H A R V A R D M E D I C A L S C H O O L

Department of Psychiatry

B E H A V I O R R E S E A R C H L A B O R A T O R Y

Metropolitan State Hospital, Waltham, Massachusetts

STATUS REPORT 5

Period Covered: 1 September 1955 - 15 May 1956

Research under Contract

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OFFICE OF NAVAL RESEARCH, U.S. NAVY

Contracts N5-ori-07662 and Nonr-1866(18)

Project Number:	Contracts N5ori-07662 and Nonr-1866(18) sponsored by the Group Psychology Branch, Office of Naval Research.
Project Title:	New Techniques of Analysis of Psychotic Behavior
Project Directors:	B. F. Skinner, Professor of Psychology, Harvard University. Harry C. Solomon, Professor of Psychiatry, Harvard Medical School.
Report Prepared By:	Ogden R. Lindsley, Research Fellow, Harvard Medical School.
Period Covered:	1 September 1955 to 15 May 1956.
Previous Reports:	Status Report I, 30 November 1953 Status Report II, 31 May 1954 (Annual Technical Report 1) Status Report III, 31 December 1954 Status Report IV, 31 August 1955 (Annual Technical Report 2)

Change of Report Terminology:

Since our report titles are not in accord with the titles suggested by the Office of Naval Research, we are altering our terms. Status Reports II and IV summarized the results of the first and second years' work and should be titled "Annual Technical Report" 1 and 2, respectively. Annual Technical Report 3 (summarizing the work of the third year) will be dated 15 November 1956 to comply with the requests of the Group Psychology Branch. Hereafter our Status Reports will be dated 15 February, 15 May, and 15 August and will be sent only to the Office of Naval Research (5 copies). Our Annual Technical Reports will be dated 15 November and will be mailed to our complete distribution list. Our Interim Technical Reports will appear when completed and will be mailed to the complete distribution list.

Publications:

1. Lindsley, O. R., & Skinner, B. F. A method for the experimental analysis of the behavior of psychotic patients. Amer. Psychologist, 1954, 9, 419-420. (Abstract).

2. Skinner, B. F., Solomon, H. C., & Lindsley, O. R. A new method for the experimental analysis of the behavior of psychotic patients. J. Nerv. Ment. Dis., 1954, 120, 403-406. (Abstract and discussion Interim Technical Report No. 1).

3. Skinner, B. F. Critique of Psychoanalytic Concepts and Theories. Scientific Monthly, 1954, 79, 300-305.

4. Azrin, N. H., & Lindsley, O. R. The reinforcement of cooperation between children. J.abnorm.soc. Psychol., 1956, 52, 100-102. (Interim Technical Report No. 2).

Additional Support:

In addition to the contract with the Office of Naval Research, the laboratory has been supported by research grant M-977 from the National Institute of Mental Health, of the National Institutes of Health, Public Health Service, since 1 December, 1954. Work done under the Public Health grant is not included in this report.

GENERAL STATEMENT

The laboratory was expanded from 2 experimental rooms, a shop and office to include 11 experimental rooms, 2 apparatus areas, a shop, 2 toilets, a patients' lounge, a treatment room and an office. By the end of March the patients' lounge, treatment room and 5 new experimental rooms were in operation. Public Health Service funds were used for this expansion. The two original experimental rooms (constructed and operated for ONR) were operated throughout this construction period. We lost only one afternoon's data in room 2 while it was shortened to provide an entrance to the new apparatus area. Patients were responding in the room the next day while the mortar was still wet. Our ONR reports will continue to report the research carried out in these two rooms. Experiments conducted in the new rooms will be reported in the PHS Progress Reports.

STATUS OF WORK IN PROGRESS

1. Observations on New Patients:

Our sample of adult psychotics has been increased from 36 to 46 patients. Three of these were female. To date we have recorded approximately 7,000 patient-hours of data.

2. Quantification of "Psychotic" Properties of Records:

We have been automatically recording the total number of inter-response times greater than 10 seconds (#IRT>10") that occur during each hour-long experimental session and also the sum of the time spent in inter-response times greater than 10 seconds (ΣIRT>10"). These measures of the frequency and total of the durations of the relatively long pauses in responding are very sensitive to changes in experimental variables as well as to indications of the "degree of distraction", or "psychosis" in a one-minute variable-interval record. We are currently going over old cumulative records with a grid to reclaim these measures from experimental records obtained before the automatic recording was developed. When the records have been measured we can compare all the patients we have studied to date with our normal records with respect to these two measures of extreme psychosis.

3. Effect of Food Reinforcement:

We have briefly tried food reinforcement with all of the patients who respond at very low rates of response. It produced no striking increases in rate. Until we can arrange food-deprivation schedules we do not plan to extensively use food with the patients who do not respond at high rates for other reinforcers. Since food produces no greater rate of response in the patients who respond at high rates for the other reinforcers and since bits of food are so messy to dispense, we are indefinitely postponing this aspect of our research.

4. Effect of Chlorpromazine:

To date 6 patients have been studied for over 10 hours each on a one-minute variable-interval schedule of reinforcement while they were receiving 150 to 400 mg/day dosages of thorazine. We have little to add to our previous observations. It is clear that in most cases the drug does not alter the variable-interval rate of response under these conditions. We will probably not continue this research until we can study patients with more complex experimental behavior (ie: fixed-interval schedule of reinforcement, discrimination, differentiation, conditioned suppression, etc.).

5. Effect of Insulin Coma:

Since the insulin patients are usually acute patients

and have been in the hospital only a short time, we cannot record a very long base-line of behavior before they receive insulin. Also, if they recover, they are discharged almost immediately; post-insulin control sessions are thus extremely limited. We have indefinitely postponed the investigation of the effects of insulin shock until arrangements can be made which will permit pre- and post-insulin control observations so that our studies can be conclusive. Research without adequate controls is more often misrepresentation than illumination. Our planned investigation of the effects of electro-shock therapy await similar arrangements for pre- and post-therapeutic control periods.

6. Effect of Lysergic Acid on Normal Subjects:

The research project which was directed by Dr. Robert W. Hyde to investigate the effects of Lysergic Acid on normal subjects has terminated. Therefore, our collaboration with him on this particular investigation has also terminated.

7. Increased Duration of Experimental Session:

Recently patients have stayed in one experimental room for 4 continuous hours without leaving. So far only a few patients have done this, but sessions of 4 hour duration appear to be possible with the majority of our patients. A decrease in the rate of response towards the end of the four-hour session (indicating fatigue or satiation) is noticeable with some patients but other patients show no decrease in rate. We plan to try even longer sessions in the near future.

8. Intensive Analysis of Individual Patients:

We are still conducting long-term, intensive investigations with a few patients. The rate of response of our first patient (P-1) steadily increased in a cyclical fashion for over 250 daily sessions. In the course of this increase he was placed on parole. Another patient (P-36) appears to be going through a similar process. We have recorded about 100 sessions so far and are also rating his ward behavior on the Lucero-Meyer Behavior Scale. Perhaps the earlier curve of P-1 can be reproduced with P-36.

Another patient (P-23) has responded for over 200 hours (one hour per day) in extinction (no reinforcement) without any

decrease in rate of response. We are currently attempting to determine whether this is due to a general inability to extinguish, or to some source of hidden reinforcement in our experimental situation. We also intend to slow down his rate of response by reinforcing responses made after long pauses (Differential reinforcement of low rates - DRL). If this is possible it will demonstrate the important point that even though the patient's rate does not drop in extinction, his responding is still controlled by reinforcement presentations. It is possible that this patient responds to the presentations of reinforcement, but does not respond to the failure to present reinforcement. In other words he can modify his behavior and adjust to the presentation of reinforcers, but when no longer reinforced he continues responding indefinitely (his "extinguisher" is broken). If this proves to be the case, the patient is very important because: (1) he typifies a clear-cut behavioral anomaly which might help define a behavioral syndrome. Such a functional deficit is the kind of behavioral symptom we are seeking; and (2) the general psychological theories which state that acquisition and extinction are just two aspects of the same process will be embarrassed if it is demonstrated that an individual exists with only one aspect of this "single process".

One patient (P-35) has shown long term (60 to 70 day) cycles in rate of response, effects of fixed-ratio schedule, and ward behavior ratings. We are studying this patient's behavior intensively in order to correlate these three measures at the different points of the patient's "psychotic cycles".

9. Increased Motivation:

We have decided to delay the use of substantial food until we can arrange mild food deprivation. However, we have been able to increase some of the low rates of response by using pure tones as aversive stimuli.

10. Behavior Data Card:

Initially we wrote important observations and counter readings, etc., directly on the cumulative records of each experimental session. Since the foot-long cumulative records are so troublesome to handle, later statistical analysis was very difficult. Also, as the research progressed, more and more information was being written on each record, until the final result was very confusing. An 8 x 5 inch card was printed

with a form developed to include descriptions of the patients' daily clinical examination, medications, behavior on leaving the ward, in the patients' lounge, going to the experimental rooms, and returning to the lounge. The card is printed so that the experimentor need only circle the appropriate descriptive items. The other side of the card has printed items describing the behavior in the experimental rooms and spaces for writing the different counter and timer readings that we record. This card has greatly facilitated our data collecting and processing. The next step, of course, is an IBM card, but our printed cards contain much more than the 80 units of information stored on one IBM card.

11. Development of Precise Manipulandum:

In free operant conditioning, the device that the organism manipulates defines the response that is conditioned, and the lawfulness of the data collected. Therefore the design of this manipulandum is extremely important. It should be constructed so that its rate of operation will be stable under constant experimental conditions, and the limits of its rate of operation should not be set by the physical properties of the device. The manipulandum should also be indestructable, easily serviced and available in standard form so that different laboratories can collect similar responses. Early in the course of free-operant research a suitable precise manipulandum should be developed. We have developed such a device which is now commercially available and which is being used by three other laboratories. It will be described in detail in Annual Technical Report 3.

PLANS FOR FUTURE WORK

We plan to continue the following phases of our research.

1. Increase sample of patients.
2. Analysis of inter-response times greater than 10 seconds.
3. Intensive analysis of individual patients.

4. Exploration of different reinforcers.

5. Increased duration of experimental session.

We plan to initiate the following investigations:

6. Differential reinforcement of low rates: (for reasons described above).

7. Analysis of the per cent inter-response times immediately after reinforcement: This should provide a quantification of one of the "ratio-effects" (the tendency to pause immediately following reinforcement). This effect does not occur in the behavior of some patients on ratio schedules; other patients develop it slowly. We would like to quantify this effect since it differentiates between our patients.

8. Analysis of "responding through reinforcement": During the 5-second conditioned reinforcement period, when the room light is out and the magazine light on, responses are not reinforced or recorded on the cumulative record. The responses in this period are recorded on counters though. Some patients have not learned to stop responding during this period, even though they have undergone 300 experimental sessions or approximately 18,000 periods of conditioned reinforcement. This is actually an S-delta type discriminative stimulus as well as a conditioned reinforcer. An analysis of the responding during this period will give some data on the discriminative ability of our different patients.

9. Analysis of withdrawals and refusals: Sometimes a patient will refuse to leave the ward or to enter the experimental rooms, or will knock on the door and withdraw from a room during the experimental session. We have recorded this information and plan to analyze it for differences in the frequency of refusals and withdrawals related to the nature of the reinforcement, the type schedule of reinforcement, and individual differences among patients.