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Effects of motivational incentives on GATB "F" and "M" subtest performance with hospitalized neuropsychiatric patients

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EFFECTS OF MOTIVATIONAL INCENTIVES ON GATB
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NEUROPSYCHIATRIC PATIENTS.

Iowa State University, Ph.D., 1970
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EFFECTS OF MOTIVATIONAL INCENTIVES ON GATB "F" AND "M"
SUBTEST PERFORMANCE WITH HOSPITALIZED
NEUROPSYCHIATRIC PATIENTS

by

Richard Wayne Myers

A Dissertation Submitted to the
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~~Dean of Graduate College~~

Iowa State University
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1970

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I. INTRODUCTION

The Veterans Administration treats veteran patients who suffer emotional disabilities as a part of continuing benefits to men who were subjected to military duty for a period of 90 days or more. There were 64,538 veterans admitted to Veterans Administration neuropsychiatric hospitals during the 1969 fiscal year. Even more impressive is the fact that 73,970 veterans were discharged during that same 1969 fiscal year from 114 installations. Neuropsychiatric treatment programs in the Veterans Administration Hospitals (VAH) are conducted according to the current philosophy and practices set forth by those persons responsible for administering VA medical programs. Hospital staffs work within the general framework set forth by regulations and have basic goals and objectives common to all. The return of the patient to the community as a useful and productive citizen is one of the more lofty objectives set forth. Ideally, the veteran regains complete identity as an individual and his family benefits psychologically, socially, and financially. Society benefits by having a productive and useful citizen restored to its ranks.

There are many far-reaching implications which may be difficult to discern when initially appraising the subject of returning veterans to the community. The return to a fruitful, productive life implies the ability to work on a

competitive basis with others and assume normal family and personal responsibilities. It also implies that the veteran, once discharged, can return to a warm and loving home life and environment to resume his normal role. It would be therapeutically ideal if such a situation always prevailed. The truth of the matter is that environmental pressures detrimental to good health may have been prevailing at the onset of the illness, and little may have been accomplished in correcting them. It is not an uncommon situation for an emotionally disturbed veteran to have alienated himself from family, friends, co-workers, and employers. Retraining or the appropriate vocational placement for an entirely new and different environment is often mandatory due to such situations.

Veteran patients at Knoxville Veterans Administration Hospital are evaluated vocationally by means of the General Aptitude Test Battery (GATB) and all other instruments deemed necessary. However, GATB is the primary measurement utilized. It appeared feasible to compare Hospitalized Neuropsychiatric Patients (HNP), as a group, with the normal population with whom they must compete for jobs and training.

Warman and Myers (25) found significant differences on GATB scores when Hospitalized Neuropsychiatric Patients (HNP) were compared with walk-in clients of the United States Employment Service (USES) in Des Moines, Iowa. Motor per-

formance differences were especially significant when it was demonstrated that HNP clients scored a mean score of nearly one and one-half standard deviations below the USES walk-in client mean on subtests measuring these aptitudes. A severe problem is presented due to such scores in that state and federal rehabilitation programs require GATB test results. Occupational aptitude patterns (OAP's) cannot be met with scores of such low calibre. Test evaluation to determine vocational potential is most difficult to assess if OAP's cannot be utilized, or if scores are in the lower quartile of norms.

The inability of HNP to compete favorably with USES walk-in clients for job placement and training programs apparently prevails for a multiplicity of reasons. Especially crucial among these reasons are: (1) the lack of formal education and training prior to hospitalization by many veterans; (2) establishment of maintenance levels of ataractic medication which may depress motor performance; and (3) the deterioration of motivation towards rehabilitation which often accompanies prolonged and serious emotional instability. It is entirely possible that any one of these three reasons could create a deficit serious enough to impede the individual's progress towards post-hospital adjustment. It would be decrement of overwhelming magnitude if all three were present. This is precisely what often happens with

many chronic HNP. Hunt and Cofer (13) further complicate the problem by offering evidence of a "psychological deficit" among schizophrenics which may be responsible for motor performance decrement.

The HNP population of 900 at Knoxville VAH would appear to be typical of most VA neuropsychiatric hospitals charged with treatment of the emotionally disabled. It was for this reason a population sample was utilized to investigate the effects of reward on motivation to increase motor performance. This type of investigation becomes particularly pertinent when one realizes that 1,155 HNP were discharged during fiscal year 1969 from Knoxville Veterans Administration Hospital and became clients in the training programs and the labor market.

It is accurate to assume that all discharged HNP would not be seeking training or job-placement. The reasons for this are varied, but primarily because: (1) many would not be emotionally or physically able to work; (2) some have jobs to return to; (3) many would be reassigned from this hospital to domicilliaries and foster home care programs; (4) many desire no help. The patients who would actively be seeking placement services were well represented by the study sample.

A. Statement of the Problem

Vocational counseling personnel at the Veterans Administration Hospital, Knoxville, Iowa, have found that HNP do not

compete well with USES walk-in clients for jobs and training. Experience in placement revealed that the HNP had considerable difficulty in qualifying for selected jobs and training when GATB scores were required. The problem was documented more completely by means of a pilot study which compared HNP GATB scores with USES walk-in clients at the Des Moines service office. Warman and Myers (25) found that HNP scores were significantly lower on all GATB subtests, but especially so on those subtests requiring motor performance.

V. A. hospital staff experience in placement efforts have been such that several variables could be considered as contributing to the HNP GATB score debilitation. Motivation was one such factor to be investigated. The level of normal motivation assumed to be present due to impending hospital discharge and subsequent return to the community apparently is not as great as one might think. It was decided to investigate the problem further by means of a motivational reward variable. HNP would have the choice of reward which they felt would best motivate them as individuals.

Diagnostic classification and age level were considered as important variables which could affect scores in which a motivational reward was involved. The major proportion of the population at VAH, Knoxville, would be well represented by two major diagnostic groups: neurotic and schizophrenic. The mean age of HNP was found to be 41 years. Age categories

were divided into groups of 18-41 and 42-54. These ages were considered to be the upper and lower age limits of patients generally referred for job-placement and training.

The problem to be investigated was that of the effects of motivational rewards on HNP GATB "F" and "M" subtest scores. Diagnostic classification and age groups were attending variables thought to be influential on the reward effects.

B. Definitions

Schizophrenia: The term is synonymous with the formerly used term dementia praecox. It represents a group of psychotic reactions characterized by fundamental disturbances in reality relationships and concept formations, with affective, behavioral, and intellectual disturbances of varying degrees and mixtures. The disorders are marked by a strong tendency to retreat from reality, by emotional disharmony, unpredictable disturbances in stream of thought, aggressive behavior, and in some, by a tendency to "deterioration". The predominant symptomatology will be the determining factor in classifying such patients into types.

Motivation: Something (as a need or desire) that causes a person to act. A motivational incentive thus applies to an external influence (such as an expected reward) which incites to action.

Decrement: A gradual decrease. The quantity lost by

diminution or waste.

Neurotic or psychoneurotic: The chief characteristic of these disorders is "anxiety" which may be directly felt and expressed, or which may be unconsciously and automatically controlled by utilization of various psychological defense mechanisms (depression, conversion, displacement, etc.). In contrast to those with psychoses, patients with psychosomatic disorders do not exhibit gross distortion or falsification of external reality (delusions, hallucinations, illusions) and they do not present gross disorganization of the personality.

Psychomotor or motor activity: (1) synonym for movement; (2) bodily activity involving muscular processes.

Hospitalized Neuropsychiatric Patients (will be referred to as HNP throughout this study): Patients diagnosed as having mental, emotional, or behavioral disorders.

General Aptitude Test Battery (will be referred to as GATB throughout this study): A USES controlled aptitude test which measures nine aptitude variables. (In addition to GATB, the nine subtest variables will be referred to by their respective GATB initials.)

Aptitude G - Intelligence: General learning ability. The ability to "catch on" or understand instructions and underlying principles; the ability to reason and make judgments. Closely related to doing well in school. Measured

by Parts 3, 4, and 6.

Aptitude V - Verbal Aptitude: The ability to understand meaning of words and to use them effectively. The ability to comprehend language, to understand relationships between words and to understand meanings of whole sentences and paragraphs. Measured by Part 4.

Aptitude N - Numerical Aptitude: Ability to perform arithmetic operations quickly and accurately. Measured by Parts 2 and 6.

Aptitude S - Spatial Aptitude: Ability to think visually of geometric forms and to comprehend the two-dimensional representation of three-dimensional objects. The ability to recognize the relationships resulting from the movement of objects in space. Measured by Part 3.

Aptitude P - Form Perception: Ability to perceive pertinent detail in objects or in pictorial or graphic material. Ability to make visual comparisons and discriminations and see slight differences in shapes, shadings of figures, and widths and lengths of lines. Measured by Parts 5 and 7.

Aptitude Q - Clerical Perception: Ability to perceive pertinent detail in verbal or tabular material. Ability to observe differences in copy, to proofread words and numbers, and to avoid perceptual errors in arithmetic computation. Measured by Part 1.

Aptitude K - Motor Coordination: Ability to coordinate eyes and hands or fingers rapidly and accurately in making precise movements with speed. Ability to make a movement response accurately and swiftly. Measured by Part 8.

Aptitude F - Finger Dexterity: Ability to move the fingers and manipulate small objects with the fingers rapidly and accurately. Measured by Parts 11 and 12.

Aptitude "M" - Manual Dexterity: Ability to move the hands easily and skillfully. The ability to work with the hands in placing and turning motions. Measured by GATB-Parts 9 and 10.

Ataractic drugs: Drugs having therapeutic value in the alleviation of symptomatology involved in severe emotional distress.

Institutionalization: The self-subjection by an individual to a permanent living status within an institutional setting such as would require an emotional dependency for support of the given institution.

Service-connected: The adjudication of a physical or emotional disability of a veteran of the military service related directly to duty as the point of origin.

Nonservice-connected: The adjudication of a physical or emotional disability of a veteran of military service where the point of origin is other than assigned duty function while in the service.

Self-determined motivational reward: A mode of motiva-

tion utilized in a special research study whereby subjects are allowed to determine the type and amount of reward for increased performance on GATB "F" and "M" subtest scores which exceed pre-determined pilot study means. Self-determined rewards were subject to hospital regulations and availability of the reward.

Analysis of variance: A statistical technique by which the possible significance of near differences can be analyzed simultaneously by an overall test of significance. When there are many mean results to be compared the use of analysis of variance saves time and involves less risk of a Type I error; i.e., the error of rejecting a true null hypothesis. There are three basic general requirements for the use of the variance ratio technique. They are: (1) independence of the variance estimate; independence meaning that the value of one of the components in a sample result is not predictable from the value of the other component; (2) normality of the sampled populations or each subsample of measurement is drawn from normally distributed population measurements; and (3) homogeneity of their variances, or, assumption that the variance of the subsample results in an experiment are random variations from a common population variance.

Analysis of covariance: A statistical technique used in research which is useful when random samples from different populations are such that they cannot possibly be

matched. Thus, the covariance of a bivariate distribution is the mean of cross-products of the deviations. It is based on a partitioning of the sum of the cross-products (xy) of bivariate into two or more components.

Compensation: The amount of monetary remuneration provided HNP for physical or emotional disability by a state or federal governmental agency.

II. REVIEW OF LITERATURE

HNP veterans tend to consider occupations and training programs which require motor performance as part of the aptitude variable. The motivation to perform well on vocational testing is questionable in studies reviewed. Sub-normal scores recorded in the four-year period, 1964-1968, at Knoxville VAH leads one to question the motivation of HNP to perform at maximum efficiency. It is hoped that a review of studies involving motivational indices will clarify some of the confusion.

The HNP sample being presented in this study is classified diagnostically as neurotic or schizophrenic. Related areas in review include work therapy, psychomotor performance, alcoholic variables, distraction, age and practice effect factors among normals.

Normals and neurotics apparently score more nearly alike than do neurotics and schizophrenics (13). Many of the studies utilized do not differentiate between normal and neurotic performance. There is some evidence that neurotics do comprise a category different from normals and schizophrenics, and there are some implications contained herein.

A. Schizophrenic

It is appropriate to understand what happens to make the schizophrenic and the neurotic inefficient. "Schizo-

phrenia includes a group of disorders manifested by character disturbances of thinking, mood and behavior. Disturbances in thinking are marked by alterations of concept formation which may lead to misinterpretation of reality and sometimes to delusions and hallucinations, which frequently appear psychologically self-protective. Corollary mood changes include ambivalent, constricted and inappropriate emotional responsiveness and loss of empathy with others. Behavior may be withdrawn, regressive, and bizarre" (1, p. 33). It is primarily a thought disorder as opposed to a mood disorder.

"Clinicians agree that most schizophrenics are so inefficient in managing their affairs that they must be hospitalized. The male schizophrenic tends to be too disorganized to maintain an acceptable output of work. Such inefficiency may be due to the interference of cognitive symptoms, or to a problem of motivation" (4, p. 264).

Generally, the neurotic is able to utilize defense mechanisms and thus functions, at least concomitantly, in his work. Most research compares schizophrenics with normals, and, in general, they perform poorer than normals. Hunt and Cofer (13, p. 1023) labeled this decrement as a psychological deficit. They state, "There are two motivational approaches to psychological deficit. The first assumes that the schizophrenic lacks motivation. He is withdrawn, isolated and apathetic. There is simply no interest or involvement in

immediate situations or in the larger social environment. There has been an extinction of standards for performance and of thought skills that have been socially rewarded. Thus the cause of the apathy and isolation is an insusceptibility to the usual rewards of everyday life. This lack of motivation would seem to account for his inefficiency" (4, p. 265).

"The second approach assumes that the schizophrenic is overmotivated; he is extremely sensitive to rebuff or rejection, overreactive to stimuli connoting affect, and excessively anxious. He is easily threatened and sees the world around him as dangerous and potentially destructive. His reaction to a wide range of situations, especially social situations, is to avoid them if he can or to escape from them if already involved" (13, p. 1023).

1. First motivational approach

There presumably is a tendency to be uncooperative, disinterested, and unmoved by the usual rewards given in the laboratory or by pleasing the experimenter (4, p. 264). Cohen and Cohen (9) demonstrated that although neurotics could be verbally conditioned when the experimenter said "good", schizophrenics did not. Cohen (8) hypothesized that an experimentally produced increased motivation will occasion greater improvement in the performance of schizophrenic patients than in normal individuals. His results indicated that schizophrenic deficit was established with assurance

and the addition of shock failed to produce an appreciable effect on the performance of normal subjects. Two generalizations were derived from the findings: (First) Schizophrenics in task situations are inadequately aroused by acquired motivational cues. (Second) This inadequacy can be partially compensated for by substituting primary motivation and reward, (e.g., shock stimulation at onset of task stimulus and termination of shock with completion of correct responses). The findings were interpreted in terms of an inferred process of motivational dissipation during performance by schizophrenics.

The study by Cohen (8) did not indicate whether any, all or none of the schizophrenics were on ataractic-type medication. Neither did it present information as to whether motivational indices were experimenter determined. It was Buss' (4) feeling that normal subjects would show relatively little improvement in performance. He felt normals work near their limit of proficiency under ordinary testing conditions. There would be relatively little room for improvement with experimentally increased motivation, implying that motivation could be increased by (1) urging the subject to do better, thus increasing incentive to do better, or (2) application of an aversive stimuli.

Levanthal (17) found equality of performance under verbal reward or punishment was not shown by either neurotic

and schizophrenic subjects. Neurotics clearly demonstrated learning only, under the combined use of reward and punishment-and-reward alone, indicating the use of punishment to be ambiguous. He found that schizophrenic subjects learned under (1) reward and punishment, and (2) punishment only. This is in close agreement with Cohen (9).

There are variables one might wish to investigate in this study: (1) exact replication of the study of patients who were first admissions with less than four months total hospitalization, (2) medication level which had been established for the two groups of patients, and (3) age variables, which were not delineated.

D'Allessio and Spence (10, p. 390) utilized a speed task in which praise and encouragement were administered for performance. Open ward, closed ward, and normal subjects were used. The experimental group contained one-half of the open ward, one-half of the closed ward, and one-half of the normal subjects. The rest of the subjects constituted the control group. They hypothesized that "schizophrenics are less responsive to positive rewards and motivation than are normals, and hence show less improvement in performance when they are introduced into the experimental situation." The results indicated: "(1) each experimental group performed consistently faster than its respective control group, (2) normals in both groups performed clearly better than all

schizophrenic subgroups, and (3) although not as marked, open ward groups were superior to closed ward groups." It was concluded that "(1) praise and encouragement facilitated performance in all groups, and (2) the magnitude of performance change under these conditions was no different in schizophrenics than in normals."

The researchers made eight studies examining the hypothesis, and 7 out of 8 supported the above conclusions. The experimenter apparently made the decision as to motivational indices.

Fischer (11) showed that aversive stimuli enhanced motor performance by schizophrenics. These findings corroborated Levanthal's (17) work. No information on medication was given in the report.

2. Second motivational approach

The second motivational approach assumes the schizophrenic is overmotivated and therefore is extremely sensitive to rebuff or rejection, overreactive to stimuli connoting affect, and excessively anxious (4).

Evidence to support the theory that social rewards and punishment produce opposite effects in schizophrenics and normals was presented by Olson (19). He was studying failure and subsequent performance by schizophrenics. The study was designed to investigate the comparative effects of positive, negative, and nonevaluative verbal statements on the per-

formance of schizophrenics and normal subjects. Motivation, not efficiency, was the main concern of the study. Tranquilized subjects were used and distributed uniformly among the three groups. Results disclosed schizophrenics less motivated under detrimental effects than under praise. Hypersensitivity to failure by schizophrenics is reported in the study. Findings were somewhat different from other reported investigations and contrary to the second motivational approach. It should be noted that tranquilized patients were used in this study. There is no indication that tranquilized subjects as a group were measured against nontranquilized subjects. It would appear that such a comparison might have given some valuable information.

The effects of prior experimenter-subject relationships on reinforced reaction time of schizophrenics and normals were studied by Berkowitz (3). He hypothesized that schizophrenic reactivity to social incentive may be increased in the context of a positive interpersonal relationship, and that they may be motivated, in experimental tasks, to gain approval of an individual with whom they have established such a relationship. This study attempted to test the validity of the hypothesis by comparing effects of two forms of prior experimenter-subject relationships.

Results showed that only those schizophrenic subjects in warm environmental test conditions with the experimenter

had significantly slower reaction times. The two variables, reaction time as opposed to task performance, are separate and distinct in function. A question would be raised as to the appropriateness of using a motivational variable with reaction time since it is a reflex and not a controlled action.

Buss (4, p. 265) states, "Most clinicians agree that the outstanding symptoms of schizophrenia are in the cognitive and motor areas; (1) the motor symptoms consist mainly of aspects of social withdrawal: Fear of others, isolation from others, and avoidance of close contact or any contact at all, and (2) the motivational approach assumes that motivational variable (rewards, punishments, and drives) account for the subsequent development of cognitive symptoms." Cognitive theories are based on an impersonal model; and all cognitions are important, not merely those involving others. The fundamental defect lies in schizophrenic perceptions, associations and concepts. Interference theory emphasizes cognition and neglects motivation; and therefore inadequacy, rather than lack of motivation, is believed to be the basic trouble.

A later study by Buss and Lang (5) concluded that schizophrenics perform less adequately than normals on performance tasks. Data on the use of both positive and negative urging do not support a motivational interpretation of

deficit. Buss and Lang (5) found that normals, schizophrenics, and brain-damaged patients all tend to respond with equal improvement on these conditions.

Stotsky (22) reported that neither motivational nor organic variables supported hypotheses concerning psychomotor impairment of performance by schizophrenics and normals. Positive reinforcement apparently produced performance improvement by schizophrenics on shorter and easier tasks but less improvement on complex tasks.

Schlehta, Gwynn and Peoples (21, p. 225) showed that "when such casual social reinforcers as nods of the interviewer's head, or 'mmm-hm' follow particular verbal behavior, normal subjects yield a significantly greater percentage of criterion responses than do schizophrenics."

Buss and Lang (5, p. 7) conclude, "The deficit, then, is not in the schizophrenic's ability, but in his motivation. It follows that if the schizophrenic could be urged to cooperate, or, if he were given appropriate incentives, rewards or punishments, his performance would equal that of normals." The key to Buss' conclusion apparently lies in the term "appropriate incentives, rewards, or punishments". Topping and O'Connor (23) reported that monetary reward improved the performance of normals on a serial anticipation task but non-paranoids did not improve and paranoid schizophrenics worsened under the same conditions.

Rewards were found to be relatively ineffective as a motivation for learning and punishment eventuates decrement according to Johannsen (14). Significant differences were found in the interaction of trials, diagnostic category, and reinforcement. Medication reportedly had no effect on performance in the learning tasks.

B. Neuroses

"The neuroses, as contrasted to psychoses, manifest neither gross distortion or misinterpretation of external reality nor gross personality disorganization. . .traditionally, neurotic patients, however severely handicapped by their symptoms, are not classified as psychotic because they are aware that their mental functioning is disturbed" (1, p. 39).

Studies involving motivation and performance of psychoneurotic populations are more difficult to research. Prior information leads us to believe this diagnostic category is often included in normal populations. This group of persons do not always find their way into hospitals. When they do, they often present a complexity of complaints.

Buss (4, p. 46) states, "A neurotic symptom is an observed reaction or complaint that does not constitute a clean break with reality (e.g., worry, pain, inability to concentrate, recurrent thoughts and phobias). They can be transient in nature, disappearing when precipitating stresses disappear,

or they can exist continuously and/or recur periodically.

The cognitive areas, restricted to man, include thought processes which are essentially intact in neurosis (e.g., thinking, planning, imagining, inventing, remembering, dreaming, labeling). The exception is memory, which may show a large deficit, especially in hysteria. The other thought processes are not aberrant in neurosis, although the content may be deviant (e.g., worry about catastrophes, dreadful possibilities or perhaps nightmares). Thought processes are disturbed only in psychosis, whereas thought contents are disturbed in both neurosis and psychosis.

The motor reaction system includes all muscular responses, both skeletal and vocal, that interact with the environment. These responses fall under the heading of instrumental behavior, the term 'instrument' meaning that they move the individual closer to or farther from rewards or punishments. Further, Buss divides the motor reactions into two types: (1) social, involving the behavior of one or more persons. These are considered very important to adjustments because the most potent rewards and punishments come from persons. (2) nonsocial, involving objects and events, but not persons. These are in relation to the environments of job, school, and play (4, p. 48).

Neurotics display several kinds of motor symptoms. One type is faulty learning and another is faulty modulation,

signifying either over-activity or under-activity.

Maslow (18) arranged basic needs in a hierarchy of prepotency. His hierarchical concept is useful in explaining many aspects of normal and neurotic behavior. He does not stress individual differences, but these certainly are of considerable importance. Motivation theory utilizes some of these basic needs and need gratification. Roe (20, p. 29) states, "Basic needs are considered to be instinctoid in nature. . .not the same sort of instinctive behavior found in lower animals." She further states, "A satisfied person is one for whom there are readily available the means for satisfying all his basic needs, whenever he develops an appetite for any of them. Early frustration frequently tends to initiate neuroses and therefore blocks the satisfying fulfillment of these 'appetites'."

C. Age Factors

King (15) found that age probably made the most profound effect on the motor performance of neurotics. When dexterity movements of subacutes were compared with normals, an increase in dexterity was found during practice trials for both groups. There were significant differences at the .01 level in the direction of retarded performance by the subacute group. He found the performance tended to resemble the normal group more than the chronic group. Pseudoneurotic schizophrenic groups showed greater deterioration on psychomotor

test performance when the subacute group was divided into neurotic and pseudoneurotic schizophrenic groups. Most gains made on repeated performance were made in the early practice series (15).

D. Work Therapy

Work is the method by which status in our culture is often achieved. Personal integration often results from satisfactions gained therein. Personality disintegration is the result of satisfaction deprivation or destruction. Work therapy programs with emotionally maladjusted have achieved therapeutic success primarily as a result of ego-building and self-respect. These programs usually follow symptom reduction and consist of tasks with differing levels of difficulty. It is an individual rehabilitation program geared to the maximum of self-attainment the person can achieve. Repetition of mass production often frustrates the normal person but may prove extremely functional for the emotionally disabled. Centers (6, p. 212) states, "All groups, urban as well as rural, high as well as low, indicate by frequency of their performance that independence or freedom from supervision is a highly prized and much valued circumstance." If the emotionally disabled can attain such status, his self-concept and self-actualization has reached the near pinnacle of personal success. Routine and repetition often epitomize attainable goals for the person who is frustrated

by the complex and the creative.

Motor performance is a physical activity which can be impaired physically, emotionally, or chemically. Physical and chemical impairment is not an issue here. Measurement of emotionally disabled by the GATB is the specific issue. Studies which involve GATB and neuropsychiatric patients are not numerous. There have been some studies and certainly it would not be misleading to expect more in the future. It is appropriate to discuss variables which could affect GATB and other similar type motor performance measures.

Fleischman (12, p. 450) sets forth a list of major factors in psychomotor performance. Among those he lists are factors which are considered important to this study. They are "(1) reaction-time; (2) arm-hand steadiness; (3) finger dexterity; (4) manual dexterity; (5) fine psychomotor coordination." It is appropriate to investigate two of the factors: finger dexterity and manual dexterity. The research Fleischman did was with Air Force personnel. The involvement of these aptitudes are just as applicable to the emotionally disabled in their effort to become rehabilitated. It is also appropriate to note that motivational variables discussed encompass these two dexterity measurements, as well as others.

E. Alcoholics

Kish and Cheney (16) found that 90 alcoholic patients did not score as well as normals on GATB. No verbal motivation was used with the alcoholic group. Their hypothesis indicated the GATB would be expected to reflect sensitivity to Central Nervous System dysfunction. The hypothesis was accepted. Impaired functioning was found on subtests measuring motor performance skills. Apparently the subjects in this study were taking medication and research information is not available as to drug effect on GATB motor performance scores. No indication was made whether any clinical diagnosis other than "alcoholism" was present for any of the 90 subjects.

F. Dexterity

A pilot study by Warman and Myers (25) compared GATB finger dexterity (F) and manual dexterity (M) scores between 131 HNP and 131 normal USES walk-in clients. There were no attempts to motivate either group. Results showed performance deficits similar to those found by Kish and Cheney (16). They do not support the hypothesis that subnormal GATB F and M subtest scores may reflect sensitivity to Central Nervous System dysfunction as medical records did not reveal dysfunction in the nonalcoholic population. Inspection by Warman and Myers (25) on the same pilot study indicated that age and diagnostic indices apparently do affect GATB motor performance scores. Limited numbers preclude statistical assurance that

this is a stable pattern.

Age factors, as referred to by Myers, have been researched for normal populations (24) but not psychiatric populations. The largest decline for subtests P, F, and M in normals begins at about age 32 and continues throughout the years. The norm groups do contain women in the sampling. The trend of mean scores for the two sexes did not differ significantly except on aptitude N.

King (15) reported that motor performance does not dissipate until about age 70. This is incongruent with the research presented by those individuals who collected GATB data.

G. Distraction

Distraction was demonstrated by Chapman and McGhie (7) to be especially disturbing to schizophrenics on several different motor tasks. He found that tasks involving only motor speed were not deteriorated by distraction.

H. Practice Effect

The practice effect variable should be considered in the evaluation of motor performance. It has been reported by the U.S. Department of Labor (24) that retesting with the same or alternate form of an aptitude test usually produces improved scores. Practice effect results from familiarity with test content or the testing situation gained in initial testing. Anastasi and Foley (2, p. 93) point out, "Such factors as education and test-wisness may be related to differences

between scores on initial testing and retesting. To the extent that individuals differ in the amount of practice effect tends to depress test reliability coefficients." Reliabilities of aptitudes F and M were found to be generally lower than the reliabilities of other aptitudes for normal students and adults. "Practice effect tended to be greater for aptitude F and M than for other aptitudes" (24, p. 31).

I. Summary

Studies pertaining to motivation and motor performance have been reported under many varied conditions. Studies reviewed tend to relate differences between normal and neurotic/schizophrenic populations. Use of operant work conditions are few. Experimentally produced motor tasks appear to be the most feasible method of studying motivation and performance. Investigators have been unique in their approach to the study of motivation, and this probably helps explain the lack of conformity in the collective results. It would seem valid to assume that where replication is possible, results are similar. Unfortunately, exact replication does not exist very often due to the multi-faceted variables encountered when working with emotionally disabled persons.

Psychological deficit among schizophrenics apparently is one of the more valid and research-supported theories

encountered in the major literature. Whether motivational variables can be introduced which might transgress psychological deficit remains questionable. Negative stimuli reportedly is the most successful method in the attempt to motivate better performance in schizoprenics. Normals tend to respond more efficiently to positive stimuli, and neurotics apparently react more like normals in response than like schizophrenics. Few major studies have dealt directly with motivational rewards of a monetary nature on the motor performance involved in dexterity testing. Perhaps even more intriguing is the lack of information relating to methods of motivational indices selection. The use of GATB and HNP research material is not plentiful. GATB norms do not specifically include psychiatric patients in the literature and thus its validity for HNP is at best, very questionable. Indirectly some psychiatric scores may be included in the norms if they were clients of the USES and not hospitalized at the time.

GATB research on normal populations indicate that GATB scores decline with age, but that the largest decline was found in GATB subtests "P", "F", and "M". These scores show little or no decline until about age 32.

Practice effect for GATB "F" and "M" scores show a definite increase when the time interval is short, but levels off from about one year to three years with about a 6.5 point

mean increase. Even though there were pronounced changes in the increase of means, there was very little change in the coefficients of reliability. The longitudinal study was a test-retest project.

The related studies presented herein indicate a need for further research of the multiplicity of variables which are confronted in the attempt to motivate HNP.

III. INVESTIGATION

A. Objectives

The objectives of this study were: (1) to observe whether or not motivational rewards would yield significant differences on GATB subtests "F" and "M" performance; (2) to observe relationships between diagnostic groups and age categories of the experimental study group; (3) to be alert to any and all variables or information derived from results obtained in the study which might lend further clarification to the problem being studied.

B. Hypotheses

Reasons for low HNP GATB subtest "F" and "M" performance could be provided. The difficulty involved was the question as to which reasons were valid, and of the valid reasons, which were most appropriate to investigate. Three questions stated in the form of null hypotheses to investigate the problem were:

H_{0_1} : Test the hypothesis that there were no significant differences on HNP GATB subtest "F" and "M" scores between an experimental group and a control group.

H_{0_2} : Test the hypothesis that there were no significant differences on HNP GATB subtest "F" scores between diagnostic

subgroups and age subgroups of the experimental study group.

Ho₃: Test the hypothesis that there were no significant differences on HNP GATB subtest "M" scores between diagnostic subgroups and age subgroups of the experimental study group.

√

IV. METHODS OF PROCEDURE

A. Subjects

One hundred and four hospitalized neuropsychiatric patients (HNP) from the Veterans Administration Hospital, Knoxville, Iowa, took part in this study. Two sample groups of 52 HNP each were used.

The experimental group of 52 HNP was the motivational reward group, randomly selected from veterans eligible for the study. Both groups contained 26 HNP patients who were clinically diagnosed as psychoneurotic and 26 HNP patients who were diagnosed as schizophrenic. Within each of the two diagnostic groups were 13 HNP who were between the ages of 18 and 41 and 42 and 54.

A control group of 52 HNP did not receive self-determined motivational rewards. This sample was randomly selected from HNP who met eligibility requirements and who had been referred to the Des Moines USES office for job-placement or training prior to the study.

Eligibility for selection to either the experimental or control group was based on the following selection criteria: (1) the HNP would be eligible for routine referral for vocational counseling services; (2) the HNP would have a primary diagnosis of psychoneurotic or schizophrenic; (3) the HNP would be between the ages of 18 and 54; (4) the HNP was receiving a maintenance dosage of medication; (5) the

HNP would be assigned to an industrial therapy work assignment on a continuous basis.

Clinical diagnoses were corroborated verbally by the building physician, social worker, and psychologist. HNP with questionable diagnoses were not included in the study. The diagnostic group of schizophrenics included paranoid, simple, catatonic, and hebephrenic types. The diagnostic group of psychoneurotics included anxiety reactions and depressive reaction types.

B. Methods

The pilot study by Warman and Myers (25), which utilized 131 HNP and 131 USES walk-in clients, served as the basis for further investigation. The significant differences revealed in the pilot study comparison of GATB subtest "F" and "M" means provided the base scores on which the current study was proposed. The recorded GATB "F" and "M" subtest means for the pilot study HNP group were utilized as a base from which increased motor performance would be measured in the current study. The pilot study mean for GATB subtest "F" was 72.7 and for GATB subtest "M" was 67.4.

The amount of improvement required to earn a reward was determined by the standard deviation recorded on GATB subtests "F" and "M" for the pilot study group of HNP. The standard deviation for HNP pilot study GATB subtest "F" was 22.4 with a one-half standard deviation of 11.2. The

standard deviation for HNP pilot study GATB subtest "M" was 24.6 with a one-half standard deviation of 12.3.

Two levels of reward were made available to each HNP in the experimental group. A "low-reward" could be earned by scoring a GATB subtest "F" score of 84, and a GATB subtest "M" score of 80. A "high-reward" could be earned by attaining a GATB subtest "F" score of 95, and a GATB subtest "M" score of 92. HNP were required to meet both of the low-reward minimum scores of 84 and 80 to earn the low-reward. The HNP must meet both the GATB "F" and "M" high-reward scores of 95 and 92, respectively to earn the high-reward. The low-reward was earned if HNP met one low-reward score and one high-reward score.

Some prior studies reviewed, which utilized incentive rewards, inferred that the rewards were investigator-determined. It seemed reasonable to assume that not every one could or would be motivated by what the investigator considered motivating. The decision was made that rewards would be determined by each individual HNP in the experimental group. Each of the HNP assigned to the experimental group was interviewed and given an opportunity to accept or reject taking part in the study. If he chose to accept the role of a subject in the study, he was then allowed to select his own reward. The reward was defined as something of value to the patient which he felt would motivate or

effect a desire to attain the highest score he was capable of scoring on GATB subtests "F" and "M". HNP did not know prior to testing what the reward level scores were. A sample survey was utilized with a group of HNP who were eligible for the study to determine what types of reward appeared to be most desirable, and the level or amount. The results of the survey were used as a suggestion list for the later study participants, who were not restricted to just that list. If there were other rewards which were felt to be more motivating to the individual HNP, he could name them. The only restrictions placed on rewards were: (1) it must conform to hospital regulations; and (2) it must be reasonable in value or amount so that it would be within the means allotted for the project. The sample survey form suggestion list form appear in the Appendix.

GATB subtests "F" and "M" were administered immediately following the personal interview with the investigator and the reward selection by the HNP. Proper GATB test administration protocol was followed while giving the GATB subtests "F" and "M". Rewards were given to participants who earned them within a week following completion of all testing. Payment delay was necessary due to administrative regulations concerning leaves of absences, industrial work therapy assignments, and fiscal payment vouchers.

Data were collected and recorded on VA Form 7015C

"Data Sheets". The data sheets were coded according to GATB subtest form, diagnostic category, age classification, and compensation level. The information was delivered to the statistical consultant at Iowa State University, Ames, Iowa, who in turn submitted it to the computer center at the university. Proper statistical design for an analysis of variance and an analysis of covariance was programmed and the data were computed mechanically. Print-out sheets were provided for statistical interpretation. The significance level for this study was set at $P < .05$ level.

V. RESULTS

Deficits observed of HNP GATB subtests "F" and "M" scores over a period of three years prompted a comparison of the competitiveness of such scores. Table 1 shows the means and standard deviation for 131 HNP and 131 USES walk-in clients from the Des Moines office which comprised the pilot study by Warman and Myers (25). The table also indicates the amount of increase required by the standard deviation and GATB subtest "F" and "M" scores to earn the motivational reward. Inspection of the means and standard deviations reveal that the minimum converted GATB subtest "F" and "M" scores are 84 and 80, respectively. GATB percentiles for adults (24) list a GATB subtest "F" score of 84 at the 21st percentile and a GATB subtest "M" score of 80 at the 16th percentile. The minimum low-reward for both subtests were still recorded in the low quartile on the norms, but permitted HNP to meet minimum scores for many occupational aptitude patterns (OAP). GATB percentiles for adults (24) list a GATB subtest "F" score of 95 at the 40th percentile, and a GATB subtest "M" score of 92 at the 35th percentile. Both minimum high-reward score requirements were placed in the third quartile on GATB norms. These minimum scores would enable HNP to be competitive on most GATB occupational aptitude patterns for which they might be seeking training or job-placement.

Table 1. Means and standard deviations of a comparison of GATB subtest "F" and "M" between 131 HNP and 131 USES walk-in clients

GATB	HNP veterans		USES clients		One-half s.d. increase	One s.d. increase	Required GATB score for reward
	Mean	s.d.	Mean	s.d.			
"F"	72.7	22.4	99.1	22.2	11.1	22.2	84 (low) 95 (high)
"M"	67.4	24.6	106.2	24.6	12.3	24.6	80 (low) 92 (high)

Observations of performance deficit by HNP revealed by the means in Table 1 indicate that HNP need improvement if they are to compete adequately with USES walk-in clients for training or job-placement when GATB scores are utilized as part of the qualifying criteria.

An experimental and control group of HNP were tested by means of GATB subtests "F" and "M" to investigate the effects of self-determined motivational rewards. Table 2 presents the means and standard deviations of GATB subtests "F" and "M" for diagnostic classifications and age groups in the experimental and control groups. Neurotic 18 to 41 year old HNP who had been offered self-determined rewards scored higher means than did the group on GATB subtest "F". All other diagnostic-age groups reveal that control group HNP score higher means on GATB subtest "F". No inference can be drawn other than the subgroup of young neurotics perform at a faster rate on the finger-dexterity task when a self-determined motivational reward was offered. It was significant to observe that young control group schizophrenics scored higher than their older neurotic and schizophrenic counterparts.

GATB "M" data in Table 2 reveals that HNP in the experimental schizophrenic subgroups scored higher means than did the schizophrenic control subgroup with age apparently not a factor. It was interesting to note that neurotics

Table 2. Means and standard deviations of GATB "F" and "M" subtests for experimental and control groups

	Age	Neurotic		Schizophrenic	
		Control	Experimental	Control	Experimental
GATB "F"					
Mean	18-41	75.2	78.7	73.9	64.4
	42-54	72.4	59.8	67.4	53.9
s.d.	18-41	22.1	33.2	18.6	21.8
	42-54	14.7	18.5	11.9	22.7
GATB "M"					
Mean	18-41	75.3	75.1	66.3	70.9
	42-54	67.4	51.5	58.5	62.2
s.d.	18-41	28.9	35.1	27.7	20.6
	42-54	17.4	27.1	32.5	30.3

were the only 42 to 54 year old age subgroup to score higher than a younger diagnostic classification. They scored higher than the young control group schizophrenic subgroup. It is significant to note that young neurotics of both study groups scored the highest means on GATB subtests "F" and "M".

An observation of the means of both GATB subtests "F" and "M" begin to reveal an apparent factor in HNP performance

ability. All young diagnostic subgroups scored higher than their older counterparts.

GATB subtests "F" and "M" results for treatment groups of HNP are shown in the analysis of variance in Table 3. When independent variables of the higher scoring GATB subtest "F" and "M" neurotic diagnostic subgroup, the 18 to 41 year age group, the control group, and the interaction therein were investigated, only the 18 to 41 year age group produced a significant difference. It is apparent that the motivational reward variable was influenced by age, whereas it was not influenced by diagnostic classification.

The ANOV did not reveal any significant difference when the experimental group was compared with the control group as a whole.

It was interesting to note that even though the young age did influence the reward variable, it apparently did not influence the interaction of the other independent factors with dependent variable of self-determined rewards.

Age and diagnosis were considered as factors which could influence GATB scores on subtests "F" and "M". Investigation of the two factors were desirable in order to study their effects on the experimental groups.

The analysis of variance shown in Table 4 for GATB subtests "F" and "M" experimental group reveals that age, as an independent variable produced a significant difference

Table 3. An analysis of variance of GATB subtests "F" and "M" means for HNP experimental and control groups^a

Source	d.f.	Sum of squares		Mean square		F	
		"F"	"M"	"F"	"M"	"F"	"M"
Treatments	7	6466.8	6380.6	923.8	911.5	2.0	1.34
A (Neur)	1	1164.5	243.1	1164.5	243.1	2.56	.36
B (18-41)	1	2423.1	3852.7	2423.1	3852.7	5.33*	5.67*
C (Control)	1	1648.0	1028.2	1648.0	1028.2	3.62	1.51
A x B	1	139.4	404.0	139.4	404.4	.30	.59
A x C	1	660.1	118.4	660.1	118.4	1.45	.17
B x C	1	297.8	323.1	297.7	323.1	.66	.48
A x B x C	1	234.0	412.0	234.0	412.0	.56	.61
Error	96	43610.0	65176.3	454.27	678.9		
Total	103	50076.9	71556.9				

^aModel I is the fixed group.

$$y_{ijkl} = \mu + A_i + B_j + C_k + (AB)_{ij} + (AC)_{jk} + (BC)_{jk} + (ABC)_{ijk} + Se/_{ijk}$$

*P < .05 F 1,103 3.93

Table 4. An analysis of variance of GATB subtest "F" and "M" for an experimental group of HNP^a

Source	d.f.	Sum of squares		Mean square		F	
		"F"	"M"	"F"	"M"	"F"	"M"
Treatments	3	4282	4028	1427.3	1342.6	2.4	1.6
A (Age)	1	2807	3201	2807	3201	4.6*	3.9
B (Diag)	1	1320	11	1320	11	2.2	.01
AB	1	157	816	157	816	.3	1.0
Error	41	29286	39719	610.1	827.5		
Total	51	33570	43747				

$${}^a y_{ijk} = \mu + A_i + B_j + (AB)_{ij} + Se/ij$$

$$*P < .05 \quad F_{1,48} \quad 4.04$$

on GATB subtest "F". The two diagnostic classifications apparently did not influence the effect of the self-determined rewards on motor performance, but did approach significance. The total age group interaction with diagnostic categories did not significantly affect the performance.

It is apparent from the results reviewed in all four tables that age is a very important and significant variable in the ability of HNP to increase performance on GATB subtests "F" and "M".

Compensation level was observed as a point of interest and the results of amounts of compensation received by HNP

was analyzed by means of an analysis of variance. Compensation level apparently had no effect on main effects of the neurotic diagnostic group, the 18 to 41 year old age group and the study control group. There were significant differences observed in the interaction of all main effects except the combination of the 18 to 41 year age group and the control group. Strangely enough, none of the three main effects approached significance, even though some of them revealed significant differences when interacting with one another.

Table 5. An analysis of variance of HNP compensation effects^a

Source	d.f.	Sum of squares	Mean square	F
Treatments	7	176364.3	25194.9	3.14
A (Neurotic)	1	5082.0	5082.0	.63
B (18-41 age)	1	4277.8	4277.8	.53
C (Non-motiv)	1	7128.1	7128.1	.88
A x B	1	55800.8	55800.8	6.96*
A x C	1	49853.2	49853.2	6.20*
B x C	1	4806.2	4806.2	.60
A x B x C	1	49416.2	49416.2	6.20*
Error	96	769352.5	8014.1	
Total	103	945716.8		

^aModel I is the fixed group.

$$y_{ijkl} = \mu + A_i + B_j + C_k + (AB)_{ij} + (AC)_{ik} + (BC)_{jk} \\ + (ABC)_{ijk} + Se/ijk$$

*P < .05 F 1,103 3.93

Compensation level observed in this study was a factor which was not used in relation to the main objective of the study. It was a factor which appeared to have a relationship but failed to show such an anticipated relation. Further study of the compensation variable would be in order.

Interaction of the various main effects appeared to be necessary in all but the young experimental and control groups to achieve significance. The main effect, neurotic diagnostic subgroup, appeared to be the catalyst for achieving significance as it was present in all the interactions where a significant difference was observed. This was not surprising due to the short-term nature of most HNP neurotic hospitalizations and the ensuing lack of compensation which accompanies it. The same principle could be applied to the more severe psychotic type patients in that a high level of compensation would more likely be available for a long period of time which might account for further significant differences.

Age was becoming more than just an implication in the study concerning motivational reward effects on GATB "F" and "M" subtest scores. It was desirable to investigate the influence of age more closely in an effort to determine its influence.

The analysis of covariance technique using age factors as the covariate is presented in Table 6. The covariate, or

Table 6. An analysis of covariance test for significance on GATB subtest "M"^a

Source	d.f.	Sum of squares	Mean square	F
Treatment	4	6325.5	1581.1	2.4
CV (Age)	1	4770.1	4770.1	7.24*
A (Neurotic)	1	414.6	414.6	.62
C (Non-motiv)	1	1097.4	1097.4	1.67
A x C	1	42.0	42.0	.06
Error	99	65231.4	658.9	
Total	103	71556.9		

$$a_y = \mu + CV + A + B + AB + 0$$

$$*P < .05 \quad F_{1,103} \quad 3.93$$

age variable was held constant and the ensuing significance indicated that age did influence the other two independent variables in their relationship to motivational rewards as an incentive for increased performance on GATB subtest "M". The same measurement was computed for GATB subtest "F" and no significance was observed for any of the main effects or interaction.

The analysis of covariance was then computed and age factors were withheld. No significant differences were observed.

The observation of age factors in Table 6 further sup-

port the importance of the age factor as it relates to GATB subtests "F" and "M" performance. The problem researched is further compounded by these results in that the aging process is a natural phenomena and is irreconcilable insofar as any corrective measures are concerned. The results substantially support the assumption that methods of evaluating vocational potential other than GATB subtest "F" and "M" scores need to be devised for older HNP.

VI. DISCUSSION

The review of literature on the effects of motivational rewards on motor performance revealed support for both positive and negative stimuli as having a responsive effect. Negative stimuli apparently had stronger research support from investigators reviewed as influencing variable on schizophrenic-type groups. This study utilized positive stimulus, in that HNP were being motivated by means of self-determined rewards for increased motor performance as measured by GATB subtests "F" and "M".

GATB subtest "F", finger dexterity, represents fine-motor manipulation of objects by the fingers and hands. It is a more precise and exacting type of motor response which could be seriously impeded by anxiety or cortical impairment. GATB subtest "M", manual dexterity, utilizes a gross muscle activity by the hands and arms in the performance of a motor task. Tension, anxiety, and cortical impairment could also impede motor performance of this type.

The need for a comparison of HNP and USES walk-in client GATB scores was detected by staff personnel at VAH, Knoxville, Iowa, as a result of low HNP GATB subtest "F" and "M" scores over a period of three years. The comparison indicated that HNP were severely handicapped in their efforts to obtain training and job-placement of their choice when GATB scores were required as part of the qualifying data.

The evidence of low HNP GATB "F" and "M" subtest scores presented in Table 1 provided a basis for which further study could be made. The results raised the question as to how much improvement was necessary to give HNP a competitive score. The standard deviation unit of HNP GATB "F" and "M" subtest scores was a stable measurement and could be easily adapted to use. The application of the one-half and the one full standard deviation as the unit of measurement by which scores needed to be improved resulted in the GATB subtest "F" low-reward being established at a converted GATB score of 84 and the high-reward at a converted GATB score of 95. Converted GATB "M" scores were established at 80 for the low-reward and 92 for the high-reward. When the reward level scores were converted to percentiles it became pertinent to note that many low-reward levels were then competitive at occupational aptitude pattern (OAP) minimums. The occupational aptitude pattern minimum scores were not conceived as cutting scores, but rather as the lower limits for which GATB norms could be considered as prediction coefficients. If higher scores could be achieved the ensuing consideration for training and job-placement at all levels of endeavor could be of psychological value to the confidence of HNP when seeking disposition from the hospital.

The task of deciding how much improvement was needed

was much simpler than the task of how to produce the improvement. There were several variables that could affect GATB scores, but were not considered feasible for the initial investigation. Motivation to expend maximum effort on the motor performance task involved in GATB subtests "F" and "M" had been questioned by staff personnel often. Motivation to do well seemed like a logical factor to investigate as one of the means of attempting to improve scores. Institutionalization was a factor which could affect motivation in that there were many tangible and intangible benefits from being hospitalized. Rewards which might be used to motivate HNP to improve themselves vocationally and subsequently leave the hospital appeared to be the immediate focal point of the endeavor.

Two groups of HNP were compared with the control group not receiving rewards for performance on GATB subtests "F" and "M", and the experimental group given self-determined motivational rewards for achieving pre-set levels of performance. The means were observed in Table 2, and GATB subtest "F" showed 18 to 41 year old neurotics as performing better than all the other control subgroups. GATB subtest "M" revealed that schizophrenics in the experimental subgroups scored higher under motivational incentive than did the schizophrenic control subgroups. It was significant to consider implications therein when evidence showed that all

18 to 41 year old age groups scored higher means than their older diagnostic counterparts. The implication that age factors might have considerable influence on GATB subtest "F" and "M" performance was yet to be accepted as valid, but the possibility was definitely in evidence.

The initial comparison deemed appropriate was an analysis of variance of the experimental and control groups, both as wholes and as subgroups. The null hypothesis (H_{01}) which stated, "test the hypothesis that there were no significant differences on HNP GATB "F" and "M" subtest scores between an experimental group and the control group", was tested. The null hypothesis was accepted for both GATB "F" and "M" subtests. The F-test did approach significance on GATB subtest "F", however, at the $P < .05$ level, with an F of 3.62.

These results indicated that self-determined rewards did not motivate the HNP experimental group to perform at a faster rate than the HNP control group, which was not motivated by self-determined rewards. A review of prior studies reflected results indicating that normals and neurotics tend to score alike (13), and thus, little improvement by positive rewards might be accomplished. Others reported schizophrenics more responsive to aversive stimuli, rather than such positive-type stimuli as rewards for performance (11, 17). The only inference which could be drawn is the possibility of reward

influence on the basis of the GATB subtest "F" comparison which approached significance. There was no real indication of the type of influence, positive or negative, the rewards might be exerting.

Additional questions were posed which took form in the second and third null hypotheses (H_{02} and H_{03}). Briefly, test the hypothesis that there were no significant differences on GATB subtest "F" (H_{02}) and "M" (H_{03}) scores between diagnostic classification (main effects of B) subgroup and age subgroup (main effects of A) subgroup of Table 5. The implication suggested earlier of the influence age might exert on GATB "F" and "M" subtest scores were supported in that significant differences were found for GATB subtest "F", while GATB subtest "M" approached significance. Diagnostic category apparently exerted little or no influence as no significance was observed. The implications of these results indicated a need to break the larger groups down into subgroups for a more precise analysis of variance of the experimental group.

The analysis of variance on GATB subtest "F" and "M" means for treatment groups of HNP shown in Table 3, disclosed significant differences for the 18 to 41 year age group. These results are interesting in that GATB literature indicated a performance deficit occurring in normals as the aging process took place (15). No other main effect, or

interaction approached significance in the study. The implications of these findings are important in the study of HNP performance. If older HNP cannot adequately perform on the motor tasks of GATB, it will seriously impair his ability to obtain jobs or training where he must meet GATB competition. A means by which to evaluate motor skills on an individual work-therapy program basis may be the most efficient solution to the problem.

Compensation is a variable which staff personnel have considered a negatively imposing force on the motivation of HNP towards vocational rehabilitation. Table 5 disclosed that compensation levels provided no significant differences rates within the main effects measured. It did show that where interaction among all three main effects and compensation was considered, a significant difference was found. The only exception to these findings were in the interaction of the 18 to 41 year age group and the control group where compensation was a factor. The implication of significant interactions suggests that the main effects, of and in themselves, are not so important when compensation is considered. When compensation is considered with the influence of a combination of main effects, as shown in Table 5, however, there is considerable influence to be considered. A question which remains to be investigated resulting from the implications, is whether or not low compensation and

short-term hospitalization is more influential than high-compensation and long-term hospitalization or, the determination of the severity of illness of the HNP is an important consideration, as this is the factor which often determines the amount of compensation awarded. An additional factor which might influence compensation rates is that of the veteran's service-connected status. This is determined by whether or not the HNP's illness was directly related to his military service. If the illness were service-connected, the compensation award was usually much higher than those who had a nonservice-connected illness.

This study concerned itself primarily with comparisons of variables when motivational rewards were used with an experimental group and no rewards were used with the control group. The computation of age factors of experimental and control groups as an independent variable was considered desirable as an ancillary independent measurement. The analysis of covariance observed in Table 6 supported the previous implications of age as an influential factor in HNP inability to perform well on GATB "F" and "M" subtests. The results do not contradict studies by others who report age as a debilitating variable on motor performance when measured by GATB subtests "F" and "M" (15, 24). A realistic view must be assumed on this variable. Even though age does appear to negatively affect motor performance by HNP, the

fact remains that younger HNP do not score well when compared with young, normal USES walk-in clients as shown in Table 1. This suggested the need to consider factors other than what has been discussed so far.

There were other variables which could be considered important in the attempt to research the problem of deficient GATB subtest "F" and "M" scores by HNP.

Medication level was considered to be very important in the attempt to discover causes for depressed HNP GATB scores. It was thought that such a study should be an independent effort because of the longitudinal nature of the undertaking. It is a study which would present many administrative problems due to the differing philosophies by medical staff members who would necessarily be involved.

"Psychological deficit", if it exists, is another question which could be considered in ascertaining motor performance levels of schizophrenic HNP. Investigators have made several efforts to report on "psychological deficit" and have established the definite possibility of its existence and influence on motor performance.

By way of summary, the study of the effects of self-determined motivational rewards on HNP GATB "F" and "M" performance revealed that: (1) there were no significant differences observed on GATB subtest "F" and "M" scores between experimental and control groups of HNP, thus

accepting the first null hypothesis (H_{01}); (2) there was a significant difference observed on HNP GATB subtest "F" between diagnostic classification groups and age groups of HNP who had been offered motivational rewards of their own choice for performance increase. No significant difference was observed for the same subgroups on GATB subtest "M". Thus, the second null hypothesis (H_{02}) was rejected and the third (H_{03}) was accepted; (3) there were significant differences observed on HNP GATB "F" and "M" scores where the 18 to 41 year age group was compared. This result was independent of the main hypothesis of the study; (4) there were significant differences observed on GATB "F" and "M" subtests when compensation and main effects interaction was measured in the analysis of variance shown by Table 5; (5) there was a significant difference observed on GATB subtest "M" when total ages were utilized as the covariate with the main effects A and C, as shown by Table 6. No difference was observed for GATB subtest "F". There were no significant differences when age was held constant in the analysis of covariance.

It can be stated that motivational rewards did not increase motor performance by HNP as measured by GATB subtests "F" and "M". It may be stated that age does affect motor performance in that younger HNP tend to score better under the reward system than do their older counterparts.

Contrarily, diagnostic classification and age did not produce significant differences. Recommendations for further investigation were made and appeared to be justified as a lack of conclusive evidence that undermotivation depressed motor performance by HNP was indicated.

CHAPTER VII. SUMMARY

Hospitalized neuropsychiatric patients (HNP) General Aptitude Test Battery (GATB) scores observed over a three-year period were considered as being too low to effectively compete for job placement and training with normal United States Employment Service (USES) walk-in clients at the Des Moines, Iowa, office. These observations precipitated a pilot study by Warman and Myers (25) which compared 131 HNP with 131 USES walk-in clients on GATB. The results of the study revealed that significant differences were scored on all nine subtests of GATB with the USES clientele scoring higher scores. The most significant of the results observed was the extremely high differences observed on subtests which measured motor performance. This was significant because it involved GATB subtest "F" and "M" scores which measure finger dexterity ("F") and manual dexterity ("M"). Both of these measurements are considered extremely important to HNP as they are included in virtually all occupational aptitude patterns (OAP) which make up aptitude requirements for trades skills, manufacturing occupations, service occupations, and other nonprofessional types of jobs. Few HNP have been placed in jobs or training which require aptitudes of an academic area. The consequences of low GATB "F" and "M" scores are difficulties by HNP in competing for jobs and training which require GATB subtests "F" and "M".

The pilot study results only revealed differences between HNP and USES walk-in clients. It did not reveal data pertinent to why HNP scores were low.

Major questions which were posed by the problem were then formulated into null hypotheses. The null hypotheses were concerned primarily with comparisons between groups of HNP used in a study to measure the effects of self-determined motivational rewards on GATB subtest "F" and "M" scores.

The initial comparison was between 52 randomly selected HNP who made up the experimental study group and 52 randomly selected HNP who made up the control group. The experimental and control groups were composed of two diagnostic classifications and two age groups. Each subgroup was comprised of 13 HNP. All HNP selected met eligibility criteria and were not required to participate in the study if they objected to it. An analysis of variance was computed for the experimental and control groups of 52 HNP each. No significant difference was observed indicating that self-determined motivational rewards did influence HNP to increase GATB subtest "F" and "M" performance.

Subgroup differences within the experimental group were observed on GATB subtest "F" when age subgroups were compared with diagnostic classifications. This was the first of several implications derived that age was a factor which influenced GATB subtest "F" and "M" scores.

The observation of significant differences in the broad subgroup HNP led to further investigation of smaller subgroup units within the experimental study group on GATB subtests "F" and "M". Significant differences were again observed when the 18-41 year old age subgroup was compared with the other diagnostic-age subgroups by means of an analysis of variance. The results of the comparison indicated that age factors influenced both GATB "F" and "M" subtest scores. No other subgroups or interactions therein showed a significant difference. Evidence was beginning to accumulate which showed age to be a very important factor. An analysis of covariance was made with age as the covariate and another where age was withheld. A significant difference was observed when age was held constant. No difference was observed in the analysis of covariance when age was withheld. The findings of the statistical measurements computed all indicated that age factor apparently influenced GATB subtest "F" and "M" performance in the experimental study group.

Compensation was another variable considered worthy of investigation with the experimental study group. An analysis of variance revealed significant difference when interaction of the main effects were influenced by rate of compensation. It was recommended that further study into the significance of compensation on GATB "F" and "M" subtests be made as not enough evidence was available to make a definite conclusion

as to its effects on GATB subtest "F" and "M" scores.

Discussion of other variables which might affect GATB subtests "F" and "M" score was presented. Medication and its subsequent influence on motor performance as measured by GATB subtests "F" and "M" is a major factor which needs to be investigated. "Psychological deficit" as explained by Hunt and Cofer (13) is another variable of considerable importance from an investigative point of view. If motor performance is adversely effected by psychological deficit in schizophrenics, efforts to improve the ability would be difficult if not impossible.

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IX. APPENDIX

Scale I. A self-determined motivational reward scale used to survey a random sample of HNP as to motivational reward choices or preferences.

Rate on a 5-4-3-2-1 point scale. Give 5 points to the item below which you consider most desirable to you as a reward for accomplishing any task; 4 points for next most desirable; 3 points for next, and so forth down to 0.

- _____ 1. Monetary (such as canteen books, cash, wages, etc.)
- _____ 2. Praise (verbal or written)
- _____ 3. Increased off-grounds responsibility passes (such as an extra 4 or 8 hours downtown pass)
- _____ 4. Choice of hospital detail.
- _____ 5. Other: _____
(Name some other reward you would consider desirable that is within the realistic realm of being available and that does not violate hospital regulations.)

Scale II. A scale on which HNP involved in a motivational reward study makes a determination as to the motivational rewards which he feels will motivate him to perform at a maximum rate on GATB subtests "F" and "M".

REWARD MOTIVATION FOR INCREASED PERFORMANCE

Purpose: Many studies have been conducted in attempts to determine the most efficient methods of motivating people to increase performance at routine motor tasks. Most of the studies have used rewards which are determined by the researchers. I am asking for your opinion as to what type of reward might be most desirable in motivating you, as an individual, to perform at your utmost speed on the dexterity part of the aptitude test used at this hospital in helping patients get jobs and training.

The following are some reward suggestions to which you might like to refer for ideas. If you were to participate in such a study, you would actually receive one of these rewards if your performance met certain pre-determined levels. These are for your help only--you do not have to use any of these if you have rewards you feel would be more desirable to you. List rewards, however, that could be made available while you are a patient at this hospital.

Reward suggestions:

1. Money (50 cents - \$1.00 - \$2.00 - \$3.00 - etc.)
2. Additional off-station pass (one 4 hour pass - 2 four hour passes - etc.)
3. Additional LOA'S (4-day; 5-day; 6-day; etc.)
4. Choice of Industrial Therapy Detail while a patient at the hospital.
5. Verbal praise for your ability to do well at a task.
6. Verbal criticism for your inability to do well at a task.
7. Clothing (socks-ties-shirts-gloves; etc.)
8. Additional recreational activities (community sports events-movies-swimming-out-of-town trips to events)

OPINION SCALE

1. List in order of importance to you as a hospitalized patient, three (3) types of reward which you feel would motivate you to attain your maximum speed on the finger and manual dexterity parts of the General Aptitude Test Battery used at this hospital to help patients get jobs and training.

1. (Most desirable reward) _____

2. (2nd most desirable reward) _____

3. (3rd most desirable reward) _____

2. What amount or level of these three rewards you named above do you feel is enough to really motivate you to attain your maximum speed in the dexterity tests?

1. (Most) _____ (Least) _____

2. (Most) _____ (Least) _____

3. (Most) _____ (Least) _____