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AUTHOR Pederson, David R.; And Others
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INSTITUTION University of Western Ontario, London. Dept. of Psychology.
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ABSTRACT

In this study designed to compare the relative pacifying properties of horizontal and vertical rocking, 13 infants (mean age--58 days) were each tested on two subsequent days. The rocking device was a cradle that could be manipulated to produce side-to-side rocking similar to a commercial cradle or up-and-down rocking. In its up-and-down mode, the cradle was moved through a 4-inch vertical excursion. Each subject received one mode of rocking in one daily session and the other mode on the following day. The subject's activity was independently rated on a 6-point scale every 30 seconds by two observers, and by an Electro-Craft Movement Transducer placed under the mattress of the cradle. Each day the infant received two 5-minute periods of rocking preceded and followed by a 5-minute observation period. Scores showed that activity during rocking decreased; but with termination of rocking, activity returned to the baseline level following the first rocking period. Activity after the second rocking period did not rise to the initial level. The up-and-down mode was more effective as a soother than the side-to-side mode. Transducer scores were in agreement with observer scores. (Author/AJ)

Relative Soothing Effects of Vertical and Horizontal Rocking

David R. Pederson

Louise Champagne

&

Linda L. Pederson

University of Western Ontario

At the 1967 meeting of SRCD, Lipsitt and Ambrose presented some interesting observations on the soothing effects of rocking. Their study was concerned with the effectiveness of different kinds of stimulation in producing temporal conditioning in neonates. One of the stimuli that they used was vestibulation produced by a motor driven baby rocker. This rocker moved the baby up and down through an excursion of three inches. Although Lipsitt and Ambrose did not collect systematic data on the pacifying properties of this vestibular stimulus, they reported being impressed at its profound soothing effects. Intrigued by these observations, we decided to initiate a series of studies on the soothing effects of rocking. The study that we are reporting today is the first in this series. Being somewhat conservative in nature, the first rocker we built moved the infant in the conventional horizontal mode similar to the movement produced by a commercial cradle. However, preliminary testing on this cradle did not produce the soothing effects that the Lipsitt & Ambrose observations led us to expect. Since the direction of rocking seemed to be the major difference between our procedure and theirs, we decided that

in this initial study we would compare the relative pacifying properties of horizontal and vertical rocking.

Method:

Subjects. Subjects in the final sample were 13 infants obtained by an article about the study in the local newspaper.[1] The age of these subjects ranged from 29 to 82 days with a mean of 58 days.

Apparatus. The rocker is shown in Figure 1. This device can

Insert Figure 1 about here

produce either a side to side rocking in one mode, or an up and down rocking in the other mode. In its up and down mode, the cradle was moved through a 4 inch vertical excursion by turning the crank in the front of the apparatus. A bar connected the underside of the cradle to a 7 inch wheel. This wheel was rotated through a 2 to 1 reduction gear by turning the crank. In its side to side mode, a pin was inserted in the upright supports. The springs on the four corners of the supports and the bar on the underside of the cradle were removed, thus allowing the crib to swing freely. Both the side to side movement and the up and down movement were paced by a visual-metronome at the rate of one complete cycle every two seconds. The infant's movements were sensed by an Electro-Craft Movement Transducer. The sensor of this transducer was replaced by a screen in the mattress of the cradle. This modification expanded the sensing field of the transducer to include the entire inside area of the cradle.

Procedure:

Each infant was tested on two subsequent days. One mode of rocking was presented on one day and the other mode on the following day. The design of each daily session is presented in Table 1. The first five minutes of each daily session were used to accustom the

Insert Table 1 about here

infant to the experimental situation. This was followed by two fifteen minute periods. Each period consisted of five minutes Before rocking, five minutes During rocking and five minutes After rocking.

The activity level of the subject was recorded in two ways. First, two observers independently rated the activity of the infant on a 6-point scale every 30 seconds. This scale was an adaptation of one used by Bridger, Birns and Blank (1965). Activity on this scale ranged from a rating of 1 (quiet sleep) in which the infant was relaxed with little or no movement and was breathing regularly, through to 6, (marked irritability) in which the infant was extremely agitated, cried severely and had very irregular respiration. The second method of recording subjects' activity level was movement counts produced by the Electro-Craft movement transducer. These counts were recorded every 30 seconds.

Results:

Observer Ratings. Interobserver agreement on the judgements of

the activity level of the subjects was assessed by computing separate correlations for each infant and for each daily session. Out of the possible 26 correlations, 21 were .90 or greater. The correlations ranged from .99 to .71 with a mean of .94.

Figure 2 presents the mean observer ratings for each mode and session of rocking as a function of five minutes before, five minutes during, and five minutes after rocking. Note that, 1) there was a

Insert Figure 2 about here

reduction in activity during rocking for each mode; 2) during rocking activity was less for the up and down mode than for the side to side mode, and 3) the effects of rocking lasted longer after the second rocking session. An overall analysis of variance indicated significant main effects for period of rocking ($F = 18.89$, $df = 2/24$, $p < .05$) and mode of rocking ($F = 5.97$, $df = 1/12$, $p < .05$), and an interaction between period of rocking and rocking session ($F = 4.68$, $df = 2/24$, $p < .05$). A *priori* contrasts showed that both for Rocking 1 and for Rocking 2, up and down rocking was more soothing than side to side rocking but only during rocking ($F = 4.98$ for Rocking 1, and $F = 5.25$ for Rocking 2, $df = 1/12$, $p < .05$). Follow-up tests on the scores for Rocking 1 revealed that up and down rocking produced a significant decrease in activity from before to during rocking ($F = 8.63$, $df = 1/12$, $p < .05$), and that termination of rocking produced a significant increase in activity ($F = 5.40$, $df = 1/12$, $p < .05$). Side to side rocking did not produce these significant changes. For Rocking 2, both modes of rocking

produced a significant decrease when rocking was initiated ($F = 17.09$ for up and down, $F = 5.03$ for side to side, $df = 1/12$, $p < .05$). There was no significant change produced by the termination of Rocking 2. A final set of comparisons revealed that only for the second application of up and down rocking was activity less after rocking than before ($F = 10.71$, $df = 1/12$, $p < .05$ for up and down, $F = 4.59$, $df = 1/12$, $p < .10$ for side to side).

Activity Scores. A similar analysis of variance was conducted on the activity scores produced by the movement transducer. Because of movement artifacts produced by the rocking motion, analysis of these scores compared 5 minutes before with 5 minutes after rocking. The means relevant to this analysis are presented in Figure 3. These activity score means are in agreement with the conclusion reached from

Insert Figure 3 about here

the analysis of the observer rating scores. That is, rocking had its greatest pacifying effect during the second application. The second up and down rocking period produced greater soothing effects than the second side to side rocking period. Analysis of variance on the activity scores revealed a significant main effect for period of rocking ($F = 12.50$, $df = 1/12$, $p < .05$) and a significant period by rocking session interaction ($F = 5.62$, $df = 1/12$, $p < .05$). A priori contrasts comparing activity scores before and after rocking for each mode and session of rocking indicated that only the second application

of up and down rocking produced a significant decrease in activity ($F = 6.01$, $df = 1/12$, $p<.05$).

Cochran's Tests. The above analysis tested the hypothesis that one mode of rocking produces a greater amount of soothing than the other mode of rocking. A second question that can be asked of the data is, whether one mode of rocking soothed more infants than the other mode. The table in Table 2 presents the data relevant to this hypothesis. For the observer ratings, 6 of the 13 subjects were less

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Insert Table 2 about here

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active after up and down rocking than before, for the first rocking period, and 12 of the 13 subjects were less active after the second application of up and down rocking. For the side to side mode, the comparable figures are 6 out of 13 and 8 out of 13 subjects. The portion of the table relevant to the activity scores can be interpreted in the same fashion. Cochran's Tests applied to each dependent variable leads to the conclusion that the second up and down rocking session soothed a greater proportion of the infants than any of the other three conditions.

Relationship between the activity scores and the observer rating scores. The correlation between the activity scores and observer rating scores over all subjects and conditions was .72.

Discussion:

Despite the fact that pediatricians, mothers and poets have made frequent references to the importance of rocking, we have been able to find only two systematic studies of the soothing effects of rocking. Birns, Blank and Bridger (1966) compared the soothing effects of rocking with auditory, oral and thermal stimulation. Each stimulus was applied for a 60-second period. They reported that when exposed to these stimuli, neonates were less aroused than during a non-stimulus control period, but that no one stimulus was more effective as a soother than any other. A second study reported by Gordon & Foss (1965) examined the effect of rocking on the frequency of crying in a newborn nursery. Each day in the experiment, the number of infants who were not crying were counted. One of these infants was selected for rocking, the remaining infants formed a control group. The experimental session consisted of 30 minutes of rocking followed by a 30 minute observation period. Results showed that the proportion of infants who cried was less for the experimental group than the control group. Unfortunately, neither Birns et al. or Gordon & Foss were explicit in such parameters of rocking as the frequency, direction or amount of movement.

The results of the present study are in agreement with observations of an Australian pediatrician (Knowles, 1959). He observed that the native women of New Guinea quiet their infants by carrying them in a bag attached to their back, and walking until the baby is asleep. Knowles constructed a spring-mounted canvas cradle that he used

to examine the soothing effects of different forms of motion. His observations with this device led him to suggest that an up and down motion was more soothing than swinging or rocking in the side to side fashion. Although his experiments were somewhat informal in nature, our findings do confirm his conclusions.

Kessen & Mandler (1961) have considered rocking as an inhibitor of distress for the infant. They made several suggestions about rocking that we hope to explore further. One is their opinion (as shared by Peiper, 1963, p. 606) that the cessation of rocking will reinstate distress. The suggestions from the data in the present study indicate that both the amount and direction of rocking may affect the duration of the soothing effects after cessation of rocking. A second suggestion put forth by Kessen & Mandler, is that the soothing properties of rocking may be related to the similarity between its periodisity and viseral rhythms.

We must conclude with a word of caution. Unfortunately, our cradle made slightly more noise when rocking in its up and down mode than its side to side mode. Since there is some evidence that auditory stimulation has a soothing effect on infants, the results of the present study might be attributed to auditory rather than vestibulary stimulation. In investigating a similar possibility with their up and down baby rocker, Lipsitt & Ambrose (personal communication) found that infants placed in a basinet next to the rocker did not show the same reduction in activity as infants being rocked. Future versions of our apparatus will hopefully eliminate this confounding factor.

FOOTNOTE

[1]We are indebted to Jeanne Graham and Del Bell of the London Free Press for their assistance in obtaining subjects.

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Department of Psychology
The University of Western Ontario London, Canada

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TABLE 1

Five Minute Periods Presented in Each Daily Session

1	HABITUATION	
2	BEFORE	
3	DURING	Rocking 1
4	AFTER	
5	BEFORE	
6	DURING	Rocking 2
7	AFTER	

TABLE 2

Number of subjects who were less active after rocking than before rocking

	Observer Ratings	
	Rocking 1	Rocking 2
Up - Down	6/13	12/13
Side to Side	6/13	8/13

	Activity Scores	
	Rocking 1	Rocking 2
Up - Down	8/13	13/13
Side to Side	7/13	8/13

SUMMARY OF COCHRANS TESTS

Observer Ratings

Q (U-D vrs. S-S for Rocking 1) = 0
Q (U-D vrs. S-S for Rocking 2) = 8
Q (Rocking 1 vrs. Rocking 2 for U-D) = 14.6
Q (Rocking 1 vrs. Rocking 2 for S-S) = 1

Activity Scores

Q (U-D vrs. S-S for Rocking 1) = 1.4
Q (U-D vrs. S-S for Rocking 2) = 5
Q (Rocking 1 vrs. Rocking 2 for U-D) = 5
Q (Rocking 1 vrs. Rocking 2 for S-S) = 2

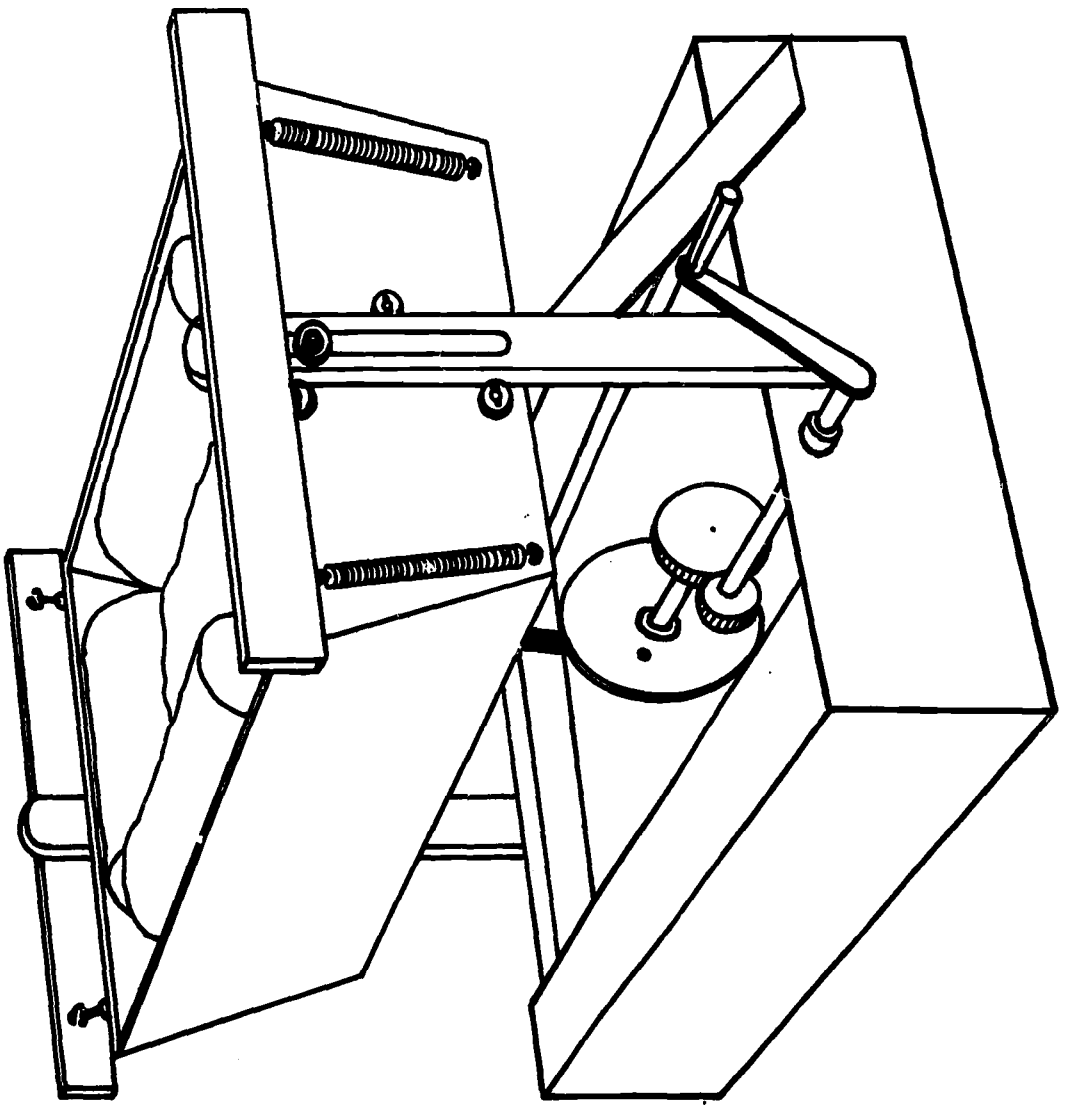
$X^2_{.05}$ (1) = 3.84

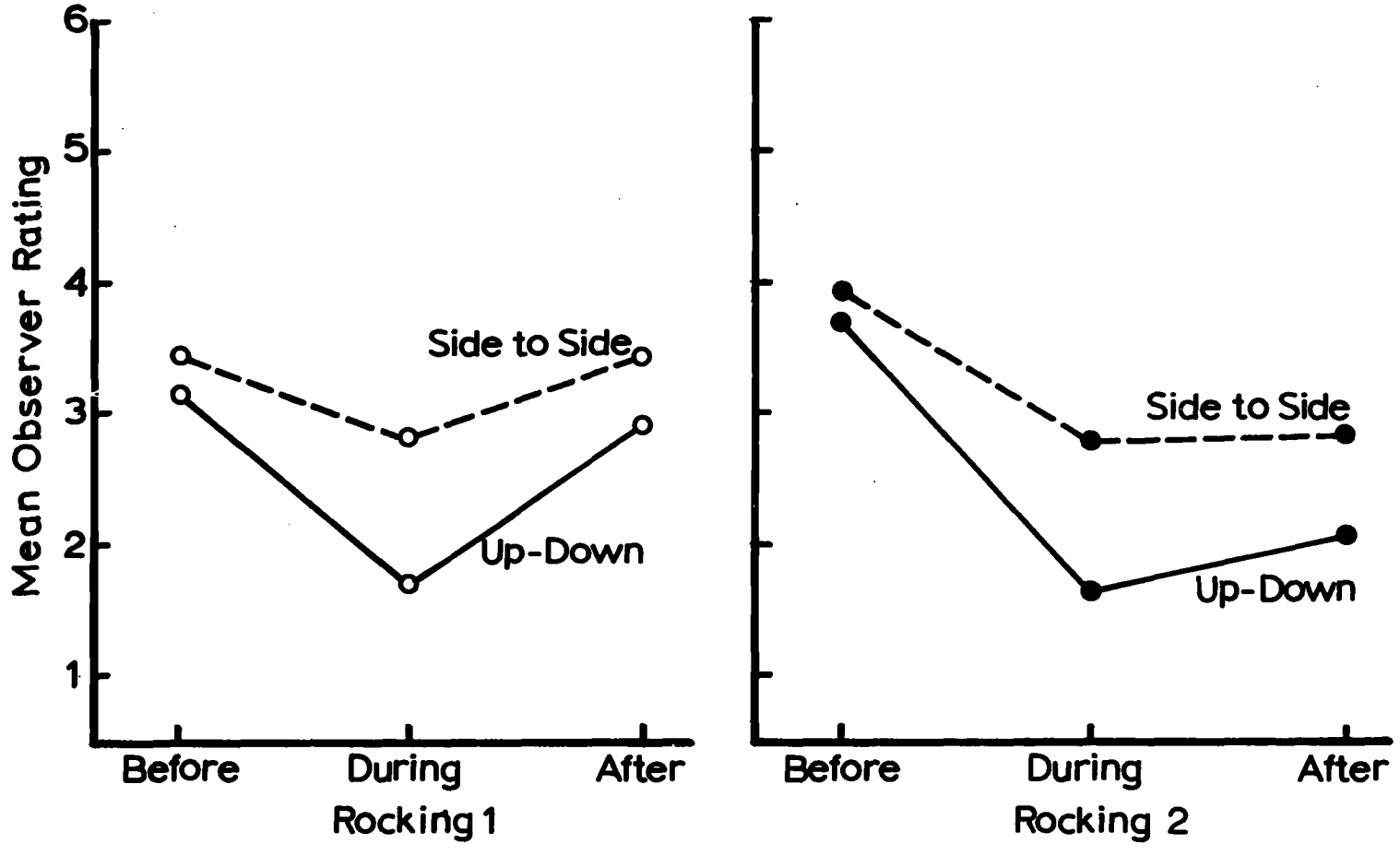
FIGURE TITLES

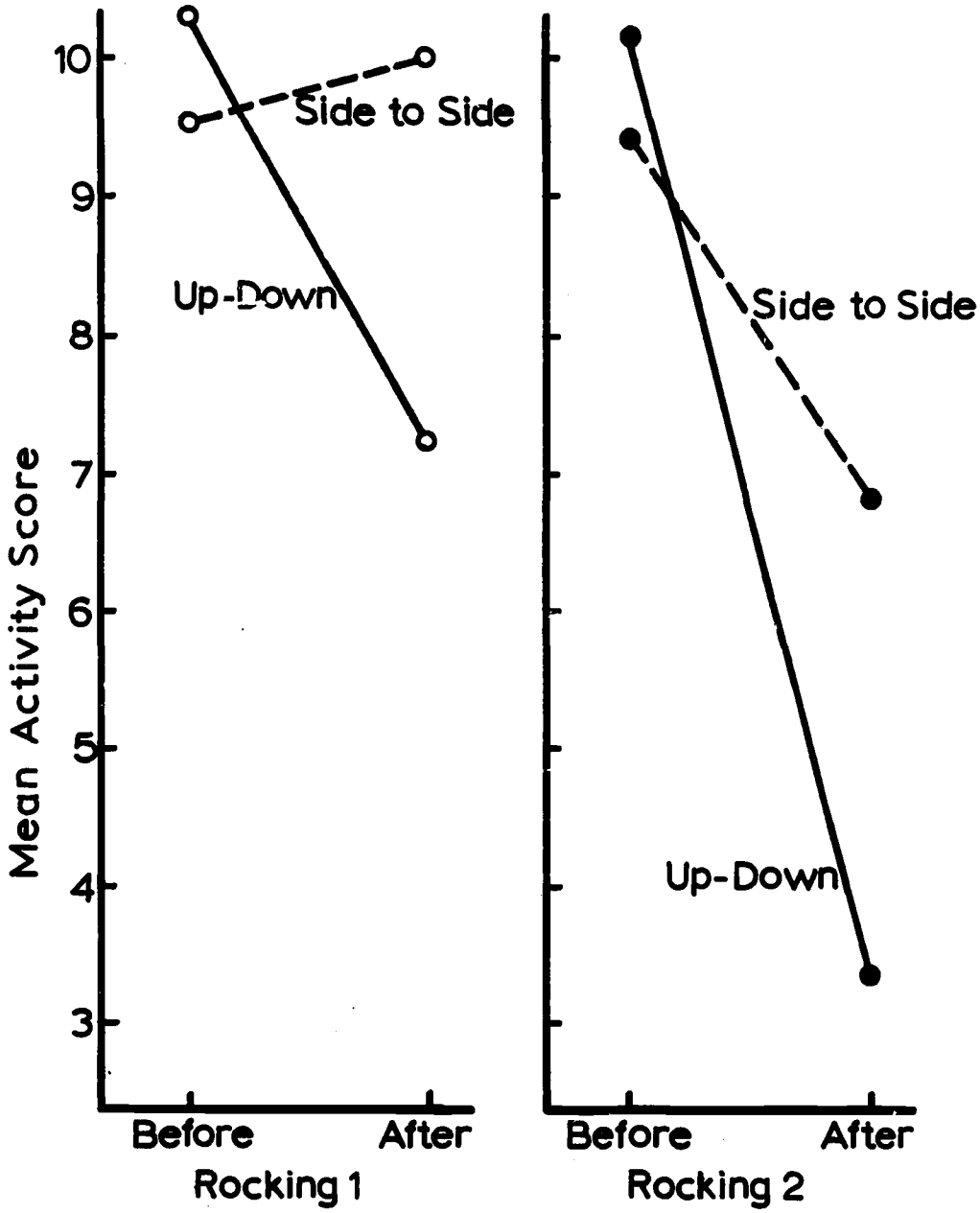
Figure 1: Line drawing of the rocker.

Figure 2: Mean observer ratings for each mode and session of rocking as a function of five minutes before, five minutes during, and five minutes after rocking.

Figure 3: Mean activity scores for each mode and session of rocking as a function of five minutes before and five minutes after rocking.




Mean Observer Rating
6
5
4
3
2
1
Side to Side
Up-Down
Before
During
After
Rocking 1
Side to Side
Up-Down
Before
During
After
Rocking 2


Mean Activity Score
10
9
8
7
6
5
4
3
Side to Side
Up-Down
Before
After
Rocking 1
Side to Side
Up-Down
Before
After
Rocking 2