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VIBRATION AS A REINFORCER WITH A PROFOUNDLY RETARDED CHILD[1]

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Data are presented which indicate that lever-pressing behavior of a profoundly retarded child could be reinforced by the contingent application of vibratory stimulation for each response. With vibration available 24 hr per day, no decrement in daily rate of responding for vibration was seen over a three-week period. Suggestions are made for further use of this finding in working with the profoundly retarded.

Finding adequate, easily administered reinforcing stimuli for profoundly retarded children that are sufficiently resistant to satiation often presents problems to the behavior modifier. These problems are compounded when the retardate is severely handicapped, very young and crib-bound.

Fuller (1949) showed that contingent food could be used to increase the amplitude of simple arm movements in a vegetative patient. Food has limitations as a reinforcer, however, not only because of present institutional requirements that access to nourishment be non-contingent but also because, in practice, it is inconvenient to dispense by hand, delivery is not easily automated for liquids or spoon-feeding, and satiation may be rapid.

An alternative reinforcing stimulus for profound retardates, which does not have the disadvantages of food, is vibratory stimulation. Schaefer (1960) demonstrated that the vibration from an electric toothbrush could be used to maintain button pressing and to establish pill taking in a 17-month-old child. Meyerson, Kerr, and Michael (1967) presented records showing that vibratory stimulation maintained lever pressing in a profoundly retarded 4-yr-old child for one 60-min session, but was markedly less effective in a second session. This fragmentary evidence indicates that vibration can be reinforcing, but the conditions under which it is effective and its durability have not been established. The present study was undertaken to determine if vibration could be used on a long-term basis to maintain lever-pressing responses in a profoundly retarded, crib-bound child.

METHOD

Subject

Phil had been the subject of a previous experiment (Meyerson *et al.*, 1967) in which pilot work with tactual stimulation was carried out. He was 7 yr old and small for his age (height: 39.5 in.; weight: 27 pounds). He was blind, at least partially deaf, had no speech or language, was not toilet trained, could not feed himself, and could not walk. Phil was taken out of his crib only briefly while his sheets were changed but he never interacted with the other children at these times. He was usually ignored by the attendants except for feeding (by bottle) and diaper changing. The subject had a repertoire of stereotyped "self-stimulatory" behaviors that was quite large and seemed to take up virtually his entire waking hours. These included slapping his face; hitting himself on the chin, ears, and side of the head; jabbing his teeth and sucking on his fingers or his whole hand. In addition, Phil banged his head, teeth, or a foot against the bars of his crib with such intensity that the noise could be heard at the far end of the nursery approximately 30 ft away. Other less injurious behaviors consisted of the subject's flipping his lips

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with fingers, scratching the sheets, and repetitive rocking on his back.

Phil was physically restrained occasionally when his fingers and hands became so lacerated from sucking, chewing, and gnawing on them that they were open to infection. During the course of this research, however, he was not restrained, receiving medication, or involved in any other therapy.

Apparatus

A removable leather-padded oval lever, 8.5 by 5.5 in. in size was placed in Phil's crib. Wire leads from the lever microswitch were connected to the appropriate electro-mechanical scheduling equipment used to count responses and to control the operation of the vibrator. The vibration was produced by an industrial vibrator (Model DVE-10 Martin Engineering Company, Salt Lake City) mounted on the underside of the springs of Phil's crib. Lever presses were recorded on a Gerbrands cumulative recorder and tallied on a counter.

Procedure

The padded lever was mounted on the side of Phil's crib and frequency of lever pressing was recorded 24 hr per day. During the seven-day baseline period, responses did not produce vibratory stimulation nor result in any consequence. After a stable level of pressing was reached, the vibration condition was introduced and was in effect for 21 days. Each lever press then produced 6 sec of vibration if the vibrator was not already operating; a response during vibration had no effect but was recorded. For a subsequent period of 23 days the vibrator was disconnected from the lever, and lever-pressing frequency under extinction conditions was recorded.

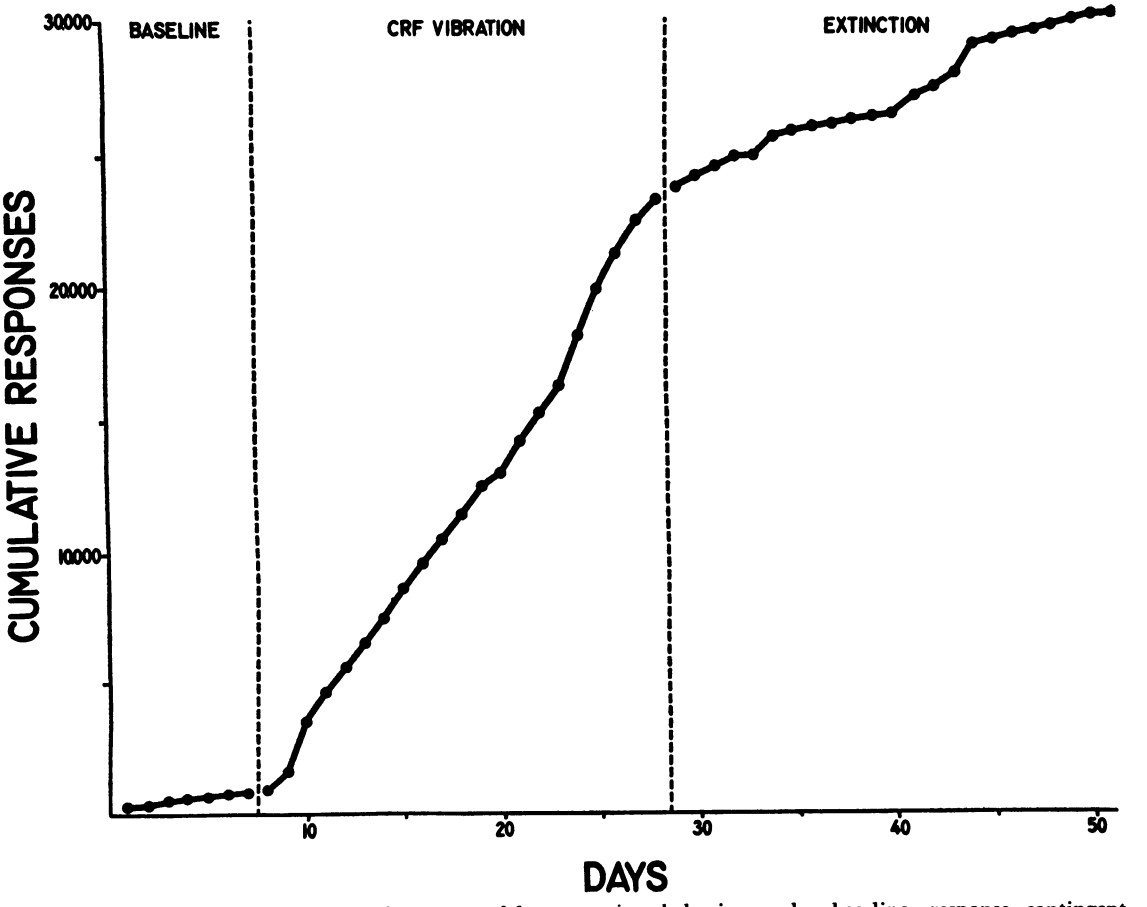

Fig. 1. Cumulative record showing frequency of lever-pressing behavior under baseline, response contingent vibration, and extinction conditions. Sessions were run 24 hr per day.

RESULTS

Results are shown in Fig. 1. It will be seen that a very low rate of responding occurred during the seven-day baseline condition when lever pressing had no consequences. The mean number of responses under this condition was 135 per day with a range of 30 to 300 per day. Most responding occurred in the early afternoon: none occurred before 1:00 p.m. or later than 9:00 p.m.

During the following 21 days, in which 6 sec of vibratory stimulation was contingent on each lever press, the mean number of responses daily was more than 1000 with a range of 700 to 2000 responses per day. In addition, responding now occurred over a much greater part of Phil's waking hours: he frequently began pressing before 8:00 a.m. and on several occasions did not stop until after 10:00 p.m. Responding, of course, was not uniformly distributed over these hours. There were periods lasting several hours in which Phil pressed the lever at a high rate or did not lever press at all. The latter usually followed the former. On observation during a lever-pressing burst, he was seen typically to press the lever lightly with his hand or kick it with his foot and then remain motionless or occasionally giggle while the vibrator was on. He would then press the lever again as soon as the vibration stopped.

The decrease in lever-pressing frequency under extinction conditions was striking. During the first week of extinction, responding dropped to an average of 400 lever presses per day, and during the last seven days of extinction, the frequency was almost identical to the operant level.

DISCUSSION

It appears evident that vibration was an effective reinforcer for lever pressing over a relatively long period of time with no noticeable decrement in effectiveness.

Further research is needed to determine for what other subjects and behaviors vibration may be an effective reinforcer. Several lines of further development seem feasible: (1) Exploration of the range, combinations, and permutations of vibratory-tactual stimulation, in various temporal arrangements, would be desirable to determine the effectiveness of each pattern as a reinforcer. (2) For retardates who may be described as vegetative or grossly deteriorated, vibratory self-stimulation contingent on lever pressing, by means of apparatus built into cribs, might have advantages over present conditions of sensory isolation which appear to lead to self-injurious self-stimulatory activities. (3) If vibration is a strong and durable reinforcer for human organisms generally, and handicapped ones in particular, a simple behavior generated with vibratory reinforcement might be considered a first approximation to enlarging a child's repertoire to include more complex and useful forms of behavior and to bring those behaviors under the control of more flexible kinds of reinforcement.

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