight during the 20 day handling period than any of the other groups.

TABLE 1
Number of Bar Presses and Defecation
Boluses During a 30 Minute Period

Group	Bar Presses	Defecation Boluses
Gentle	39	6
Mistreated	27	16
Inconsistent	145	2
Control	15	15

TABLE 2
 Summary of the Analysis of Variance of Bar
 Presses in the 30 Minute Testing Phase

Source of Variation	SS	df	MS	F	P
Between groups	1341	3	447	1.46*	.01
Within groups	<u>8567</u>	<u>28</u>	305		
Total	9908	31			

*Required F=4.57

TABLE 3
 Summary of the Analysis of Variance of Defecation
 Boluses in the 30 Minute Testing Phase

Source of Variation	SS	df	MS	F	P
Between groups	18	3	6	4.00*	.01
Within groups	<u>42</u>	<u>28</u>	1.50		
Total	60	31			

*Required F=4.57

TABLE 4
Weight in Grams of Groups Before and After Treatment

Group	Days After Birth	
	10	37
Gentle	197	976
Mistreated	195	916
Inconsistent	192	936
Control	198	860

Discussion

The hypothesis that different types of handling differ in their influence on the behavior of young rats in an operant conditioning chamber was not supported by the findings of the present study.

Eells (1961) found that subjects that received harsh treatment defecate more than subjects that receive gentle petting. Eells therefore fails to support Levine's findings (1958) that different types of stimulation tend to produce much the same effects as long as some type of stimulation is provided. The results of the present study supported Levine's suggestion that different types of stimulation produce the same effects but do not support Eells (1961) implication that the effects of gentle handling differ from those of harsh stimulation.

Denenberg (1963) and Weininger (1956) using defecation as the measure reported that handling decreases emotionality in a novel situation. The majority of studies support these findings. In the present study there was no significant difference between handled and nonhandled subjects in terms of defecation rates in the operant conditioning chamber.

Weininger (1956) has demonstrated that gentle handling increases body weight. The results of the present study tend to support his findings. Group G, receiving gentle treatment, gained more weight than Group C, which was not handled.

Summary

Three groups of albino rat pups were handled in 3 different ways 5 minutes a day for a total of 20 days. Another group of pups was not handled except for weighing at 10 days of age. Group G received gentle handling such as stroking. Group M was thrown into the air and slapped and treated in a generally rough manner. Group I received both the treatment of Group G and Group M. Group C was not handled.

After the 20 day handling period the subjects were deprived of water for 24 hours and individually placed in an operant conditioning chamber. The number of bar presses for a 30 minute period was recorded. The defecation boluses during the time in the operant conditioning chamber were counted for the 4 groups. A one factor analysis of variance for bar presses and defecation boluses yielded no significant difference for the 4 groups.

The weights of the 4 groups were taken before and after the treatment period. Group G, which received gentle treatment, gained more weight than Group C, which was not handled.

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