LEARNING AND PERCEPTION IN PSYCHOTICS, NEUROTICS AND NORMALS

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We, the undersigned members of the Committee appointed by you to examine the thesis submitted by Mr. Franklyn Hoover Farley in partial fulfillment of the requirements for the degree of Master of Arts, beg to report that we consider the thesis satisfactory both in form and content.

Subject of Thesis: Learning and Perception in Psychotics, Neurotics and Normals.

We also report that Mr. Farley has successfully passed an oral examination on the general field of the subject of the thesis.

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There have been a number of attempts in recent years to bring theories and techniques in learning, motivation and perception to bear on the psychology of personality. Representative of these attempts is the work of Bruner and Krech (1950), Dollard and Miller (1950), Eysenck (1957), Eysenck, Granger and Brengelmann (1957), Mednick (1958), McClelland (1953), McReynolds (1961), Mowrer (1950), Pascal (1959), Rotter (1954), Sears (1951), Shoben (1949), and Witkin et al (1954). Some of these attempts have been largely theoretical with little consequent research, while others have involved theorizing and a great amount of experimental investigation. The assumption underlying these integrative attempts has been that these areas, e.g., learning and personality, are related in important ways and that an understanding of each can be gained by examination and investigation of the other.

One of the most theoretically parsimonious and experimentally productive of these integrative programs has been that of Eysenck (1957). He has attempted to apply a behavior theory, modified from that of Pavlov (1941) and Hull (1952), to personality phenomena. Central to Eysenck's analysis has been the implication of neural excitatory-inhibitory processes as underlying certain personality phenomena. His general postulate relating to individual differences is, that:

> "Human beings differ with respect to the speed with which excitation and inhibition are produced, the strength of the excitation and inhibition produced, and the speed with which inhibition is dissipated. These differences are properties of the physical structures involved in making stimulus-response connections." (1957, p. 114)

In particular, he has implicated the Hullian variable of reactive inhibition (I_R), Hull (1952), in his experimental investigation of personality. The notion of individual differences in central excitatory-inhibitory processes is Pavlovian. Hull's inhibitory constructs were nomological without reference to individual differences. Though Hull conceived of I_R as a peripheral phenomenon, Eysenck has modified this to rule out peripheral effects. The resulting construct Becker (1961) has more appropriately labelled reactive cortical inhibition. Ammons and Ammons (1951), Kimble (1952) and Humphries (1963) have presented evidence that reactive inhibition is a central rather than a peripheral phenomenon, a central negative drive state. Eysenck accepts Jones (1958) modification of Hull's analysis of I_R as a negative drive variable.

Eysenck has attempted to account for certain personality characteristics in terms of I_R parameters. In general, persons with extraverted patterns of behavior (and who, if neurotic breakdown occurs, evidence hysterical symptoms) are postulated to have a rapid growth of I_R, to develop higher levels of I_R, and to dissipate I_R more slowly. Persons with introverted patterns of behavior (and who, if neurotic breakdown occurs, evidence dysthymic symptoms) are postulated to develop I_R slowly, generate lower levels of I_R, and to dissipate I_R quickly. Recently, Eysenck (1961) has made an attempt to account for some aspects of psychotic behavior within the framework of general learning theory, with an emphasis on certain postulated differences in I_R parameters between psychotics and neurotic or normal subjects.

Eysenck's Analysis of Psychotic Behavior in Terms of I_R

The theoretical analysis that Eysenck (1961) has offered is aimed principally at accounting for the generalized slowness or retardation, which is characteristic of psychotic behavior. One common feature of test results of psychotic groups when differentiated from the performance of normal and neurotic groups seems to be a generalized pattern of slowness in cognitive, perceptual and motor functions (Babcock, 1933; Payne, 1960; Craig, 1960). The usual clinical hypothesis for this behavior is in terms of a low level of drive. Eysenck, however, proposes that the generalized slowness of the psychotic is due to an abnormally slow rate of dissipation of I_R.

Eysenck begins his argument by accepting the basic Hullian equation $P = f(H \times D)$, in which performance (P) is a multiplicative function of habit (H) and drive (D). At any given time the drive state of the organism is determined by the value of the positive drive D, but also by the value of the negative drive (I_R) or reactive inhibition (Jones, 1958). Eysenck calls the resultant drive state ($D-I_R$) effective drive, symbolized $\overline{D}$. The equation would now read $P = f(H \times [D-I_R])$.

With this simple model, Eysenck suggests two hypotheses to account for psychotic retardation.

(i) lower D in psychotics

(ii) lower $\overline{D}$ in psychotics due to a slower rate of dissipation of I_R.

As I_R builds up fairly rapidly, even in normal subjects, Eysenck suggests that the postulated lower $\overline{D}$ in psychotics would unlikely be due to a rapid build up of I_R, and more likely to a slower rate of dissipation of I_R.

To test these two hypotheses, one must be able to measure reactive inhibition and drive. A widely used measure of the former is the recovery of performance (reminiscence) after a rest introduced into a period of massed practice of sufficient length to allow I_R to accumulate. Eysenck (1961) suggests that reminiscence may also be used as a measure of drive. Reactive inhibition during massed practice will increase to the point at which it equals D (Kimble, 1950).

At this point, $\bar{D} = D - I_R = 0$, which Kimble asserted would result in a brief cessation of performance or involuntary rest pause (I.R.P.) during which I_R will dissipate. When enough I_R has dissipated to give $\bar{D}$ a large enough value (that is, when H x D exceeds threshold), performance will be initiated, I_R will accumulate again, another I.R.P. will occur and so on. As reminiscence has here been interpreted as a function of I_R, then under conditions of massed practice sufficient to establish a critical level where $D = I_R$ with consequent I.R.P.'s, reminiscence would also be a function of drive (Eysenck and Maxwell, 1961; Eysenck and Willett, 1961; Willett and Eysenck, 1962).

Both the above hypotheses put forward to account for psychotic retardation would lead to the prediction that psychotics would show little or no reminiscence where conditions are such that it would be evidenced in normal or neurotic groups. However the first hypothesis, attributing psychotic retardation to a lack of positive D, would predict low or non-existent reminiscence regardless of the length of interpolated rest during massed practice. On the other hand, the second hypothesis relating psychotic retardation to an abnormally slow rate of dissipation of I_R would predict low or non-existent reminiscence after short rest periods, but if the interpolated rest period was to be sufficiently extended, e.g., 24 hours, then the psychotics would be expected to show marked reminiscence effects. Eysenck suggests that it might be possible that both hypotheses are correct. Thus assuming psychotics to have a slow rate of I_R dissipation, one would expect some reminiscence after long rest periods but not after short, e.g., 10 minutes. And assuming psychotics to have low drive, one would expect less reminiscence for psychotic subjects than for normals or neurotics.

Outline of the Present Study

Eysenck (1961) reported some preliminary unpublished studies from his own laboratory which he interpreted as lending support to the hypothesis of slow rate of I_R dissipation in psychotics. One study by Ley (cited by Eysenck, 1961) found reminiscence in the rotary pursuit performance of psychotic males after 24 hours but not after 10 minutes. Ley also tested two groups of 10 normal subjects in the same way, with rest pauses of 10 minutes and 24 hours respectively. He found reminiscence after both rest intervals, but that the amount after 24 hours was somewhat lower than after 10 minutes. Psychotics after 24 hours showed greater reminiscence than either of the two normal groups. Rachman (cited by Eysenck, 1961) using two groups of chronic schizophrenic males, 10 subjects per group, on the pursuit rotor, found one group with a rest interval of 24 hours showed a mean reminiscence score significantly superior to the other group which had been given a 10-minute rest interval. Rachman did not use any normal subjects in his study. These studies seem to lend support to the hypothesis. Eysenck, however, does not provide enough information in his citation to evaluate this point. In particular, there are no data given regarding comparability of the groups on variables other than reminiscence, chronicity of the patient groups, procedures of sample selection, and sample characteristics.

The present study was undertaken in order to examine Eysenck's hypothesis, using normal, neurotic, acute and chronic psychotic subjects. It was also proposed to extend the analysis to tasks other than rotary pursuit, namely a printing task and a measure of satiation, the Archimedes rotating spiral (SVA). With regard to the latter, Eysenck (1955), Duncan (1956), and others have drawn attention to the close similarity of Hull's reactive inhibition and Köhler and Wallach's concept of "satiation" in perception. Satiation effects are usually inferred by measuring the effects of stimulation on subsequent perceptual response. Reactive inhibition is usually inferred by measuring the effect of making a response on subsequent motor responses. Eysenck suggests that reactive inhibition and satiation are examples of similar cortical inhibition processes. Eysenck and Eysenck (1960) have suggested that the SVA may have special importance in being related to learning parameters. They propose that 'massed' trials on the spiral followed by a sufficient rest interval will elicit a reminiscence effect analogous to that found in some motor learning. The presumptive occurrence of post-rest reminiscence in the duration of SVA following massed trials suggested a perceptual test of the hypothesized slow rate of dissipation of inhibition in psychotics, with perceptual reminiscence being measured after short, e.g., 10 minute, and long, e.g., 24 hour, rest intervals.

To attempt to measure the motivational state (drive level D) of the psychotic and other groups studied, scores were obtained for tests of persistence at a physical task (maintained hand grip), rate of response in tapping, and Manifest Anxiety scores (Taylor, 1953).

Eysenck (1961) has suggested that persistence may to some extent be a measure of drive. He cites evidence of greater persistence of psychotics over neurotics and normals on a mental task as evidence against a low drive interpretation of psychoticism. He does not limit his suggestion to only one type of persistence, e.g. ideational, as a measure of drive. Therefore, in view of the difficulties involved in measuring mental persistence in abnormal subjects (Payne, 1961), a task of physical persistence was selected.

Rate of response in tapping was available as a measure of drive on the assumption that group differences in habit strength on such a task would be at a minimum, so that a major determinant of response rate would be D, even though as pointed out by Malmo, Shagass and Smith (1951) purposive acts, being largely voluntary, are less regularly associated with emotional arousal.

The Taylor Manifest Anxiety Scale (MAS) was selected as it has been extensively utilized as a measure of D in testing predictions from Hullian theory (Taylor, 1956).

Research Hypotheses

In specific terms, the following research hypotheses were proposed:

Psychotic patients will evidence more reminiscence during long rest intervals (24 hours), than during short rest intervals (20 seconds or 10 minutes). Normals and neurotics will also show reminiscence during 24 hours, but the proportion of change in performance from short rest reminiscence to long rest reminiscence will be greatest in the psychotic subjects.

Psychotic subjects will be characterized by lower D than neurotics or normals and will have lower MAS, tapping and physical persistence scores.

Method

Subjects

Subjects were classified as psychotic, neurotic or normal. Four groups of subjects were tested.

Group I consisted of 20 male psychotic subjects drawn from the chronic wards of a large provincial mental institution. The mean chronicity of this group was 14.9 years (SD = 8.4), based on date of last admission. All patients except one had been continuously hospitalized for at least six years prior to testing. One patient had been continuously hospitalized for a period of two years.

Group II consisted of 21 acute psychotic subjects (9 male, 12 female) drawn from the psychiatric ward of a teaching hospital.

Group III consisted of 39 neurotic subjects (17 male, 22 female) drawn from the psychiatric ward of a teaching hospital.

Group IV consisted of 30 normal subjects (16 male, 14 female) drawn from the non-professional employees and nurses of a teaching hospital, together with students attending university.

The patients were assigned to groups according to the final diagnosis of the consultant and resident psychiatrists concerned. Subjects were excluded from the study whenever there was disagreement as to differential diagnosis of neurosis or psychosis, but not if the two psychiatrists agreed as to whether the subject was neurotic or psychotic.

Patients were accepted for the study only if they were effectively drug-free, that is, if in the opinion of a psychiatrist their ability or cooperativeness was not impaired by the medication (see Appendix B). Patients were not accepted for the study if they were on a treatment regime, or showed signs of organic impairment (as reported by the psychiatrist concerned).

For information regarding age and intelligence see Tables I and II of the results section.

All normal subjects and most of the patients were tested in the same room, under the same conditions of illumination. The group of chronic psychotic patients, however, was located in a provincial mental hospital, and therefore was tested in a different room from the other groups. The testing room in this instance, however, was of similar size, and all test apparatus was placed in the same relative location. Task procedures and instructions were the same for all subjects, and one experimenter was used throughout the study. Because the scheduling of many subjects and tasks had to be fitted into another research project, some subject and task attrition occurred, in that not all the subjects performed on all the experimental tasks. (The _n_ associated with each task is given in the applicable table in the results section).

Apparatus and Procedure

The tasks used were the pursuit rotor, a symbol printing task, Archimedes rotating spiral, tapping, hand persistence, selected personality questionnaires, and a vocabulary measure of intelligence.

Rotary Pursuit.[1] The rotary pursuit procedure involved five minutes massed practice, ten minutes rest, five minutes massed practice followed twenty-four hours later by a block of ten minutes massed practice. This paradigm was identical for each subject. The selection of five minute practice periods with a ten minute rest was based on the review by Jones (1961) indicating this schedule to be the most efficacious in bringing out relationships between personality factors and the learning parameters of rotary pursuit. The twenty-four hour interval was chosen in line with Eysenck's (1961) suggestion that after 24 hours psychotics would show strong reminiscence effects. Furthermore, any longer period would have been effectively impossible to schedule as subjects were generally available on a strictly short-term basis.

Performance on the pursuit rotor was measured by percentage-time-on-target, ten second intervals being used.

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[1]The author wishes to express his appreciation to Dr. N. McK. Agnew, Psychol. Res. Center, Saskatoon, for the generous loan of this apparatus.

The subject was instructed in the procedures involved, but was given no preliminary practice. The experimenter demonstrated the technique. The subject stood upright before the rotor apparatus, gripping the stylus in his preferred hand. Recording of performance was made by the experimenter situated on the right side of the subject out of his direct line of vision. No recording apparatus could be seen by the subject during his performance trials.

Symbol Printing.[2] The symbol-printing task was made up of four symbols which the subject was to repetitively copy by pencil in a prepared booklet. The procedure involved six thirty-second massed trials followed twenty-four hours later by two thirty-second unspaced trials. The selection of this paradigm was based on the work of Agnew (1958), who was able to demonstrate reminiscence with an inverted alphabet printing task under similar conditions. In the present study each subject was also given initial familiarization with the task by printing three rows of the symbols without overt timing or speed instructions. The time taken to complete this printing was covertly recorded by the experimenter. The six massed performance trials were given with the timing being done overtly by the experimenter.

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[2]This task was designed by Dr. W. J. Craig, Psychiatric Research Unit, University Hospital, Saskatoon, as part of a larger project under his direction. The author wishes to express his indebtedness to Dr. Craig for the generous loan of this task.

The subject sat directly across a desk from the experimenter. To the right of the experimenter on the desktop, an electric laboratory clock was located; approximately halfway between the experimenter and the subject there was a small stand with a card displaying the four symbols, which faced in the direction of the subject. Covert timing by the experimenter could be accomplished using an electric wall clock situated behind the subject and in the experimenter's line of vision. The experimenter read the task instructions to the subject. Each subject printed with his preferred hand.

Archimedes Spiral After-Effect. The Archimedes spiral consisted of 4 1/4 turns about the center, and was painted in black on a white ground. The experimental procedure for the SVA was the same as for the rotary pursuit, in that it was scheduled for five minutes of "massed" trials, ten minutes interpolated rest, five minutes of massed trials followed twenty-four hours later by ten minutes of massed trials. The spiral apparatus rested on a desktop, the center of the disc being 45 inches from the floor. The subject sat on a chair, 17 1/2 inches high, situated six feet directly in front of the disc. The experimenter sat behind the apparatus to program and record the trial sequences. The room was in darkness except for the light surrounding the spiral disc. Dark conditions were accomplished by a heavy curtain fitted against the window, and by the elimination of all artificial light sources. The subject was instructed in the procedures involved and was given a demonstration of the after-effect phenomenon using a forty-five second contraction stimulation time. This was done to detect and eliminate from the study those subjects who either did not report experiencing the after-effect, or those who could not understand the instructions. Most of those eliminated were members of the chronic psychotic group. When viewing the spiral, the subject sat erect against a table, with his hands folded and resting on the table top. The procedure for the experimenter when operating the apparatus involved starting the rotation, timing the trial length, stopping rotation at the end of each trial, initiating rotation again when the subject signalled cessation of the after-movement, recording the length of the reported after-effect, and repeating this procedure for each trial. The experimenter was in relative darkness to the subject, and could observe him from behind the apparatus. The expansion after-effect was used because of information supplied the writer by Costello (1962) that in Eysenck's original study (1960) of massed trials with the SVA, the expansion after-effect had been employed, though this was not reported in that paper. The stimulation time per trial was sixty seconds. Holland (1958) and Holland and Eysenck (1960) have presented evidence that asymptotic values of the length of SVA as a function of length of stimulation occur somewhere above 100 seconds per trial, whereas Dickinson (1959) has found little increase in duration of SVA beyond thirty seconds stimulation time. Although these studies do not agree on the effect of this parameter, the reason may lie in sample and/or task differences. In view of these findings it was thought that an intermediate value might be taken, e.g., sixty seconds stimulation time. This would also conform neatly to a five-minute massed trial paradigm as was done with the rotary pursuit, i.e., both tasks involved five one-minute trials. Furthermore, the studies of Eysenck (1960) and Costello (1961) on massed trials on the rotating spiral have used one-minute stimulation times. By duplicating this aspect of their procedure, comparisons between their data and those of the present study would be facilitated. The speed of rotation used in the present investigation was 100 r.p.m., following the work of Dickinson (1959) who found that duration of after-effect was greatest at that speed. Holland (1958) found that between rotation speeds of 50-150 r.p.m. no change in SVA duration was discernible. Eysenck has used 100 r.p.m. routinely. This speed, then, was selected in the absence of any compelling contraindications.

Hand Persistence. Persistence at a task, suggested by Eysenck (1961) as a measure of drive, was calculated as the amount of time in seconds that a subject would keep the pointer of a hand dynamometer at a given point. The procedure involved four trials of strength on the hand dynamometer for each subject in the order RLLR or LRRL (R - right hand; L - left hand). Two-thirds of the mean strength of each hand was calculated, and the subject was given two trials of persistence at this setting (Costello and Eysenck, 1961). He was instructed to keep the pointer as long as possible at the right hand setting with his right hand, and at the left hand setting with his left hand. The duration of persistence was timed with a stop watch. The mean of the two persistence trials was taken as the subject's persistence score.

Alternation Tapping (King, 1954). The tapping test, for which it was assumed that performance would largely be a function of drive, required the subject to tap with a steel stylus on two separate steel plates, alternating between plates after each tap. The plates were 4 inches x 4 inches large, mounted on a board 13 1/2 inches apart. The alternation tapping procedure involved five thirty-second trials each separated by five seconds rest. The apparatus was situated between the experimenter and the subject on an otherwise clear desktop. The experimenter timed the trials with a stop watch. At the termination of each thirty-second trial, the experimenter recorded the cumulative count from the electric counter on the back of the tapping apparatus. The subject was given no practice before performing aside from briefly familiarizing himself with the arm movement required. The subject sat close to the desk, and adjusted the distance between the apparatus and himself to suit his arm length. Before each subject was run, the two steel plates and the steel tip of the stylus were cleaned with alcohol to ensure optimum conditions for electrical contact.

Paper and Pencil Tests. The Taylor Manifest Anxiety Scale (MAS), the Maudsley Personality Inventory (MPI) (Eysenck, 1959), and the Mill Hill Vocabulary Test (Raven, 1948) were administered to all subjects in the study.

Instructions for the experimental tasks were read by the experimenter, as it was not possible to record them for presentation. Instructions on a very few occasions had to be slightly amplified to effect communication with some patients.

Details as to apparatus construction, task instructions, etc., can be found in Appendix A.

Results

Group differences on the various experimental tests were compared by Duncan's Multiple Range Test (DMRT) (Duncan, 1955) using a 5% level of confidence. Where t-tests were used, two-tailed tests of significance were made.

Table I indicates the comparability of the groups in age. It is evident that the groups differ markedly on this variable. Further analysis suggested, however, that these differences had little if any effect upon the dependent variables used in the study. Thus correlations between age and the variables of reminiscence and performance on the experimental tasks were uniformly low, with, however, mean tapping speed reaching a significant correlation of -.36 ($p < .05$) in the normal group only, and the symbol printing reminiscence score after 24 hours attaining a significant correlation of -.38 ($p < .05$), also in the normal group.

Table II indicates the comparability of the groups in intelligence. Here, again, significant differences are evident. That these differences had little if any effect upon the dependent variables used in the study is indicated by the absence of any significant correlations between the intelligence scores and the dependent variables.

Table I

MEAN AGE (YEARS) AND STANDARD DEVIATIONS OF EXPERIMENTAL GROUPS

	Chronic Psychotic Male N = 20	Acute Psychotic Male N = 9	Neurotic Male N = 17	Acute Psychotic Female N = 12	Neurotic Female N = 22	Normal Male N = 16	Normal Female N = 14
MEAN*	47.90	40.89	35.59	32.92	31.36	30.37	27.36
SD	9.80	11.55	11.53	9.92	9.32	12.00	9.93

*Mean scores significantly different, $p < .05$ (DMRT). Groups which are underscored by the same line were not significantly different from each other but were different from all groups which are not so underscored.

Table II

MEAN INTELLIGENCE SCORES (MILL HILL VOCABULARY TEST) AND STANDARD DEVIATIONS OF EXPERIMENTAL GROUPS

	Chronic Psychotic Male N = 20	Neurotic Female N = 22	Neurotic Male N = 17	Acute Psychotic Male N = 9	Acute Psychotic Female N = 12	Normal Male N = 16	Normal Female N = 13
MEAN*	33.35	46.72	47.44	49.11	50.58	53.71	57.34
SD	10.15	9.68	11.47	8.11	9.42	9.94	8.15

*Mean scores significantly different, $p < .05$ (DMRT). Groups which are under-soored by the same line were not significantly different from each other but were different from all groups which are not so underscored.

Rotary Pursuit. The rotary pursuit data were scored for reminiscence using the method employed by Eysenck (1960) in which the mean of the last three pre-rest 10 second trials is subtracted from the first post-rest 10 second trial. The significance of the reminiscence scores was assessed by a t test for correlated means. The results of this analysis are shown in Table III.

It can be seen that very few of the groups showed significant reminiscence effects using Eysenck's method of measurement. The normal subjects clearly displayed reminiscence after the 10 minute rest, but not after 24 hours. However, reminiscence in the chronic psychotic group was approaching significance in the 10 minute rest condition. The lack of 24 hour reminiscence in the psychotic groups clearly does not support the experimental hypothesis. It is also of interest to note that a retest of the chronic psychotic group after seven months yielded a mean of 19.18 and SD of 51.07, this reminiscence value not being significant ($t = 1.45$). Retest reliability of the rotary pursuit performance over seven months was found by product-moment correlation to be 0.83. During the seven month period two of the patients had been briefly given mild medication but none of them had undergone somatotherapy or psychotherapy of any sort. All the patients were medication free at the

Table III

MEAN GROUP REMINISCENCE SCORES (PERCENTAGE TIME ON TARGET), STANDARD DEVIATIONS AND t VALUES, ROTARY PURSUIT PERFORMANCE

		Duration of Rest Interval					
		10 Minutes			24 hours		
Subject Groups	N	$\overline{X}$	SD	t	$\overline{X}$	SD	t
Psychotic (Male, chronic)	18	1.56	4.45	1.44	-0.66	8.09	-0.34
Psychotic (Male, acute)	6	4.29	7.69	1.25	-3.93	11.69	-0.75
Neurotic (Male)	10	3.14	11.70	0.81	-5.18	20.08	0.77
Neurotic (Female)	16	4.22	6.82	2.39*	-1.25	15.64	0.46
Normal (Male)	14	6.96	10.22	2.45**	-5.35	16.25	-1.19
Normal (Female)	10	8.66	3.73	6.98**	8.07	16.38	1.48

*Statistically significant 5% level

**Statistically significant 1% level

time of testing.

One possible explanation of the negative results obtained is that the method of scoring reminiscence was contaminated by warm-up effects. Warm-up is generally defined (Adams, 1961) as the sharp initial rise in a post-rest performance curve. This rise may be construed as a decrement to the extent that initial post-rest performance is below an expected level because of the need to warm-up. To examine this interpretation, reminiscence was recalculated as the difference between the peak of the warm-up segment and the mean of the last three pre-rest trials. Unfortunately there is considerable imprecision involved in judging the termination point of the warm-up segment for individual subjects (Adams, 1961). To account for this the convention of Adams (1952) and Jahnke (1956, 1961) was adopted, where warm-up in rotary pursuit is the improvement in performance over the first five post-rest ten second trials. The reminiscence measure was then defined as the mean of post-rest trials 5 and 6 minus the mean of the last three pre-rest trials. The mean of post-rest trials 5 and 6 was taken in order to increase the reliability of the score over that taken from one 10 second trial.

The results of this analysis are shown in Table 4. It can be seen that for the psychotic groups, no reminiscence

Table IV

MEAN GROUP REMINISCENCE SCORES (PERCENTAGE TIME ON TARGET) CORRECTED FOR WARM-UP, STANDARD DEVIATIONS AND t VALUES, ROTARY PURSUIT PERFORMANCE

		Duration of Rest Interval					
		10 minutes			24 hours		
Subject Groups	N	$\overline{X}$	SD	t	$\overline{X}$	SD	t
Psychotic (Male, chronic)	18	1.17	9.46	0.51	2.37	15.02	0.65
Psychotic (Male, acute)	6	10.48	10.43	2.25*	0.82	14.08	0.13
Neurotic (Male)	10	17.87	13.02	4.12**	12.93	21.02	1.85
Neurotic (Female)	16	15.18	15.15	3.88**	4.83	13.95	1.34
Normal (Male)	14	15.54	17.76	3.16**	12.01	9.17	4.73**
Normal (Female)	10	23.41	12.51	5.61**	21.20	13.58	4.68**

*Statistically significant 5% level

**Statistically significant 1% level

is evident after rest intervals of 10 minutes and 24 hours. It should be noted, however, that the chronic psychotic group demonstrated significant reminiscence ($p < .05$), as measured, in a retest seven months after the first experimental session ($\overline{X}$ reminiscence score = 5.91, SD = 9.59, t = 2.39). This finding is in accord with that of Huston and Shakow (1948, 1949) whose data suggest rotary pursuit reminiscence in chronic psychotics but not in normals after an interpolated rest interval of three months. However, they did not statistically analyze their data for reminiscence effects. S.B.G. Eysenck (1960) failed to find long term reminiscence in the rotary pursuit performance of normals. It may mean that I_R takes longer to dissipate in (chronic) psychotics than Eysenck had considered, so that no reminiscence would be expected after a 24 hour rest interval as well as after a 10 minute rest. However, there also was a greater likelihood of I_R accumulating over the final 10 minute massed practice phase than over the 5 minute phases, thus facilitating relatively greater reminiscence scores subsequently taken. Unfortunately, none of the other subject groups was available for retesting after seven months. The possibility that important extra-experimental events during the seven month period affected the retest performance of the chronic psychotics cannot be ruled out. Because of this possibility, and the lack of a retest control group, it cannot be concluded that Eysenck's hypothesis is supported.

In order to assess the change in amount of reminiscence following the short and long rest intervals, the ratio of the second reminiscence value over the first reminiscence value was calculated, and the resulting values for the groups compared by DMRT. The results of this analysis are summarized in Table V where the values reported are the mean ratio scores for each group. It can be seen that none of the groups were significantly different from the other in the change in amount of reminiscence from short to long rest interval.

The performance curves of rotary pursuit for all groups (except the female acute psychotic group, because of small N and extreme variability) are found in Figure 1. The ten second trials were grouped into one minute trials.

It can be seen that some degree of learning occurred in all groups. With one exception the chronic psychotics are significantly poorer in level of performance from all other groups on all phases of practice (DMRT, $p < .05$). The exception occurred for the first phase where the difference between female neurotics and chronic psychotics was not significant. The male normals were significantly superior to all other groups on the three phases of practice ($p < .05$). Chronic psychotics, then, were clearly differentiated from the normals and neurotics in level of performance,

Table V

RATIO OF TWENTY-FOUR HOUR REMINISCENCE

TO TEN MINUTE REMINISCENCE,

ROTARY PURSUIT PERFORMANCE

	Normal Male N = 14	Psychotic Acute Male N = 6	Neurotic Female N = 16	Neurotic Male N = 10	Psychotic Chronic Male N = 18	Normal Female N = 10
MEAN*	.795	.818	.880	.906	.955	.987
SD	.390	.265	.350	.650	.204	.320

*Groups which are underscored by the same line were not significantly different from each other (DMRT).

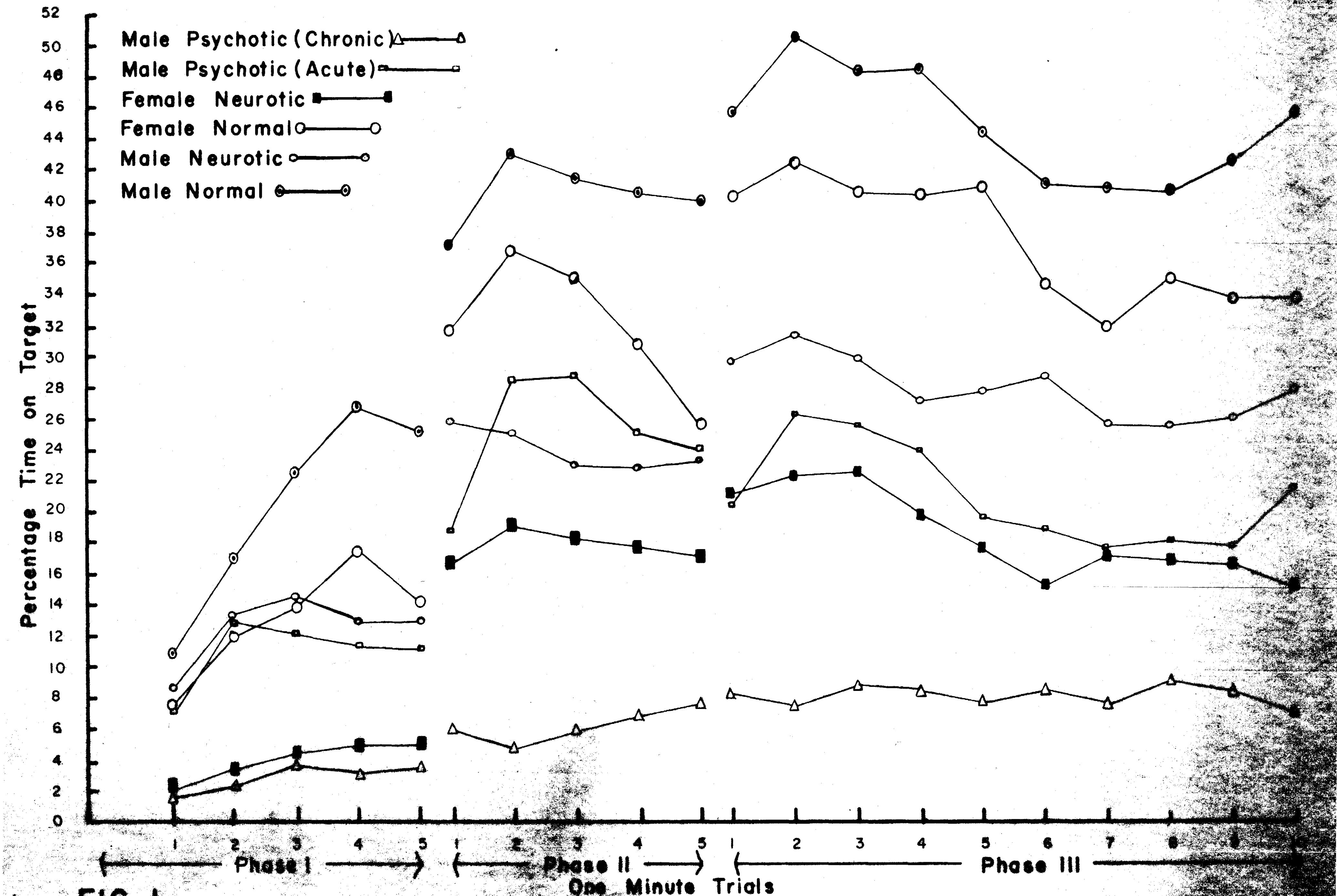

Male Psychotic (Chronic)
Male Psychotic (Acute)
Female Neurotic
Female Normal
Male Neurotic
Male Normal
Percentage Time on Target
52
50
48
46
44
42
40
38
36
34
32
30
28
26
24
22
20
18
16
14
12
10
8
6
4
2
0
Phase I
Phase II
Phase III
One Minute Trials

FIG. I

but not in the change in reminiscence. It was of some interest to note that the male acute psychotics were significantly superior in level of performance to the male chronic psychotics ($p < .05$). Given the very great restriction of sample size, especially in the acute psychotic group, the data offer some support to the importance of chronicity of illness in the psychomotor performance of psychotics (cf King, 1954).

Symbol-Printing. To make use of this task in testing Eysenck's hypothesis, it was necessary to show that reminiscence effects could in fact be derived from massed performance on it, and that it was a reliable performance test. Its reliability was found to be extremely high as assessed by intraclass correlation (see Appendix A). Reminiscence was scored as the performance on the first post-rest 30 second trial minus the performance on the last pre-rest 30 second trial. Statistical analysis of the obtained reminiscence scores is reported in Table VI. It can be seen from Table VI that all groups except the female acute psychotics evidence highly significant reminiscence effects after the 20 second rest interval, though it may be seen that the female psychotic group approaches significant reminiscence for this rest period. These results do not support the hypothesis of slow I_R

Table VI

MEAN GROUP REMINISCENCE SCORES (NUMBER OF SYMBOLS PRINTED), STANDARD DEVIATIONS AND t VALUES, SYMBOL PRINTING PERFORMANCE

		Duration of Rest Interval					
		20 seconds			24 hours		
Subject Group	N	$\bar{X}$	SD	t	$\bar{X}$	SD	t
Psychotic (Male, chronic)	20	0.90	1.18	3.70**	0.35	3.07	0.59
Psychotic (Male, acute)	9	3.33	2.58	3.61**	-0.11	2.77	-0.24
Psychotic (Female, acute)	12	1.25	2.17	2.01	1.67	3.73	1.53
Neurotic (Male)	17	1.53	2.23	2.65*	1.18	2.88	1.64
Neurotic (Female)	22	1.86	2.10	4.18**	3.36	4.56	3.42**
Normal (Male)	16	2.25	3.11	2.73*	4.50	2.76	5.99**
Normal (Female)	14	3.00	2.56	4.20**	5.43	3.41	5.76**

*Statistically significant 5% level
**Statistically significant 1% level

dissipation in psychotics. Both male psychotic groups showed significant reminiscence after the short rest interval, but insignificant reminiscence after the long interval. The chronic psychotics were retested seven months after the first experimental session but no statistically significant reminiscence effects were found ($\bar{X}$ reminiscence score = -0.11, SD = 1.74, t = -0.26). Retest reliability of the symbol printing performance over seven months was found by product-moment correlation to be 0.84.

In order to compare the subject groups in the relative changes in amount of reminiscence following the short rest interval and the long rest interval, a measure of the reminiscence differences between the two intervals was derived from the ratio of the second reminiscence value over the first reminiscence value. Comparisons among the groups in the resultant reminiscence ratios were made with DMRT. A summary of this analysis appears in Table VII. The group showing least proportional increase in reminiscence from the 20 second to 24 hour rest interval was the male acute psychotics, who demonstrated a decrease in reminiscence significantly different from the changes in all the other groups. The two normal groups showed a gain in reminiscence after 24 hours over reminiscence after 20 seconds which was significantly greater than the change evidenced in the two male psychotic groups. The change

Table VII

RATIO OF TWENTY-FOUR HOUR REMINISCENCE TO TWENTY-SECOND REMINISCENCE,

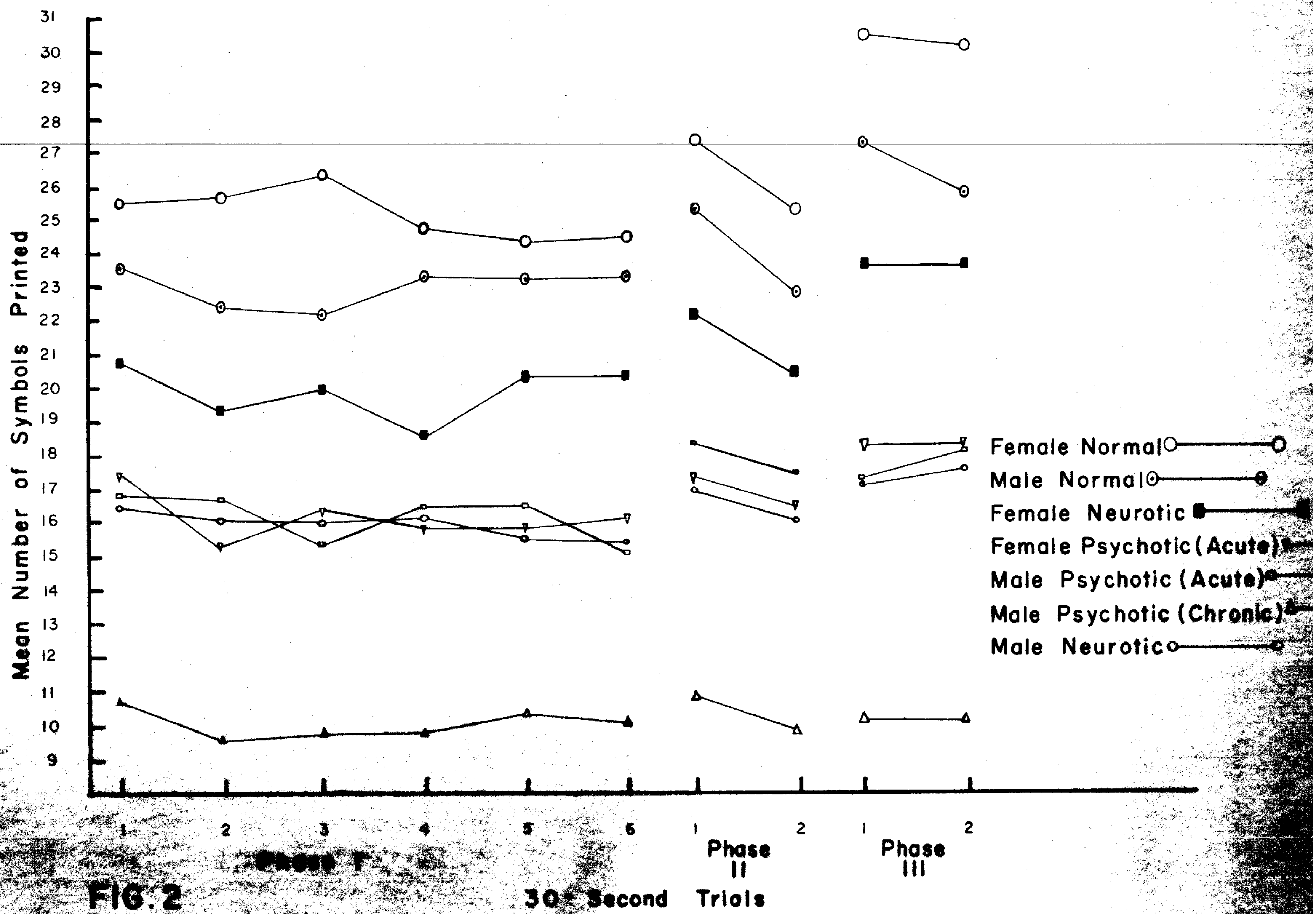
SYMBOL PRINTING PERFORMANCE

	Psychotic Acute Male N = 9	Psychotic Chronic Male N = 20	Neurotic Male N = 17	Psychotic Acute Female N = 12	Neurotic Female N = 22	Normal Female N = 14	Normal Male N = 16
MEAN*	.793	.954	.996	1.058	1.154	1.207	1.221
SD	.297	.207	.278	.359	.435	.248	.263

*Mean scores significantly different, $p < .05$ (DMRT). Groups which are underscored by the same line were not significantly different from each other but were different from all groups which are not so underscored.

in the male psychotic groups, was, in fact, in the direction opposite to that of the normals. The reminiscence ratios of the male psychotics, then, were in a direction opposite to that predicted by Eysenck's hypothesis. This finding does not support the hypothesis of slow I_R dissipation in psychotics, rather it suggests that for the symbol printing task, whatever I_R develops in the massed practice of male psychotics is to a great extent dissipated during the 20 second rest. As the reminiscence scores of the female acute psychotic group did not leave the chance level, the role of I_R in their symbol printing performance could not be satisfactorily assessed.

The performance of the various groups is plotted in Figure 2. Here, as in rotary pursuit, the chronic psychotics are significantly lower in performance level than the other groups (DMRT, $p < .05$). The female acute psychotics, male acute psychotics and male neurotics are not significantly differentiated from each other. They are, however, significantly ($p < .05$) differentiated from the female neurotics and the two normal groups. The female neurotics are significantly ($p < .05$) differentiated from the two normal groups, who are not in turn significantly different from each other. The curves do not demonstrate any obvious learning effects, but seem to primarily reflect performance. As all subjects



Mean Number of Symbols Printed
31
30
29
28
27
26
25
24
23
22
21
20
19
18
17
16
15
14
13
12
11
10
9
Female Normal
Male Normal
Female Neurotic
Female Psychotic (Acute)
Male Psychotic (Acute)
Male Psychotic (Chronic)
Male Neurotic
1
2
3
4
5
6
1
2
1
2
Phase I
Phase II
Phase III
30 - Second Trials

FIG. 2

had some pre-practice familiarization with the symbols and printing habit, and given the relative simplicity of the task, it is likely that most of the learning had occurred before the massed practice session. Reminiscence effects are clearly demonstrated in most groups, except for the chronic psychotics beyond the 20 second rest interval.

Spiral After-Effect. Reminiscence was measured as the first post-rest trial (reported duration of after-effect) minus the last pre-rest trial (reported duration of after-effect) which was the method used by Eysenck and Eysenck (1960). None of the groups showed significant reminiscence, as assessed by t test, after either the 10 minute or 24 hour rest intervals. The results of this analysis are found in Table VIII. Comparisons between groups of a reminiscence ratio calculated as in rotary pursuit and symbol printing yielded no significant differences (DMRT). A summary of this analysis appears in Table IX. These results do not support the findings of Eysenck and Eysenck (1960) of reminiscence effects on the SVA. Because the psychotics displayed no reminiscence effects after either rest period, it may be concluded that these results did not support Eysenck's hypothesis of I_R dissipation in psychotics.

Table VIII

MEAN GROUP REMINISCENCE SCORES (DURATION OF SVA IN SECONDS), STANDARD DEVIATIONS AND t VALUES, ARCHIMEDES SPIRAL

		Duration of Rest Interval					
		10 minutes			24 hours		
Subject Groups	N	$\bar{X}$	SD	t	$\bar{X}$	SD	t
Psychotic (Male, chronic)	14	3.14	8.46	1.34	4.50	8.58	1.89
Psychotic (Male, acute)	6	24.83	65.20	0.85	-20.83	52.50	-0.89
Neurotic (Male)	7	-7.43	14.37	-1.27	-5.29	8.33	-1.55
Neurotic (Female)	10	2.70	7.27	1.11	-1.00	6.00	-0.50
Normal (Male)	14	0.71	6.40	0.40	-0.64	7.06	-0.33
Normal (Female)	10	6.90	12.74	1.62	-1.50	9.49	-0.47

Table IX

RATIO OF TWENTY-FOUR HOUR REMINISCENCE

TO TEN-MINUTE REMINISCENCE,

ARCHIMEDES SPIRAL

	Psychotic Acute Male N = 6	Normal Female N = 10	Neurotic Female N = 10	Normal Male N = 14	Psychotic Chronic Male N = 14	Neurotic Male N = 7
MEAN*	.899	.964	.976	.994	1.008	1.014
SD	.034	.079	.032	.035	.046	.039

*Groups which are underscored by the same line were not significantly different from each other (DMRT).

Levels of performance of the various groups are plotted in Figure 3. Only five groups are reported, as the female acute psychotic group was too small, and the male acute psychotic group too extremely variable to permit meaningful graphic representation. An analysis using DMRT yielded no significant differences in performance levels between the groups. It can be seen that the data are not completely chaotic though they are much less orderly than the rotary pursuit and symbol printing data.

MPI. The relationship between extraversion (E scale) scores and reminiscence scores (Eysenck, 1957) for each task was examined using product-moment correlations. None of the correlations was significant, indicating that extraversion, as measured, did not contribute significantly to the variance of the reminiscence measures.

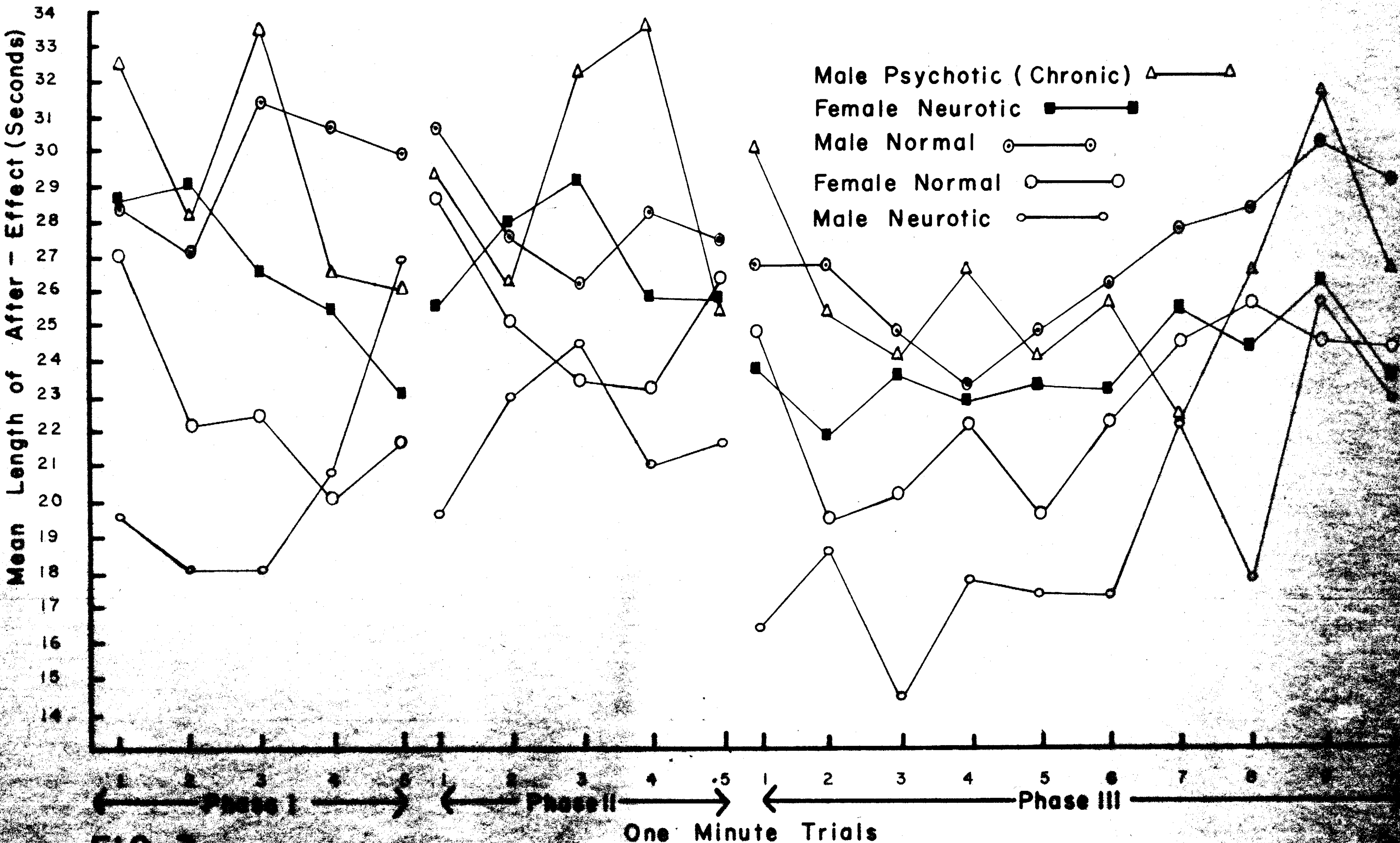

Mean Length of After - Effect (Seconds)
Male Psychotic (Chronic)
Female Neurotic
Male Normal
Female Normal
Male Neurotic
Phase I
Phase II
Phase III
One Minute Trials

FIG. 3

Measurement of Motivation

Physical Persistence. The experimental groups were compared for scores on physical persistence using DMRT. No significant differences were detected. A summary of this analysis appears in Table X. Assuming that the length of time an individual is prepared to submit to a boring, tiring or uncomfortable physical task reflects some motivational characteristics of that individual, then the present results do not support group differences in motivation as inferred from these operations. In the light of Eysenck's suggestion that persistence may be a measure of drive, it may be concluded that either the groups do not differ in drive, or the duration of maintained handgrip is not related to drive factors.

Rate of Response in the Tapping Test. The experimental groups were compared for rate of tapping using DMRT. A summary of this analysis is found in Table XI. It can be seen from this table that the chronic psychotic group has a significantly lower level of performance than the other groups. That this difference was not due to the greater mean age of the chronic group was shown by the fact that the correlation between age and mean tapping rate in the chronic group was -.23, which was not statistically significant. Furthermore, the mean age of the chronic group

Table X

MEAN PHYSICAL PERSISTENCE (SECONDS)

AND STANDARD DEVIATIONS OF

EXPERIMENTAL GROUPS

	Chronic Psychotic Male N = 20	Acute Psychotic Female N = 6	Acute Psychotic Male N = 6	Neurotic Female N = 13	Normal Female N = 14	Normal Male N = 16	Neurotic Male N = 7
MEAN*	20.55	23.33	26.00	26.84	28.21	32.18	34.28
SD	15.80	15.25	11.71	21.75	19.50	13.43	25.71

*Groups which are underscored by the same line were not significantly different from each other (DMRT).

Table XI

MEAN TAPPING RATE (PER 30 SECOND TRIAL) AND STANDARD DEVIATIONS

OF EXPERIMENTAL GROUPS

	Chronic Psychotic Male N = 15	Acute Psychotic Female N = 5	Neurotic Female N = 12	Acute Psychotic Male N = 7	Neurotic Male N = 13	Normal Female N = 14	Normal Male N = 16
MEAN*	52.34	72.64	89.82	91.42	94.76	100.72	102.98
SD	10.46	9.92	23.83	10.14	19.61	12.71	15.12

*Mean scores significantly different, $p < .05$, (DMRT). Groups which are underscored by the same line were not significantly different from each other but were different from all groups which are not so underscored.

was not significantly different from that of the male acute psychotics, yet these two groups were significantly differentiated from each other by rate of tapping. It is difficult to establish that rate of response in the tapping test unequivocally reflects drive characteristics of the individual, though the role of habit in a task such as this is probably at a minimum, so that a major determinant of performance would seem to be D.

MAS. The scores for all groups on the MAS were compared by DMRT. A summary of this analysis is contained in Table XII. The female neurotics had significantly higher MAS scores than all other groups. The two acute psychotic groups and the male neurotics did not differ significantly from each other but did differ significantly from all other groups. The two normal groups and the chronic psychotics were not significantly different from each other, but did differ significantly from all other groups. The high scores of the neurotics and acute psychotics are what one might expect of such patients newly admitted to hospital insofar as the scale is thought to measure "clinical anxiety",(Lauterbach, 1958). The scores of the normal groups are in agreement with previous studies using the scale and indicate that the subjects in this study were apparently not atypical with regard to manifest anxiety (Taylor, 1953;

Table XII

MEAN MAS SCORES AND STANDARD DEVIATIONS

OF EXPERIMENTAL GROUPS

	Normal Female N = 14	Chronic Psychotic Male N = 20	Normal Male N = 16	Neurotic Male N = 17	Acute Psychotic Male N = 9	Acute Psychotic Female N = 11	Neurotic Female N = 22
MEAN*	11.21	14.10	15.25	21.41	21.88	23.45	29.50
SD	3.43	10.30	6.13	9.53	9.56	10.00	6.59

*Mean scores significantly different, $p < .05$, (DMRT). Groups which are underscored by the same line were not significantly different from each other but were different from all groups which are not so underscored.

Smith, Powell and Ross, 1955). The low manifest anxiety of the chronic psychotics compared to the acute psychotics or neurotics is in accord with the usual clinical assessment of chronic psychotics as lacking in overt anxiety by comparison with freshly admitted acute psychotics and neurotics. The mean of 14.1 for the chronic group is comparable to that of 15.4 reported by Goodstein and Goldberger (1955) for 39 male chronic schizophrenics.

Correlations (Spearman's rho) between the MAS, hand persistence and response rate in tapping for the chronic subjects were calculated. The Maudsley Personality Inventory had also been given to these subjects, and the Neuroticism (N) score was included in this intercorrelation. The N scale of the MPI has been shown (Eysenck, 1959; Jensen, 1958) to have a high positive correlation with the MAS, and it was felt that if such a correlation held up on the present chronic psychotic sample, then it might be concluded that the MAS responses of this group were reasonably reliable, and not simply randomly made, as is a strong likelihood in such patients.

The results of the intercorrelation are found in Table XIII. It can be seen from this table that only one significant correlation was found, that between MAS and the N score of the MPI. This correlation suggests that the MAS

Table XIII

INTERCORRELATION OF MOTIVATIONAL INDICES

FOR THE CHRONIC PSYCHOTIC GROUP (N=15)

(SPEARMAN RHO)

	1	2	3	4
1.	-	0.82**	0.01	0.01
2.		-	-0.20	0.01
3.			-	0.25
4.				-

**$p < .01$

Test 1. Manifest Anxiety Scale

Test 2. Neuroticism, Maudsley Personality Inventory

Test 3. Tapping

Test 4. Persistence

responses were reliable. Otherwise, no relationships were found between MAS, rate of response in tapping, and persistence.

Discussion

Support for Eysenck's hypothesis of slow dissipation of I_R in psychotics was not found with any of the experimental tasks used. Performance of the psychotics in rotary pursuit followed prediction for the 10 minute rest period, during which they displayed no reminiscence. However, they likewise displayed no reminiscence after the 24 hour rest, which is contrary to prediction. The appearance of reminiscence effects (as measured when corrected for warm-up) after seven months cannot be held as support for Eysenck's hypothesis without proper controls being exercised. It is at best suggestive evidence, which, if verified, would require modification to Eysenck's hypothesis such that I_R in the rotary pursuit performance of psychotics takes _longer_ than 24 hours to significantly dissipate. Furthermore, such a modification would have to include a restriction of the hypothesis to specific tasks, since reminiscence in the symbol printing of psychotics was found after 20 seconds rest but not after 24 hours or seven months. As well, the hypothesis would have to be restricted to rotary pursuit reminiscence only as measured with a correction for warm-up, that is, if the hypothesis was to account for any of the present data. If Eysenck's hypothesis is to have general utility, and Eysenck (1961) does not suggest otherwise, then it should be applicable to all tasks on which I_R effects (e.g. reminiscence) can be demonstrated. Furthermore, I_R appears to be a delicate phenomenon in motor learning in that it does not appear to be generated on all tasks on which it has been sought (Humphries, 1963). Tasks involving a continuously moving target and/or conditions where the subject is paced appear to be the most efficacious in bringing out reminiscence effects (Humphries, 1963; Eysenck and Willett, 1961). If such is the case, then the potential generality of Eysenck's hypothesis in the explanation of the generalized slowness characteristic of psychotic function is greatly restricted.

The two motor tasks used in the present study, rotary pursuit and symbol printing, both displayed the reminiscence phenomenon in the normal groups, so it must be concluded that they were suitable procedures for a test of Eysenck's hypothesis.

It may be concluded that the SVA results do not support Eysenck's hypothesis. Based on the paper of Eysenck and Eysenck (1960) where reminiscence following massed trials on the SVA was reported, a deduction was made that psychotics would display greater perceptual reminiscence after a 24 hour rest interval than after a 10 minute interval. However, no significant reminiscence was found for either rest interval with any of the subject groups. This finding, then, does not support Eysenck's hypothesis pertaining to psychoticism, nor does it support Eysenck and Eysenck's (1960) more specific hypothesis and findings relating massed trials on the SVA to SVA duration decrement and 'reminiscence' effects.

It is difficult to compare the present results with other studies of I_R dissipation in the task performance of psychotics due to the generally great task differences, procedural differences, etc., between such studies. Furthermore, there is a lack of relevant published research. The absence of rotary pursuit reminiscence in the acute and chronic psychotics of the present study following the 10 minute rest interval supports the findings with rotary pursuit of Claridge (1960) with young undeteriorated schizophrenics, and Broadhurst and Broadhurst (1959) with chronic psychotics. These studies did not investigate long-term reminiscence effects. Venables (1959) found reminiscence in the performance of male chronic schizophrenics on a five-choice repetitive task following 5 minute and 10 day rest intervals. This author found a smaller amount of reminiscence in the 10 day rest period than in the 5 minute rest period. His data are similar to the present symbol printing data in that no learning effects were detectable, and short-term reminiscence was found in the respective chronic psychotic groups. Venable's finding of long-term reminiscence was not duplicated with the symbol printing task. However, the practice period following the 5 minute rest in Venables' study was 10 minutes in duration, whereas the first post-rest practice period in symbol printing was 60 seconds (two 30 second trials). Thus there was greater likelihood in the Venables study of long-term reminiscence effects following such a lengthy practice period, than in symbol printing, which might have demonstrated 24 hour reminiscence in the psychotics if the first post-rest practice period had been extended. It may be concluded that the results of Venables' study and the present results with the symbol printing task are clearly contrary to Eysenck's hypothesis.

The present findings on rotary pursuit reminiscence of psychotics do not support the unpublished findings of Ley and Rachman (cited by Eysenck, 1961), both of whom found 24 hour reminiscence in schizophrenics, but little or no 10 minute reminiscence in rotary pursuit. Both these studies used male patients, but only the report of Rachman's study contained information about the chronicity of the patients. Eysenck (1961) reports that Rachman's subjects were patients of "long standing". Both Ley and Rachman used separate groups of 10 subjects for each of the two rest periods. One group was tested after 10 minutes, the other group was tested after 24 hours. The method by which subjects were assigned to groups was not reported.

It is possible that procedural and sample factors differed between the Ley and Rachman studies and the present investigation. The present study tested the same group after the 10 minute rest and after the 24 hour rest in rotary pursuit. This allowed for more comparisons between test conditions than that based on 10 subjects. It would also be expected to decrease variability within the reminiscence scores of each rest condition. Furthermore, the additional 5 minute practice period might be expected to facilitate the appearance of subsequent 24 hour reminiscence effects in the psychotic groups.

The likelihood of obtaining similar performance data from small independent samples of psychotic subjects as in the studies under consideration is perhaps not generally high because of the wide range of behaviors subsumed under the diagnostic indentification. However, Eysenck's hypothesis is not specific to psychotic subtypes or symptom clusters. The most that may be said about the above comparisons between studies is that highly specific factors relating to tasks, samples, etc., are probably producing conflicting results, and that the generality of Eysenck's hypothesis is consequently attenuated. More specifically, if one was to hold out any hope for Eysenck's proposition, then it would appear to have to lie in the parameters of the experimental tasks used. A set of parametric studies is clearly indicated.

The present data have shed little light on the nature of D in psychotic patients. Eysenck posited the hypothesis of slow I_R dissipation as an alternative to a low drive interpretation of psychotic retardation. Eysenck and Maxwell (1961) deduced reminiscence to be a function of drive following the point at which $D = I_R$, and at which point I.R.P.'s consequently ensued. Eysenck (1961) suggested that differences between reminiscence scores of psychotics and other groups would provide a measure of the difference in D between the groups. Suppose that one was to accept Eysenck's reasoning here, and further that one assumed that the present groups had reached points in performance on the experimental tasks at which the presumptive involuntary rest pauses had begun to occur. Then the lack of 24 hour reminiscence effects in the rotary pursuit and symbol printing performance of the psychotics where the normals or neurotics are displaying reminiscence effects would lead to the conclusion that the psychotics are characterized by lower positive drive.

In reference to the habit variable, the performance of the chronic psychotics in the present study was so low as to almost preclude reminiscence effects since little or no I_R could build up. It is possible that the groups differed on rotary pursuit and symbol printing in initial level of habit strength. However, the tapping test, for which it could be expected that habit differences are at a minimum, itself differentiated the chronics from the other groups. Following Eysenck's learning analysis, this might suggest differences in D, or rate of growth of I_R. (Another possibility, not considered by Eysenck, may be that psychotics are differentiated from other groups in basal level of cortical inhibition, independent of the number of stimulations of a given neural structure). Eysenck (1961) dismisses rate of growth of I_R as an important factor in psychotic slowness. It would certainly be difficult to invoke a rapid accumulation of I_R that could explain the extreme performance differences between psychotics and normals.

Though differences in level of positive D would seem to be more obviously implicated in the present data than differential rate of I_R dissipation, the data do not lend themselves to a clearcut analysis of the relative contribution of these factors. The motivational indices of physical persistence, tapping rate, and MAS scores did not uniformly discriminate the groups, nor did they show significant relationships with each other. The identification of task persistence as an indicant of drive is cautioned by the complexity of persistence phenomena and the lack of theoretical integration of these phenomena (cf Feather, 1962). Differences in tapping rate between the groups suggests lower D in the chronic psychotic group. That the group differences in tapping rate were not likely due to differences in I_R accumulation or dissipation is suggested by the fact that discrimination between groups was the same on the first tapping trial as on the last. The MAS findings are in general agreement with those of Goodstein and Goldberger (1955) who found the MAS to be of limited usefulness in identifying chronic patients, but valuable in identifying nonchronic, psychoneurotic subjects.

There is a growing literature on the nature of drive, activation or arousal in psychiatric patients (Duffy, 1962; Martin, 1961). The terms 'activation' or 'arousal' are often identified (Malmo, 1962) with Hull's generalized D (Spence, 1951). Venables and Wing (1962), for instance, have demonstrated a relationship between level of arousal as measured by skin potential and critical flicker fusion and the degree of behavioral withdrawal in chronic schizophrenic patients. The most withdrawn patients were the most aroused. Possible roles of arousal, anxiety or D in the onset and chronicity of schizophrenia have been discussed by McReynolds (1960) and Mednick (1958).

Ryan (1958) has noted that since we do not observe drives but infer them, then the task, which is directly observable, should be the basic motivational term. The present study points to the necessity in future research along similar lines of greater knowledge of the task parameters involved, and where possible, more valid independent measures of drive such as the physiological measures of EMG, heart rate, etc. Malmo (1962) makes a strong case for the methodological advantages of physiological measures in the quantification of D. Future studies might well be directed to the simultaneous monitoring of arousal by physiological indices (Malmo, 1962), performance over time on measures such as those in the present study, and estimates of improvement and global level of patient adjustment (e.g. reliable rating scales, or interjudge agreement). Patients might be used as their own controls, thus avoiding the problem of matching groups and building up large samples.

It is likely that an analysis such as Eysenck's, in attempting to generate testable hypotheses, has had to grossly oversimplify the nature of the parameters involved. Certainly there is some question as to the formulation of $D\text{-}I_R$. Jensen (1961) has demonstrated that this formulation is unsupported by empirical evidence from animal studies. Reid (1960) has made a general criticism both of Hull, and of Jones' (1958) modification of Hull which is that subscribed to by Eysenck.

Because of the uncontrolled variables involved in research of the present type on limited psychiatric samples, it is likely that too few of the assumptions of general learning theory are being met to test deductions from that theory on such clinical groups. However, such instances do not detract from the potential importance to psychological theory of such an integrative attempt.

Summary

Eysenck (1961) has attempted to apply a form of modified Hullian learning theory to the behavior of psychotic patients. He has hypothesized that the generalized slowness or retardation characteristic of schizophrenic patients is due not to low drive, but to an abnormally slow rate of dissipation of reactive inhibition. Utilizing reminiscence as a measure of reactive inhibition he has deduced that schizophrenics should display little or no reminiscence after short rests, e.g., 10 minutes, but should show strong reminiscence effects after long rest intervals, e.g., 24 hours.

This hypothesis was tested using rotary pursuit, a printing task and a measure of satiation, the Archimedes rotating spiral (selected on the basis of the identification of satiation and reactive inhibition made by Eysenck and other writers). These tasks were under massed trial schedules with reminiscence measures taken following a short rest (20 seconds or 10 minutes) and a long rest of 24 hours.

An attempt was made to examine the alternative hypothesis of low drive through independent assessment of subjects' drive level by measurement of physical persistence, rate of tapping response, and MAS scores.

Subjects for the study were male and female psychotics, neurotics and normals.

No support for Eysenck's hypothesis was found with any of the tasks used. None of the psychotic groups displayed reminiscence in rotary pursuit, symbol printing or spiral after-effect after the 24 hour rest interval. The male psychotic groups, however, showed significant reminiscence in symbol printing after a 20 second rest, with the male acute psychotic group demonstrating reminiscence in rotary pursuit after a 10 minute rest interval.

The results from the measures of motivation suggested, if anything, a lower drive level in chronic psychotics than in acute psychotics or neurotics.

It was suggested that Eysenck's reactive inhibition hypothesis of psychotic slowness or retardation is likely too task specific to be of much utility, and that the suggested alternative of low drive is more probably implicated in the present data.

It was concluded that such attempts to bring theory from general psychology to bear on personality phenomena are valuable, but that in the present case too few of the assumptions necessary to that theory are being met.

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APPENDICES

Appendix A

Pursuit Rotor Apparatus

The pursuit rotor was a 60 r.p.m. Lafayette model. The dimensions of the rotor case were 13 inches x 13 inches x 4 3/4 inches. The turntable was 10 inches in diameter, and the target was 3/4 inches in diameter. The case had felt mounts on each bottom corner. The stylus was hinged between the insulated plastic handle 3 3/4 inches in length and the steel contact section 4 3/4 inches in length. The steel section was L shaped, with the inside of the short end of the L one inch in length. A plastic guard separated the steel section from the handle preventing the subject from pressing against the steel section with a finger so as to force the stylus against the target.

Time on target was measured in 10 second trials by two Stoelting electric timers. These were connected to a switching mechanism which diverted the current from one timer to the other every 10 seconds. This procedure allowed accurate readings of time on target during discrete 10 second trials. It was felt that this method of measurement represented an improvement over the relatively inaccurate methods used in most related studies in which one timer was employed, with the experimenter making running estimates of performance on every trial.

Instructions for Rotary Pursuit

"Your task is to keep the tip of the stylus on the silver disk, you do like this (demonstrate). Just move your arm right around with it. Don't lift the stylus from the turntable; just try to stay on top of the disk. The stylus is hinged so that it rests lightly on the turntable (illustrate). Don't press down on the stylus or hold the arm (illustrate). Keep your hand on the plastic handle only don't touch the metal arm.

Are there any questions? (Hand stylus to the subject). Is that the hand you write with? Okay, just stand here (in front of turntable) hold the stylus over the turntable, don't move your hand. Wait for my signal - don't start until I say "Go"! Don't lift the stylus from the turntable until I say "Stop"!"

Symbol Printing Task

Reliability of the symbol printing task was assessed by intraclass correlation based on 104 subjects. The reliability of total performance over the 10 trials was calculated, and yielded a value of 0.990. The reliability of individual trials was found to be 0.915.

The symbol printing task was made up of four two-line figures. They were printed on a 5 inch x 5 inch display card mounted in an almost vertical position on the desktop facing the subject. The printing was done in 8 1/2 inch x 4 1/4 inch booklets, with identification information on the first page, and 84 one-half inch squares on each of the remaining 26 pages. Each page represented one 30 second trial, that is, the subject printed for 30 seconds on one page, then 30 seconds on the next, and so on. Two booklets were used for each subject so that when one trial was completed that booklet was quickly replaced by the other opened at an unused page; when this trial was completed, the first booklet opened at an unused page was quickly put in place of the other. This avoided the confusion and delay of attempting to change rapidly from one page to the next one below it in the same booklet, which could pose a special problem to the disturbed patient. The subject was to print the symbols, one per square, from the right side of the page to the left, filling in the top row of squares, then continuing the sequence of printing to the second row beginning at the right end of the row again, and so on for each 30 second trial. When one trial was completed, the experimenter immediately removed the booklet, replacing it simultaneously with another one opened at a clean unused page. The subject then again began repetitively printing the four symbols beginning with the first symbol, from right to left as described above. At the end of six such 30 second trials, a 20 second rest was introduced, then two more 30 second trials were given. Twenty-four hours later two more such 30 second trials were administered. The booklet switching operation performed by the experimenter was a very rapid one involving a one-two motion of withdrawing the used booklet with one hand, and at the same time, using the other hand to replace it with the other booklet open at an unused page. The subject was first generally familiarized with the task by printing three rows of symbols on one page at his own speed (this was secretly timed using an electric wall clock out of the subject's line of vision). This was followed by one 30 second practice trial under overtly timed conditions. Then the six massed 30 second trials followed. The subject was instructed to work as rapidly as possible, and the timing was done openly.

Instructions for Symbol Printing

Materials. Two booklets, demonstration card, pencils, timer. One booklet is opened ready for the subject's use. The demonstration card is placed just above the booklet so the subject can consult it easily throughout the test.

"On the card you see that four symbols are printed. Notice that they are numbered from right to left, first (point) second, third and fourth".

"We are going to print these symbols in the squares on the booklet in front of you. They are to be printed in the same order and when all four are done we continue on by doing them over again. We start on this side of the paper, underneath the arrow (point) and work over to the other side of the line this way (point) just the opposite to the way you write. Let me show you, starting here, first we put in this one (print the first in the proper place), then the second (print), then the next (print) and then the last (print). Any questions? (answer these). Now you continue on printing these symbols over and over again until you have filled in three lines." (point at the end of the third line)

Let the subject continue with the booklet. Keep a record of the time without the subject being aware of it.

Open booklet, either the first one given, or the second telling the subject:

"This time I want you to do the same thing but I want you to print the symbols as rapidly as possible. Are you ready? Now start."

Time obviously. At 30 seconds say "Stop".

Fold open both booklets to a fresh page so only the working page is visible, others folded underneath. Put the number 1 at the top of the page of one booklet, number 2 at the top of the second.

"Now I want you to do the same thing again but when I say change I am going to reach over and take away your sheet and give you a clean sheet and I want you to start all over again here in the corner under the arrow with the first symbol. We will do this a number of times. Are you ready? Go!"

Time obviously. At 30 seconds say, "change". Take away the subject's booklet and substitute a fresh booklet. This can be done rapidly using one hand to remove the booklet, the other to place the fresh booklet. Start your movement just before the 30th seconds, just as you are saying "change". If the subject pauses say "get going; start here again", pointing to the space under the arrow. During the next 30 seconds the examiner turns the first booklet to a fresh page, numbering it "3", and gets it ready for the next change signal at 60 seconds. This process is repeated until six trials have been completed.

At the end of the sixth trial, (180 seconds) say "Stop and have a brief rest". Change the booklets again marking the next one "Rl".

Rest period is 20 seconds. Then say "Start again" and after 30 seconds, "change", giving a fresh booklet, "R2", and after a further 30 seconds, "Stop, that's it".

After approximately 24 hours this test is resumed.

"We are going to do the same thing as yesterday, printing these symbols on these pages. Here is the first page, and when I say, "change" I will give you a clean sheet to start on again. Any questions? (answer if required) Ready, start."

Give two trials, R3 and R4, each of 30 seconds duration.

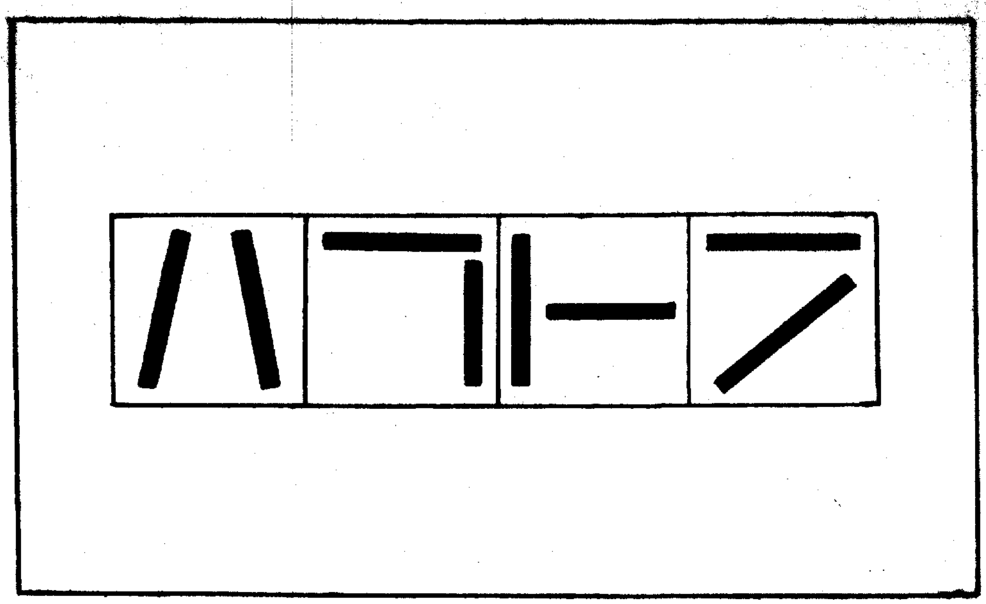
Scoring Instructions

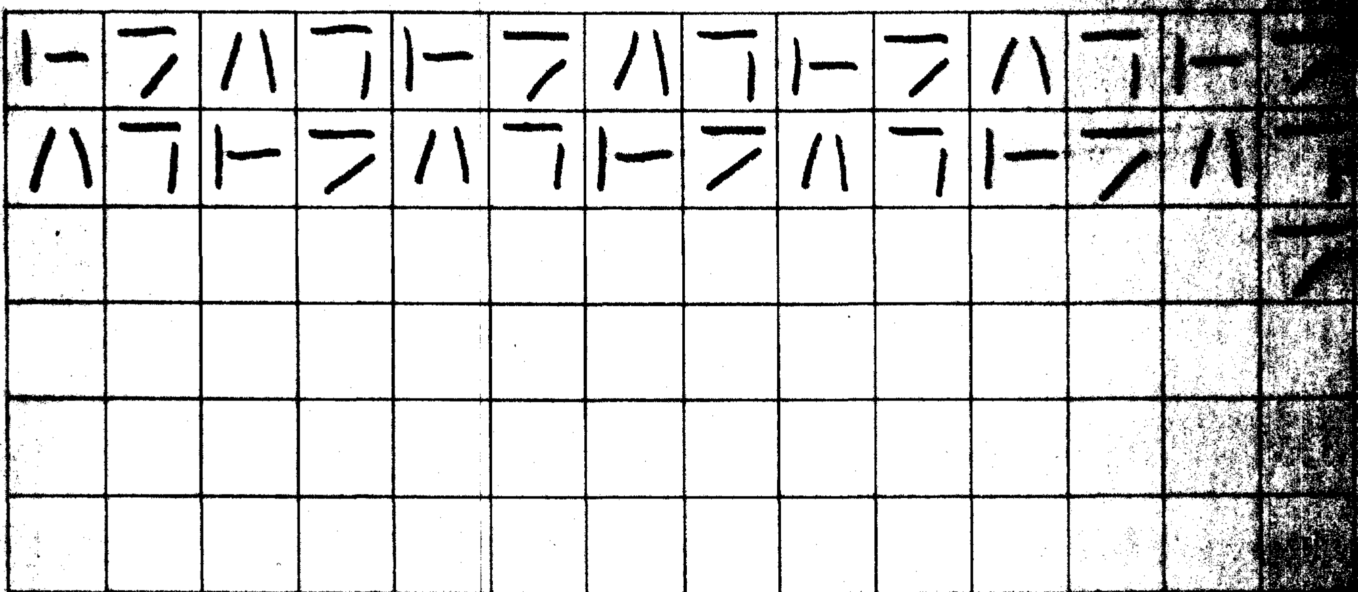
A. Count the number of symbols printed including those on which errors have been made, since according to instructions subject should correct errors by writing over them. Even if he does not do this, count the symbol because we are really interested in the amount of work performed. Each symbol has two strokes; the angles between the strokes vary but the subject may not pay much attention to the angle, so any symbol of two strokes is regarded as correct. Time for a trial may run out just as one stroke is made. This symbol is couunted as 1/2 in scoring.

B. Errors are counted but not deducted from the number of symbols printed. Errors exist where the symbol is grossly incorrect, for example, having an extra stroke or making the angle between the lines very much at variance with the correct symbol, however, here one must be careful because the subject may just have the symbols out of sequence. This has not been counted as an error.

Note: It sometimes happens that the subject attempts to simply copy the first line symbols into the second line; observe the practice trial carefully to ensure that the subject observes that this cannot be done if the proper order of the symbols is maintained.

from Test Booklet for Symbol Printing





Archimedes Spiral

Reliability of the SVA task was assessed by intra-class correlation based on 63 subjects. The reliability of total performance for phase 1 and 2 was calculated, and yielded a value of 0.938. The reliability of individual trials was found to be 0.602.

The after-effect apparatus consisted of the photograph of a black spiral of 4 1/4 turns drawn on a flat white circular disk which was 8 inches in diameter. The photograph was backed by a circular steel disk of 8 inches diameter. This disk was mounted on a horizontal steel shaft set in pillow blocks and connected by a rubber drive belt to a 1/15 h.p., 13 amp., 60 cycle AC synchronous 1725 r.p.m. Westinghouse motor. The motor and pillow blocks were mounted on a 7 inch x 10 inch steel platform which was bolted to the back of an upright 27 inch x 27 inch piece of 1/2 inch plywood. The shaft, held by the pillow blocks, extended through a small circular hole in the plywood sheet to the other side, extending 2 inches out from the face of that side. The end of the shaft was threaded, and a nut held the spiral disk on it firmly. The disk was framed within a box-like structure, which extended to within 3 inches of the disk periphery on the top, bottom and sides. This casing extended 5.5 inches outward from the vertical plane of the disk. Within the frame, on the vertical sides, were 120 volt, 60 cycle, .85 amp., trigger start General Electric fixtures with 17 inch, 15 watt General Electric cool white flourescent bulbs, one fixture on each side. These were wired independently of the rest of the apparatus. They served to produce lighting indirect from the subject's view, but which was directed toward the face of the spiral disk. The interior of the frame was painted gloss white, the exterior blackboard black. An operating panel containing a Stoelting 60 cycle, 115 volt, electric clock with an on-off switch, and an on-off and directional switch for the motor, was housed in a separate portable case. This case was connected to the main apparatus by six feet of wire, thus allowing the experimenter, if necessary, to control the operation of the apparatus at a distance away, e.g., in an adjoining room. The main apparatus housed a 6 volt D.C. battery charger of approximately 4 amps, supplying D.C. power to the electric clock. This charger was housed in a plywood compartment behind and against the main vertical section of the apparatus, and rested on the 27 inch x 17 inch x 1/2 inch plywood base-piece of the apparatus. The plywood compartment had numerous holes drilled in it to prevent over-heating of the battery charger. The main motor responsible for driving the shaft was reversible, this being controlled from the operating panel. To assure instant braking of the disk when the motor was stopped at the end of each stimulation trial, a braker arm was attached to the back of the apparatus 2 inches above the 5 inch drive wheel attached to the shaft, with the fulcrum 5 inches to the right of the perimeter of the wheel. This braker arm was attached at one end to a solenoid of 8 oz. pull such that the solenoid pulled 'up' to brake the disk; the end above the drive wheel was wrapped in rubber. The circuitry from the solenoid was connected to the main switch in the operating panel such that when the drive motor was cut off, the solenoid was activated, pulling the attached end of the braker arm up, and forcing the other rubber wrapped end down hard against the rotating drive wheel on the shaft, with the net result of instantly arresting rotation. At the same time the electric clock was automatically activated. When the subject reported cessation of the after-effect, the main motor switch was turned to the correct position for the desired direction of rotation (clockwise in this case) of the spiral, the solenoid was automatically inactivated causing the brake to be released, and the clock was also automatically inactivated, so a reading of the reported length of after-effect could be taken. These events, in effect, happened simultaneously. The mounting for the drive motor was cushioned with foam rubber, eliminating vibration noise.

The present model of SVA apparatus was designed as an improvement over many current techniques with SVA, in that instant braking was achieved so that immediate projection of the after-effect on the disk surface could occur. The potential errors in measurement of SVA duration over extended trials when a stop watch is used were eliminated by the design of automatic, coupled electric timing of SVA duration. Homogeneity of surround was accomplished by the enclosure of the spiral in a box and the use of a homogeneous white background. Most studies involve the spiral disk mounted on a small motor and located in a normally lighted room. Under these circumstances many stimuli may compete for subject's attention. The present apparatus was located in a dark room with controlled illumination falling on the spiral surface. Illumination was 'built-in' to the present apparatus rather than depending on standard room lighting or incandescent light bulbs located near the face of the disk as is usual in most studies. The present use of permanently located flourescent bulbs facilitated a more controlled and even distribution of illumination on the disk surface.

Experimenter's Procedure and Instruction Sheet for SVA

Type: Expansion after-effect (Disk rotated counter-clockwise).

Length of Stimulation Period: 60 seconds

Distance of the subject from the face of the spiral disk is six feet. He is seated (erect) before a table 30 inches in height. He faces the spiral directly, with his arms resting on the table, and hands folded. Clear instructions not to move head and shoulders should be given the subject. (Subjects wearing corrective lenses should wear these during testing.)

The spiral apparatus rests on a table 30 inches in height, so that the center knob of the disk is 45 inches above floor level.

The room is darkened except for illumination of the spiral disk by two 15-watt fluorescent bulbs enclosed in a box framing the disk.

Procedure

The subject is brought into the room and seated at the table facing the spiral apparatus. The spiral illumination is turned on (unless left on from previous testing), and the room illumination is turned off. At least <u>one minute</u> is given the subject to adapt to the changed light conditions. The experimenter then instructs the subject to concentrate on the center of the disk (Experimenter points).

"When the disk begins to rotate, the line will appear to be going in toward the center, when the disk is stopped, the line will appear to be going out toward the outside, to be expanding. Let's have a trial run."

A trial run is given of 45 seconds stimulation time. At the end of 30 seconds of rotation, subject is asked, "Do you see it going in?" At the end of 45 seconds when the disk is stopped subject is asked, "Do you see it coming out?" When you are absolutely certain there is no further movement say "stopped".

After the subject signals cessation of movement, the experimenter flicks silver switch up, then returns clock to zero.

The experimenter briefly queries the subject to ascertain that he was in fact perceiving the characteristic after-effect, i.e., "Did you see the after-movement clearly?"

"Okay, remember, concentrate on the center of the disk, and don't say 'stopped' until you are certain there is no further movement."

"Any questions?"

"Okay, ready!"

The experimenter starts rotation of spiral.

Alternation Tapping

The alternation tapping apparatus was a commercial model manufactured by Lafayette Company. It consisted of a flat 21.5 inch x 4 inch board and a 13 inch x 7 3/4 inch backpiece erected perpendicular to the flat base. On the top side of the flat base, at each end, was a 4 inch x 4 inch steel plate. These two plates were connected by 1/16 inch copper wire under the flat base board, and both were wired to a cumulative counter attached midway up the back of the perpendicular backpiece. The cumulative counter was wired to the terminals of a 6-volt battery charger of approximately 4 amps output, and was also wired to a steel conducting stylus (with wooden handle) which completed the circuit when tapped on either plate. Each time the circuit was completed the cumulative recorder was activated, thus advancing one digit. (The battery charger, connected to a 110 volt AC power source, was used to convert AC to DC). The tapping apparatus was situated on a desk top, with the experimenter facing the side on which was fixed the cumulative counter, and the subject facing the side on which the stylus was affixed.

Experimenter's Procedure & Instructions for Alternation Tapping

Experimenter shocks himself by holding metal of stylus so the subject will not worry about this. The experimenter trys the stylus a couple of times to make certain that the counter is operating correctly and to demonstrate the task to the subject. The experimenter does this while standing beside the subject.

The stylus is to be held as one would hold a pen or pencil (not in one's fist like a knife). The experimenter demonstrates to the subject that tapping on one of the metal plates causes the counter to click.

"You hold this as you would a pen or pencil and you tap first on one plate and then on the other; back and forth, like this". (The experimenter demonstrates back and forth alternate tapping on the plates.) "Now let's get you comfortable." The experimenter places the apparatus at a distance from the subject so that the subject can tap conveniently. The experimenter has the subject take the stylus and rest his elbow at the edge of the table, moving the apparatus so that the subject, with his elbow on the table, can conveniently reach both plates. The experimenter asks the subject if he is comfortable and ascertains that the subject is sitting reasonably erect with his arm resting on the table. The experimenter then sits behind the apparatus, ready to record.

"Now we seem to be ready. I can record the number of taps you make from the counter back here. I want you to tap as you were shown, back and forth on the plates. But when I say stop you are to stop at once; after a short pause I will tell you to tap again. Then you start tapping again until I say 'stop'. There will be several such pauses. That is, you will tap for a while until I say 'stop'; then you stop until I say, 'start', and keep going until I say, 'stop' again. Do you understand?"

(The experimenter explains further if necessary.)

"Alright, ready to tap as fast as you can. Start now."

The counter number is recorded before the subject starts tapping (before these instructions are completed). The number of taps at the end of each 30 seconds of performance is recorded. Timing is accomplished overtly with a stop watch.

Appendix B

Medications are shown for the day preceding testing (Day 1), and for the days during which testing was conducted.

Psychotic (Male, chronic; N = 2)

S	Day	Medication	Day	Medication
1	1	Stelazine 2 mg.TID	2	Stelazine 2 mg.TID
	3	Stelazine 2 mg.TID		
2	1	Stelazine 2 mg.TID	2	Stelazine 2 mg.TID
	3	Stelazine 2 mg.TID		

Psychotic (Male, acute; N = 5)

S	Day	Medication	Day	Medication
1	1	Stelazine 2 mg.BID	2	Stelazine 2 mg.BID
	3	Stelazine 2 mg.BID		
2	1	Niacin 1 gm. TID	2	Niacin 1 gm. TID
	3	Niacin 1 gm. TID		
3	1	Doriden 0.5 gm. stat.	2	Doriden 0.5 gm. stat.
	3	Largactil 50 mg. BID		
4	1	Sodium Amytal 3 grs. hs	2	Stelazine 2 mg. TID
	3	Sodium Amytal 7.5 grs. IM Stelazine 2 mg. TID		
5	1	Stelazine 2 mg. BID	2	Stelazine 2 mg. BID
	3	Stelazine 2 mg. BID	4	Stelazine 2 mg. TID

Psychotic (Female, acute; N = 7)

1	1	Nil	2	Nil
	3	Largactil 100 mg. TID Largactil 200 mg.stat. IM Stelazine 4 mg. QID	4	Largactil 100 mg. TID Largactil 100 mg.stat.IM Stelazine 4 mg. QID
	5	Largactil 100 mg.TID Stelazine 4 mg. QID	6	Largactil 100 mg.TID Stelazine 4 mg. QID
	7	Largactil 100 mg. TID Stelazine 4 mg. QID	8	Largactil 100 mg.TID Stelazine 4 mg. QID
	9	Largactil 100 mg. TID Stelazine 4 mg. QID		
2	1	Largactil 100 mg.stat.	2	Seconal 200 mg.(0)hs prn
	3	Seconal 200 mg.(0)hs prn	4	Seconal 200 mg.(0)hs prn
	5	Seconal 200 mg.(0)hs prn	6	Seconal 200 mg.(0)hs prn
	7	Seconal 200 mg.(0)hs prn		

Psychotic (Female, acute) cont'd

S	Day	Medication	Day	Medication
3	1	Stelazine 2 mg. BID	2	Stelazine 2 mg.BID
	3	Stelazine 2 mg.BID		
4	1	Trilifon 5 mg.stat.IM Tuinal 3 gr. hs	2	Stelazine 2 mg.TID Tuinal 3 gr. hs.
	3	Stelazine 2 mg.TID		
5	1	Nil	2	Tofranil 25 mg.TID
	3	Tofranil 25 mg.TID		
6	1	Stelazine 2 mg.TID	2	Stelazine 2 mg.TID
	3	Stelazine 2 mg.TID		
7	1	Gantrisin 0.5 gm.QID Nicotinamide Gmt TID Largactil 50 mg. TID	2	Gantrisin 0.5 gmQID Nicotinamide Gmt TID Largactil 50 mg. TID
	3	Gantrisin 0.5 gm. QID Nicotinamide GMT TID Largactil 50 mg. TID		

Neurotic (Male; N = 5)

S	Day	Medication	Day	Medication
1	1	Phenobarbital 15 mg.QID	2	Phenobarbital 15 mg.QID
	3	Phenobarbital 15 mg.QID	4	Phenobarbital 15 mg.QID
	5	Phenobarbital 15 mg. QID		
2	1	Nil	2	Nil
	3	Stelazine 2 mg. BID		
3	1	Regular insulin 5 u. NPH insulin 40 u. Frosst 217, 1 tab.stat	2	Regular insulin 5 u. NPH insulin 40 u.
	3	Regular insulin 5 u. NPH insulin 40u.		
4	1	Nil	2	Tuinal 3 grs.
	3	Tuinal 3 grs.		
5	1	Nil	2	Sodium Amytal 7.5 grs. in 10 cc IM
	3	Sodium Amytal 7.5 grs.in 10 cc IM		

Neurotic (Female; N = 12)

S	Day	Medication	Day	Medication
1	1	Tuinal 3 grs. hs prn	2	Tuinal 3 grs. hs prn
	3	Tuinal 3 grs. hs prn		
2	1	Nil	2	Equanil 400 mg. QID
	3	Equanil 400 mg. QID	4	Equanil 400 mg. QID

Neurotic (Female) cont'd

S	Day	Medication	Day	Medication
3	1	Nil	2	Kevadon 100 mg. hs.prn
	3	Kevadon 100 mghs.prn		
4	1	Sodium Amytal 200 mg.hs prn	2	Nil
	3	Sodium Amytal 200 mg. hs.prn		
5	1	Tarasan 15 mg. QID	2	Tarasan 15 mg. QID
	3	Tarasan 15 mg. QID Chlorabol 650 mg.		
6	1	Nil	2	Sodium Amytal 200 mg. hs prn
	3	Sodium Amytal 200 mg. hs prn		
7	1	Nil	2	Niacin 0.5 gm. QID
	3	Sodium Amytal 3 3/4 grs. IM hs Niacin 0.5 gm. QID		
8	1	Regular insulin 50 u.	2	Nil
	3	Stelazine 2 mg. BID	4	Stelazine 2 mg. BID
9	1	Nil	2	Sodium Amytal 200 mg. stat.
	3	Nil		
10	1	Mellaril 25 mg. TID	2	Mellaril 25 mg. TID
	3	Mellaril 25 mg. TID		
11	1	Nil	2	Parstelin 2 tabs. TID
	3	Parstelin 2 tabs. TID		
12	1	Sodium Amytal 3 3/4 gr.IM Regular insulin 10 u. 1/2 hr. before meals	2	Regular insulin 10 u. 1/2 hr. before meals
	3	Sodium Amytal 3 3/4 gr. IM Regular insulin 10 u. 1/2 hr.before meals	4	Sodium Amytal 3 3/4 grs. IM Regular insulin 10 u. 1/2 hr. before meals
	5	Sodium Amytal 3 3/4 gr. IM Regular insulin 10 u. 1/2 hr. before meals	6	Regular insulin 10 u. 1/2 hr. before meals