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INTENTIONAL AND INCIDENTAL LEARNING IN SCHIZOPHRENIA AS A FUNCTION OF SEX AND INCENTIVE

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PHYLLIS ANN VIZONSKY

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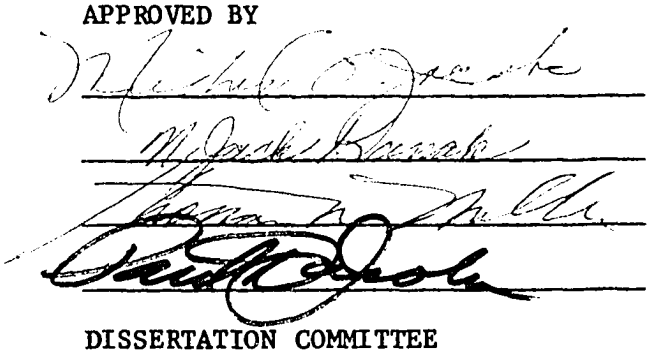

DISSERTATION COMMITTEE

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INTENTIONAL AND INCIDENTAL LEARNING IN SCHIZOPHRENIA AS A FUNCTION OF SEX AND INCENTIVE

INTRODUCTION

The present study investigated intentional and incidental learning in a verbal-discrimination task contrasting male and female chronic schizophrenics versus normals as a function of the presence or absence of a monetary incentive. Although a number of studies (e.g., Biles and Heckel, 1968; Greenberg, 1964; Heckel and Wiggins, 1964; Miller and Heckel, 1969) have compared the intentional and incidental learning performance of male chronic schizophrenics, relatively little attention has been directed toward the variables of sex and incentive and use of the verbal-discrimination task with a schizophrenic population. The verbal-discrimination task offers the advantage of clearly defined intentional and incidental learning components as well as a standardized methodology. The intentional component consists of learning to recognize and perform the item designated as correct or right (R) as opposed to its paired alternative or the wrong (W) item. On the other hand, bidirectional wrong-right (W-R) and right-wrong (R-W) associative learning and the learning of W and R items as responses have been demonstrated to be incidentally learned components of the task (Kausler and Sardello, 1967; Sardello and Kausler, 1968).

While some investigators (e.g., Biles and Heckel, 1968; Heckel and Wiggins, 1964) utilizing other tasks have reported no differences in

intentional learning between male normals and male schizophrenics, others (e.g., Greenberg, 1954) have reported conflicting results. It is conceivable that the use of non-standardized tasks varying in difficulty may be at least partially responsible for the lack of consistency in the literature.

Greenberg (1954) and Miller and Heckel (1969) have demonstrated that male chronic schizophrenics in general show less incidental learning than control Ss. Sex differences in intentional, as well as incidental learning, in schizophrenics, have virtually been almost wholly neglected. With respect to incentive, Burday (1962) found no differences between schizophrenics, brain-damaged patients, and medical controls in intentional learning as a function of a monetary incentive, but only male Ss were utilized and incidental learning was not investigated. Other investigators (Lindsley, 1960; Muchenbaum, 1969), however, have sucessfully conditioned and trained male acute schizophrenics using physical or "token" rewards. Atkinson and Robinson (1961) and McKinnon and Singer (1966) using female and male acute schizophrenic Ss found that verbal reward was less effective than mild punishment in improving the performance of their schizophrenic Ss. There was no differential response in terms of sex.

The present experiment employed a factorial manipulation of Groups (Normal/ Schizophrenic), Sex of S, and Monetary Incentive (presence or absence). All Ss learned two unrelated verbal-discrimination lists, conforming to a nonspecific transfer paradigm analogous to the A-B, C-D paradigm of paired-associate learning. As such, the design also allows the assessment of possible differential List 2 facilitation as a function of nonspecific sources of transfer (i.e., warm-up and learning

to learn; Hamilton, 1950; Thune, 1951). Incentive was manipulated during List 2 learning after the establishment of a learning baseline during List 1. Consequently improvement in the rate of List 2 learning can only be attributed to incentive to the extent that performance under incentive exceeds that of the no-incentive condition, which in turn, represents the best measure of the degree of nonspecific transfer. Incidental associative learning was measured by the administration of an associative matching task directed at List 2 pairs following the completion of List 2 learning.

METHOD

Subjects. Twenty male and twenty female chronic schizophrenic Ss confined at a regional state hospital comprised the experimental group. Each S had a diagnosis of either "Schizophrenia, Chronic Undifferentiated" or "Schizophrenia, Catatonic Type", at least seven years of continuous hospitalization, and no history of central nervous system pathology, alcoholism or paresis. The Ss were all on medication, in all cases a well-stabilized maintenance dose. All patients were confined on locked wards.

The control group consisted of twenty male and twenty female hospital employees (psychiatric aides) who had worked at the hospital continuously for at least seven years. Schizophrenic and control groups were matched for age and education. The age range for all groups was between 30 and 59 years and the median age for all groups was 45 years. Education ranged from sixth grade to two years of college for patients, median education 11th grade, and from sixth grade to two years of college,

median education 12th grade, for aides. Length of stay at hospital for patients ranged from seven to thirty years, median stay eleven years, and for aides the range of hospital employment was seven to twenty-two years, median stay ten years. All Ss were literate.

Materials. Two verbal-discrimination lists were prepared, each consisting of 12 pairs of familiar words. The 48 words were selected from the Palermo and Jenkins (1964) word norms (see Appendix 1). Meaningful similarity of the words was minimized both within and between lists. That is, words were selected for their low associative value in relation to the rest of the words within and between each list.

For both lists, one of the words in each pair was arbitrarily chosen as "correct", and left-right spatial position was randomized within each serial order, with no more than three correct words appearing consecutively on the same side on any trial. Four random orders were used to control for serial learning. A card with asterisks on it separated each order of a list.

Procedure. The word pairs were typed in capital letters on 3x5 cards. Learning was conducted by the anticipation method such that each card contained the two words in juxta-position and the second card had the correct word underlined during the feedback exposure. Cards were presented at three second intervals and timing was controlled by a Seth-Thomas wooden metronome set at 64. A card was presented on every second beat.

Each S was tested individually in a small treatment room on the ward. All Ss were given standard, simplified instructions concerning

verbal discrimination learning (see Appendices II, III, and IV). Ss were told to make a choice each time a word pair was first presented, including the first trial on each list during which S could only guess at the correct response. The instructions and practice lists were repeated until S thoroughly understood the task as demonstrated by one correct trial on a practice list of three pairs. The first list was practiced to a criterion of one errorless trial or ten trials, whichever occurred first. Incentive was not manipulated in List 1 learning in order to establish baseline learning and to demonstrate that intentional learning was intially comparable for both groups. The Ss were not informed that there might be subsequent lists to learn after the first nor were they informed that they would be tested for recall. After completion of practice on List 1, Ss were informed that they were to learn a second list. The Ss in the incentive conditions were told that after correct responses on six of the twelve pairs on List 2 they would earn a dime, after eight another dime, etc., until all 12 words were learned. Altogether the Ss could make enough dimes (4) to buy a package of cigarettes. The second list was practiced to a criterion of one perfect trial. First and second lists were randomized for all Ss, i.e. which list was learned first was randomly determined for each S.

Following VD learning all Ss were given an associative matching (AM) test on the second of the lists learned (see Appendices V and VI). In the AM task the W and R items were listed in separate columns with S being required to match those items that appeared together during the VD task. Instructions were printed on the same sheet of paper as the

words and emphasized that List 2 pairings were to be recalled. The E read the instructions and asked the S to paraphrase them to insure understanding.

RESULTS

Intentional Learning. The eight groups within the 2 (schizophrenic/normal) X 2 (sex) X 2 (incentive present/absent) factorial design did not differ significantly on the number of List 1 errors over ten trials, although the schizophrenics ($\bar{X}$ = 25.3) were slightly inferior to the normal controls ($\bar{X}$ = 20.9), F (1,72) = 2.19, $p > .10$. All other F's were typically <1. (see Appendix VII) The means of the other factors were: 22.4 (male) and 23.8 (female); 22.0 (incentive) and 24.2 (non-incentive). The incentive and sex groups were therefore well-matched for learning ability prior to the introduction of the incentive manipulation in List 2.

The measures of List 2 learning included trials to the criterion of one perfect trial, the number of errors on the first ten trials, and a difference score measure of List 1 minus List 2 errors over 10 trials of each list. In the trials to criterion analysis, only the Group X Sex X Incentive interaction effect approached significance, F (1,72) = 3.11, $p < .10$. (See Appendix VIII) The means and standard deviations, respectively, for the cells of the interaction were, for the schizophrenic groups, 7.70, 3.71 (male-incentive), 5.70, 2.45 (male-non-incentive), 5.60, 3.06 (female-non-incentive) and 4.80, 1.31 (female-incentive) while for the normal groups the comparable means were 6.50, 2.91 (female-incentive), 5.90, 2.23 (male-non-incentive, 5.66, 2.03 (male-incentive), 5.50, 2.45 (female-non-incentive). In general, the interaction suggests

FIGURE 1

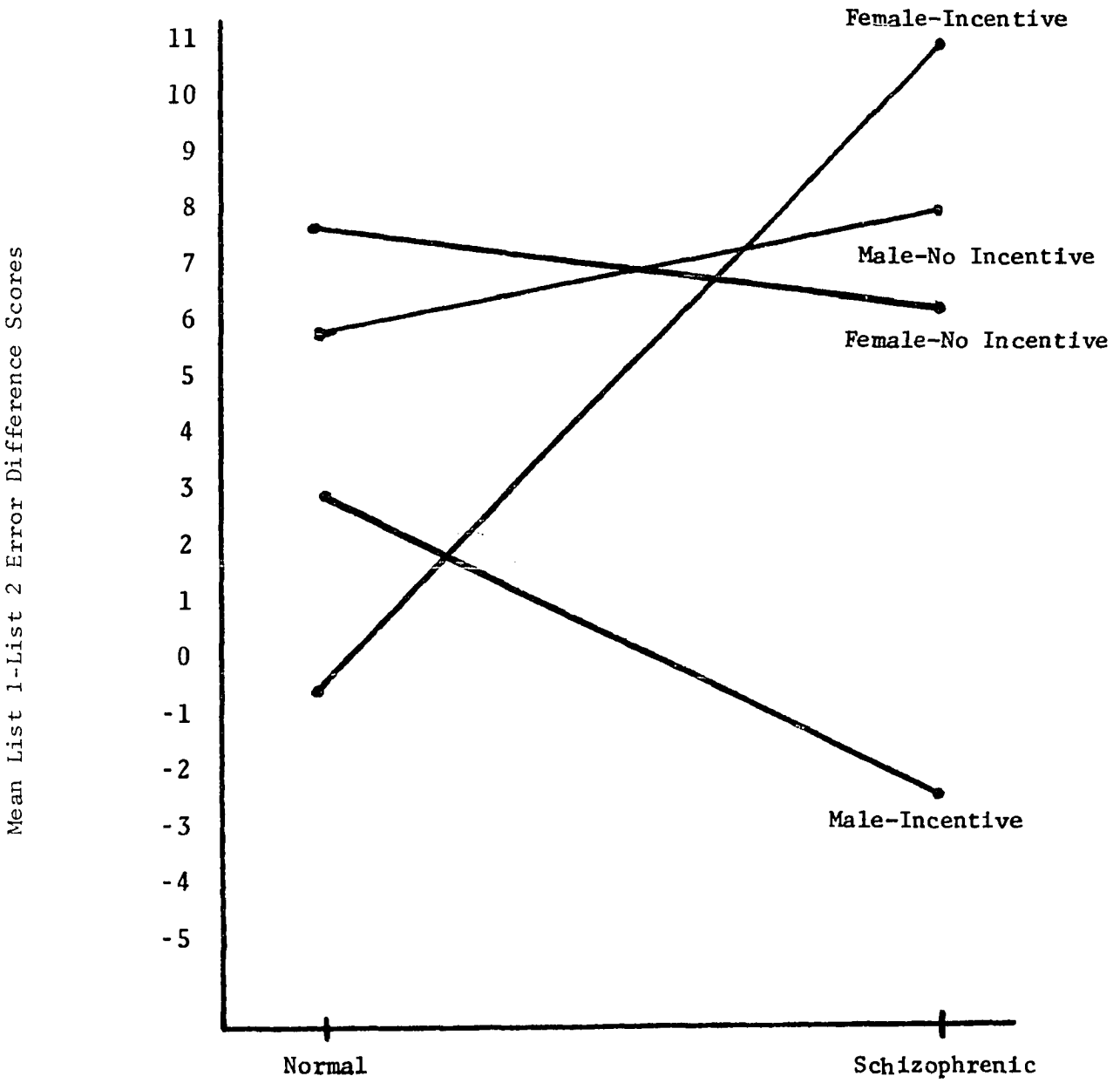

Fig. 1 The interaction of Groups by Incentive Conditions by Sex on the difference scores between List 1 and List 2 errors.

a tendency for the performance of female schizophrenics to be facilitated while male schizophrenics were inhibited by incentive.

None of the main effects or interaction in the analysis of List 2 errors over ten trials approached significance. (See Appendix IX) For the analysis of difference scores between total errors over ten trials for List 1 minus List 2, those Ss achieving a perfect trial on either list before trial 10 were assigned scores of zero errors on the post-criterion trials. The difference measure indicated that nonspecific transfer effects were present for nearly all groups except the male-schizophrenic-incentive group. The main effect for Incentive approached significance, F (1,72) = 3.59, $p < .10$, (See Appendix X) with means of 2.65 (present) versus 6.95 (absent). On the whole then, incentive interfered with, rather than facilitated, performance relative to the no-incentive condition. The interaction, however, of Groups X Sex X Incentive was significant, F (1,72) = 4.96, $p < .05$. No other main effects or interactions approached significance. Figure 1 indicates that the basis for the significant interaction is largely the superior performance of female schizophrenics ($\bar{X}$ = 10.8) under the incentive condition as contrasted with the inferior performance of male schizophrenics under the incentive condition ($\bar{x}$ = -3.6), F (1,72) = 8.90, $p < .01$. This result is in agreement with the form of the trend for an interaction on the List 2 measure of trials to criterion. In addition, female schizophrenics ($\bar{X}$ = 10.8) performed better under incentive than female normals ($\bar{X}$ = -.80), F (1,72) = 5.77, $p < .05$. Finally, male schizophrenics ($\bar{X}$ = -3.6) were inferior under the incentive condition to male schizophrenics under the no-incentive condition ($\bar{X}$ = 7.9), F (1,72) = 5.67, $p < .05$. (See Appendix XI) No other simple effects were significant.

Incidental Learning. Schizophrenic Ss produced significantly fewer ($\bar{X}$ = 2.5) correct associations on the associative matching task than normal control Ss ($\bar{X}$ = 6.5), F (1,72) = 42.91, $p < .001$, a result indicating less incidental learning for schizophrenic Ss. Males ($\bar{X}$ = 3.9) also tended to demonstrate less incidental learning than females ($\bar{X}$ = 5.1), F (1,72) = 3.65, $p < .10$. (See Appendix XII) No other effects approached significance. The means for the incentive factor were 4.3 (present) and 4.8 (absent).

DISCUSSION

In agreement with Biles and Heckel (1968) and Heckel and Wiggins (1964) who employed other tasks, no significant differences in the intentional learning of schizophrenics and normals was obtained on the List 1 measure of errors over ten trials. In addition, this result was replicated in the non-incentive conditions for the measure of trials to criterion and errors over ten trials of List 2. Sex differences were not present in any of the analyses for either population. The null difference for sex with the schizophrenic population is consistent with other reported studies (e.g., Atkinson & Robinson, 1961; McKinnon & Singer, 1966).

Sex differences in intentional learning were obtained, however, on the difference score measure between List 1 and List 2 errors over ten trials. These differences were directly related to the Incentive Conditions as demonstrated by the significant second-order interaction of Groups, Sex, and Incentive. Female schizophrenics apparently benefited from the monetary incentive, relative to both female normals and male

schizophrenics, while male schizophrenics under the incentive condition were even inferior to male schizophrenics under the no-incentive condition. As Cheek (1964) and Distler, May, and Tuma (1964) have noted, there are consistent sex-role differences between male and female schizophrenics. It can be speculated that for schizophrenics, in general, working for a reward is viewed as active involvement not only with the learning task but, and perhaps more importantly, also with the experimenter. Male schizophrenics may be seen as withdrawing from this involvement whereas for female schizophrenics, who are more active and dominant, working for a reward provides a situation in which their aggressiveness can be used for a positive gain. Although incentive was not a potent variable with normal Ss, this result is not unexpected since the potential reward of forty cents was not expected to be particularly salient for normal Ss. Finally, with respect to the results for intentional learning, both the male and female no-incentive schizophrenic groups did not differ significantly in the difference measure from the male and female no-incentive normal groups. List 2 was learned with substantially fewer errors over ten trials than List 1 for both populations, a result which suggests that schizophrenics do not show a psychological deficit (Buss & Lang, 1965) in the transfer of learning to learn and warm-up effects in a simple discrimination learning task.

Schizophrenics were demonstrated to be clearly inferior to normals on the incidental learning of intrapair associations, in agreement with previous research employing different measures of incidental learning (e.g., Greenberg, 1954; Miller & Heckel, 1969). Thus effect was independent of any interaction with incentive conditions or sex. Psychological deficit (Buss & Lang, 1965) in incidental learning may be even more

important than in intentional learning, at least where intentional learning involves only simple discrimination learning. If schizophrenics are inferior in incidental learning, they presumably learn less than normals about their environment in an informal way unless given specific instructions and direction. In view of the large amount of learning which for normals may be viewed as occurring incidentally or without instructions, systematic research on incidential learning in schizophrenics would seem a fertile area for further investigation.

REFERENCES

Atkinson, R. L., and Robinson, N. M. Paired-associate learning by schizophrenic and normal subjects under conditions of personal and impersonal reward and punishment. Journal of Abnormal and Social Psychology, 1961, 62, 322-326.

Biles, P. E., and Heckel, R. V. "Awareness" in chronic schizophrenics: II. Awareness of causal factors in recent events. Psychological Reports, 1968, 22, 255-258.

Burday, G. The performance of schizophrenic, brain-damaged and non-psychiatric patients on a modified matching concept formation task and the effects of positive motivation on concept formation performance. Unpublished doctoral dissertation, Temple University, 1962.

Buss, A., and Lang, P. J. Psychological deficit in schizophrenia: I. Affect, reinforcement and conception formation. Journal of Abnormal Psychology, 1965, 70, 2-24.

Cheek, F. E. A serendiptous finding: Sex roles and schizophrenia. Journal of Abnormal and Social Psychology, 1964, 25, 392-400.

Distler, L. S., May, P. R., and Tuma, A. H. Anxiety and ego strength as predictors of response to treatment in schizophrenic patients. Journal of Consulting Psychology, 1964, 28, 170-177.

Greenberg, A. Directed and undirected learning in schizophrenics. Unpublished doctoral dissertation. Columbia University, 1954.

Hamilton, C. E. The relationship between length of interval separating two learning tasks and performance on the second task. Journal of Experimental Psychology, 1950, 40, 613-621.

Heckel, R. V., and Wiggins, S. L. "Awareness" in chronic schizophrenics: I. Awareness of recent events. Psychological Reports, 1964, 14 367-370.

Kausler, D. H., and Sardello, R. J. Item recall in verbal discrimination learning as related to pronunciation and degree of practice. Psychonomic Science, 1967, 7, 285-286.

Lindsley, O. R. Characteristics of the behavior of chronic psychotics as revealed by free-operant conditioning methods. Diseases of the Nervous System, Monograph Supplement, 1960, 21, 66-78.

McKinnon, T., and Singer, G. Drive level and reinforcement as variables in paired associate learning of schizophrenics. Australian Journal of Psychology, 1966, 18, 48-56.

Meichenbaum, D. H. The effects of instructions and reinforcement on thinking and language behavior of schizophrenics. Behavior Research and Therapy, 1969, 7, 101-114.

Miller, P. M., and Heckel, R. V. "Awareness" in chronic schizophrenics: III. Incidental versus directed learning. Psychological Reports, 1969, 24, 783-786.

Palermo, D. S., and Jenkins, J. J. Word Association Norms: Grade School through College. Minneapolis, University of Minnesota Press, 1964.

Sardello, R. J., and Kausler, D. H. Associative recall in verbal discrimination learning as related to pronunciation and degree of practice. Psychonomic Science, 1968, 8, 251-252.

Thune, L. E. Warm-up effect as a function of level of practice in verbal learning. Journal of Experimental Psychology, 1951, 42, 250-256.

APPENDICES

APPENDIX 1

Dissertation Prospectus

The purpose of this study was to investigate intentional and incidental learning in chronic schizophrenics. The experimental questions under study were (1) Do chronic schizophrenics demonstrate intentional learning comparable to normals under conditions of incentive or non-incentive? (2) Is incidental learning in schizophrenics facilitated by the introduction of an incentive? (3) Is there a difference in the amount of incidental learning in schizophrenics as a function of the sex of Ss?

Buss and Lang (1965) in their paper on psychological deficit in schizophrenia conclude that the most fruitful explanation of deficit in schizophrenia is to be found in the interference hypothesis.

> The interference hypothesis assumes that. . .
>
> ". . . when a schizophrenic is faced with a task, he cannot attend properly or in a sustained fashion, maintain a set, or change the set quickly when necessary. His ongoing response tendencies suffer interference from irrelevant, external cues and from 'internal stimuli' which consist of deviant thoughts and associations." (p. 21)

Thus, "the primary disorder is that of a decrease in the selective and inhibitory functions of attention. The disturbance in this process leads to a number of other pathological changes . . . " which in turn accounts for psychological deficit (McGhie and Chapman, 1961, p. 114).

It has been shown (Fulkerson, 1968) that an inverse relationship exists between strength of set and amount of incidental learning. In a non-directed learning situation S must initiate his own readiness to respond in a predetermined manner, or create his own set. The performance measure in an incidental learning situation can be considered a measure of an individual's ability to initiate a response set as his attention is directed towards an intentional task by E. Therefore one method of studying schizophrenic patients' inability to initiate and maintain a response set is to investigate the amount of incidental learning accrued in a non-directed learning situation. Since the interference hypothesis stresses the schizophrenic's inability to independently initiate a response set, a significant decrement in schizophrenic performance on an incidental learning task would lend support to interference theory.

Greenberg (1954) tested a group of normal Ss and a group of chronic schizophrenic male Ss on three experimental tasks. The tasks were (1) Color-Position, in which the recall of the colors of geometric forms was the directed task, and the recall of the original positions of these forms was the undirected task. (2) Paragraphs, in which the recall of the content of one paragraph from the Wechsler Memory Scale was the directed task and the recall of the second paragraph, when the instructions called for merely tallying the frequency of the words, was the undirected task. (3) Metal-Nonmetal, in which the recall of familiar metal items was the directed task and the recall of familiar nonmetal items, exposed simultaneously with the first category was the undirected task. Buffer tests were interpolated between the experimental tests in order to interrupt a possible set to expect questions about the stimulus material beyond that

implied by the instructions. It was found that the normal group was superior to the schizophrenic group on all non-directed tasks even after correction for differences in scores on directed learning by an analysis of covariance. This study suggests that schizophrenic patients fail to observe objects and relationships toward which their attention has not been directed specifically. That is, the learning of schizophrenic Ss is minimal when no set is given.

Heckel and Wiggins (1964) and Biles and Heckel (1968) hypothesized that intentional learning was least affected by the schizophrenic process. They predicted that material gained through self-directed activity would be learned as easily by male chronic schizophrenic patients as by normal Ss. This was demonstrated in studies of awareness of recent events and awareness of causal properties of these events. The Ss were individually administered 25 questions on current events made up from items appearing on the front page or as a major heading in the feature sections of the local newspaper. A "Cause" test was constructed by selecting current events, as above, and phrasing the questions to determine causal factors of events rather than awareness. They stated that any learning condition provided by E removes intentionality as an independent variable and restricts the investigation to incidental or directed conditions.

A follow-up study by Miller and Heckel (1969) purported ". . . to determine the parameters of learning by chronic schizophrenics under conditions of incidental learning, i.e., when Ss are placed in a setting determined by E, what spontaneous acquisition of information occurs?" Twenty-five chronic schizophrenic males were used. The experimental

procedures consisted of Ss being escorted individually into a room where an eye-test was administered. The S was then left alone in the room where a second E questioned S about the first examiner's person, the physical aspects of the room, and the objects in the first room. Miller and Heckel concluded that "Significant differences were found between the schizophrenics and normals on incidental learning suggesting that the chronic schizophrenic has difficulty in initiating a response under other than internally motivated sets. The significant differences in intentional learning confirm the schizophrenic's 'psychological deficit' . . ." (p. 786).

A variable which has received little attention is sex differences among schizophrenic patients. The Ss in most studies have been men, with a minority of experiments including both sexes or using women only. This may be a function of the fact that a majority of research on schizophrenics is conducted in Veteran's Administration Hospitals and that male patients, in general, are more cooperative and display less overt behavioral disorganization than female patients. Distler, May, and Tuma (1964), in a study designed to measure response to treatment in newly admitted male and female schizophrenics found that both their predictors were significantly related to outcome criteria, but in consistently different directions for men and women. They state that their results correspond to . . .

> ". . . real differences in the external clinical picture of schizophrenia for men and women . . . Male and female wards tend to differ in a manner consistent with the noted sex-role differences. Female wards tend to be characterized by more freely condoned, overt and at times, dramatic expressions of emotionality and distress, while male wards present more an appearance of suppressed tesion and aggression under an exterior of massive control (p. 176)."

Cheek (1964) documented the observation that male acute schizophrenics are withdrawn as evidenced by low total activity rates, a low rate of dominance behavior, and low rates of disagreement and projected hostility. The female acute schizophrenics, however, present a marked contrast to the males. They are more active and dominating than female normals.

Another potentially important variable in the learning process is incentive. The effectiveness of physical rewards with schizophrenics has produced inconclusive evidence. Lindsley (1960) has successfully operantly conditioned schizophrenics using money, food, candy, and cigarettes as rewards. Muchenbaum (1969) using male acute schizophrenics first rated level of abstraction and amount of "sick talk" emitted during a structured interview. Each S was seen for 30 minutes on 11 consecutive days and were trained by social (positive and negative) and token reinforcement (canteen stubs which could be used to purchase cigarettes, candy and other valued personal items). After training schizophrenic Ss were again rated on ability to abstract (Kaufman Parallel Proverbs Test) and amount of "sick talk". It was found that ". . . the . . . experimental groups differed significantly from the two control groups; those Ss who were trained with token reinforcement improved most". Burday (1962) promised male schizophrenics, brain-damaged patients, and medical controls money for better performance on a modified concept formation task. The monetary incentive yielded no significant differences among the three groups. Salzberg and Williams (1966) attempted to measure the differential effects of reward, saying "wrong", and white noise, presented singly and in all possible combinations on the performance of male chronic schizophrenics on a concept formation task. It was found

that "a punishing stimulus when not directly associated with incorrect responses did not significantly improve performance. However, when combined with information about errors, performance improved significantly". (p. 836) However, Ss receiving only reward (marbles which could be traded for gum, candy and cigarettes) performed significantly better than the control group and as well as the groups receiving either white noise or "wrong". McKinnon and Singer (1966) using male and female acute schizophrenics, found that verbal punishment facilitated performance on simple paired associate learning as compared with verbal reward, but disrupted complex paired associate learning. However, on complex paired associate learning, verbal reward is effective in increasing the performance of schizophrenics. Therefore, it appears that physical reward can facilitate the performance of schizophrenic Ss. No sex difference was found.

The present study utilizes the verbal-discrimination analogue of the A-B, C-D paired-associate nonspecific transfer paradigm. The comparable verbal-discrimination learning paradigm is designated W_1-R_1, W_2-R_2, a notation indicating that the List 2 wrong (W) and right (R) items are unrelated to List 1 W and R items. Bidirectional W-R and R-W associative learning and the learning of W and R items as responses have been demonstrated to be incidental learning components of the verbal-discrimination task (Kausler and Sardello, 1967; Sardello and Kausler, 1968). Spence and Lair (1963) used a verbal-discrimination task with acute schizophrenic males while varying feedback conditions and found their performance to be comparable to that of normal Ss although wider variability in performance also was found.

The present experiment employed a factorial manipulation of Groups (Normal/Schizophrenic), Sex of S, and Monetary Incentive (presence or absence). All Ss learned two unrelated verbal-discrimination lists, conforming to a nonspecific transfer paradigm analogous to the A-B, C-D paradigm of paired-associate learning. As such, the design also allows the assessment of possible differential List 2 facilitation as a function of nonspecific sources of transfer (i.e., warm-up, learning to learn; Hamilton, 1950; Thune, 1951). Incentive was manipulated during List 2 learning after the establishment of a learning baseline during List 1. Consequently improvement in the rate of List 2 learning can only be attributed to incentive to the extent that performance under incentive exceeds that of the no-incentive condition, which in turn, represents the best measure of the degree of nonspecific transfer. Incidental associative learning was measured by the administration of an associative matching task directed at List 2 pairs following the completion of List 2 learning.

REFERENCES

Biles, P. E., and Heckel, R. V. "Awareness" in chronic schizophrenics: II. Awareness of causal factors in recent events. Psychological Reports, 1968, 22, 255-258.

Burday, G. The performance of schizophrenic, brain-damaged and non-psychiatric patients on a modified matching concept formation task and the effects of positive motivation on concept formation performance. Unpublished doctoral dissertation, Temple University, 1962.

Buss, A., and Lang, P. J. Psychological deficit in schizophrenia: I. Affect, reinforcement, and concept formation. Journal of Abnormal Psychology, 1965, 70, 2-24.

Cheek, F. E. A serendiptous finding: sex roles and schizophrenia. Journal of Abnormal and Social Psychology, 1964, 25, 392-400.

Distler, L. S., May, P. R., and Tuma, A. H. Anxiety and ego strength as predictors of response to treatment in schizophrenic patients. Journal of Consulting Psychology, 1964, 28, 170-177.

Fulkerson, F. E. The effects of generalized drive on intentional and incidental components of verbal-discrimination learning. A paper presented at the annual meeting of the Southwestern Psychological Association, New Orleans, Louisiana, April, 1968.

Greenberg, A. Directed and undirected learning in schizophrenics. Unpublished doctoral dissertation. Columbia University, 1954.

Hamilton, C. E. The relationship between length of interval separating two learning tasks and performance on the second task. Journal of Experimental Psychology, 1950, 40, 613-621.

Heckel, R. V., and Wiggins, S. L. "Awareness" in chronic schizophrenics: I. Awareness of recent events. Psychological Reports, 1964, 14, 367-370.

Kausler, D. H., and Sardello, R. J. Item recall in verbal discrimination learning as related to pronunciation and degree of practice. Psychonomic Science, 1967, 7, 285-286.

Lang, P. J., and Buss, A. H. Psychological deficit in schizophrenia: II. Interference and activation. Journal of Abnormal Psychology, 1965, 70, 77-106.

Lindsley, O. R. Characteristics of the behavior of chronic psychotics as revealed by free-operant conditioning methods. Diseases of the Nervous System, Monograph Supplement, 1960, 21 66-78.

McGhie, A., and Chapman, J. Disorders of attention and perception in early schizophrenia. British Journal of Medical Psychology, 1961, 34, 103-117.

McKinnon, T., and Singer, G. Drive level and reinforcement as variables in paired associate learning of schizophrenics. Australian Journal of Psychology, 1966, 18, 49-56.

Meichenbaum, D. H. The effects of instructions and reinforcement on thinking and language behavior of schizophrenics. Behavior Research and Therapy, 1969, 7, 101-114.

Miller, P. M., and Heckel, R. V. "Awareness" in chronic schizophrenics: III. Incidental versus directed learning. Psychological Reports, 1969, 24, 783-786.

Salzberg, H. C., and Williams, Jr., J. T. Effect of three types of feedback on concept formation in chronic schizophrenics. Psychological Reports, 1966, 18, 831-837.

Sardello, R. J., and Kausler, D. H. Associative recall in verbal discrimination as related to pronunciation and degree of practice. Psychonomic Science, 1968, 8, 251-252.

Spence, J. T., Lair, C. V., and Goodstein, L. D. Effects of different feedback conditions on verbal discrimination learning in schizophrenics and nonpsychiatric subjects. Journal of Verbal Learning and Verbal Behavior, 1963, 2, 339-345.

Thune, L. E. Warm-up effect as a function of level of practice in verbal learning. Journal of Experimental Psychology, 1951, 42 250-256.

APPENDIX I

Word Lists

List 1		List 2	
W Items	R Items	W Items	R Items
BREAD	NORTH	BOTTLE	VOICE
HAMMER	TABLE	RIVER	TAPE
BED	CATS	BELL	SHADE
SWEET	LIGHT	MUSIC	TOWN
KING	SALT	STORE	HORSE
BLACK	LONG	BATH	LATE
SMOOTH	HIGH	NAME	MOVIE
DAY	NEEDLE	SHARP	TASK
WINDOWS	SPIDER	LOG	PAPER
HOT	YOUNGER	THUMB	LIFE
SLOW	GOOD	LETTER	FACE
TRUE	SOFT	YEAR	WOOL

APPENDIX II

Instructions for List I

There are two words on this card. Can you read them aloud? One of these words is right and one is wrong. Can you guess which word is right? Read that word aloud.

On this card the right word is underlined. Read it aloud. Your job is to remember which word is right. Let's try another pair. Again, one word is right and one is wrong. Read the right word aloud. Let's try another pair. Now, we will go through the list again and see if you can get all the words right. A line of stars means the end of a list.

All the words and pairs were randomly chosen and paired, so there is no trick or system for you to figure out. There are twelve pairs of words in the list. We will go over and over the list until you can get all the words right one time. The cards will be presented at three second intervals so it is important for you to read the words aloud quickly.

The three practice pairs were:

EARTH	TOWEL
COFFEE	BOOK
LETTER	GIRL

APPENDIX III

Instructions for List 2

Incentive Condition

Now, you are going to learn a second list of words. The task is exactly the same as the first. However, this time, when you get six of the twelve words right you will make a dime, after eight words right you will make a second dime, after ten words right another dime and when you get them all right you will get a dime. Altogether you can make forty cents which is enough money to buy a pack of cigarettes.

APPENDIX IV

Instructions for List 2

Non-Incentive Condition

Now, you are going to learn a second list of words. The task is exactly the same as the first.

APPENDIX V

Associative Matching

List 1

Listed below are the wrong and right items which appeared in the second list you had practiced with, designated List 1. In the blank space following each wrong item place the number which corresponds to the appropriate right item so as to re-pair the items as they appeared in the list. If you are uncertain as to what constitutes an appropriate pairing, guess as to what you think is the correct pairing.

BREAD	_____	1. HIGH
SMOOTH	_____	2. CATS
KING	_____	3. GOOD
TRUE	_____	4. NORTH
HAMMER	_____	5. SALT
HOT	_____	6. NEEDLE
BED	_____	7. LONG
SLOW	_____	8. SPIDER
DAY	_____	9. TABLE
SWEET	_____	10. SOFT
BLACK	_____	11. LIGHT
WINDOWS	_____	12. YOUNGER

APPENDIX VI

Associative Matching

List 2

Listed below are the wrong and right items which appeared in the second list you had practiced with, designated List 2. In the blank space following each wrong item place the number which corresponds to the appropriate right item so as to re-pair the items as they appeared in the list. If you are uncertain as to which constitutes an appropriate pairing, guess as to which you think is the correct pairing.

BATH	_____	1. VOICE
THUMB	_____	2. TOWN
RIVER	_____	3. LIFE
LETTER	_____	4. WOOL
NAME	_____	5. TAPE
BELL	_____	6. FACE
YEAR	_____	7. HORSE
MUSIC	_____	8. LATE
LOG	_____	9. SHADE
BOTTLE	_____	10. MOVIE
STORE	_____	11. TASK
SHARP	_____	12. PAPER

APPENDIX VII

Summary of the 2X2X2 Analysis of Variance for Number of Errors On First Ten Trials on First List Learned

Source	SS	df	MS	F	p
Group (A)	387.19	1	387.19	2.19	
Sex (B)	36.45	1	36.45	.20	
Incentive (C)	92.45	1	92.45	.52	
AXB	.01	1	.01	.00	
AXC	18.05	1	18.05	.10	
BXC	273.81	1	273.81	1.54	
AXBXC	168.19	1	168.19	.95	
Within	12720.6	72	176.67		
Total	13696.75	79			

Means and Standard Deviations for Number of Errors on First Ten Trials On First List Learned

	Experimental				Control			
	Males		Females		Males		Females	
	$\bar{X}$	S.D.	$\bar{X}$	S.D.	$\bar{X}$	S.D.	$\bar{X}$	S.D.
Incentive	23.50	15.64	28.70	12.56	18.30	10.25	17.70	8.27
Non-Incentive	25.80	15.55	24.56	23.30	22.22	10.39	25.55	15.49

10 Observations per cell

APPENDIX VIII

Summary of the 2X2X2 Analysis of Variance for Number of Trials on Second List Learned

Source	SS	df	MS	F	p
Group (A)	.09	1	.09	.01	
Sex (B)	7.79	1	7.79	1.16	
Incentive (C)	4.49	1	4.49	.67	
AXB	15.36	1	15.36	2.28	
AXC	1.40	1	1.40	.21	
BXC	2.86	1	2.86	.43	
AXBXC	20.94	1	20.94	3.11	< .10
Within	484.50	72	176.67		
Total	537.33	79			

Means and Standard Deviations for Number of Trials on Second List Learned

	Experimental				Control			
	Males		Females		Males		Females	
	$\bar{X}$	S.D.	$\bar{X}$	S.D.	$\bar{X}$	S.D.	$\bar{X}$	S.D.
Incentive	7.70	3.71	4.80	1.31	5.66	2.03	6.50	2.91
Non-Incentive	5.70	2.45	5.60	3.06	5.90	2.23	5.50	2.45

10 Observations per cell

APPENDIX IX

Summary of the 2X2X2 Analysis of Variance for Number of Errors on First Ten Trials of Second List Learned

Source	SS	df	MS	F	p
Group (A)	122.51	1	122.51	.94	
Sex (B)	9.11	1	9.11	.07	
Incentive (C)	78.07	1	78.07	.60	
AXB	332.11	1	332.11	2.55	
AXC	86.05	1	86.05	.66	
BXC	201.55	1	201.55	1.55	
AXBXC	94.67	1	94.67	.72	
Within	9358.30	72	129.97		
Total	10282.38	79			

Means and Standard Deviations for Number of Errors on First Ten Trials of Second List Learned

	Experimental				Control			
	Males		Females		Males		Females	
	$\bar{X}$	S.D.	$\bar{X}$	S.D.	$\bar{X}$	S.D.	$\bar{X}$	S.D.
Incentive	26.90	20.55	17.90	7.75	15.00	7.21	18.50	9.36
Non-Incentive	17.50	9.45	17.00	12.89	16.30	7.42	19.60	10.08

10 Observations per cell

APPENDIX X

Summary of the 2X2X2 Analysis of Variance for Difference in Errors on First Ten Trials Between First and Second List

Source	SS	df	MS	F	p
Group (A)	40.61	1	40.61	.35	
Sex (B)	143.11	1	143.11	1.23	
Incentive (C)	418.61	1	418.61	3.59	$< .10$
AXB	277.51	1	277.51	2.38	
AXC	23.11	1	23.11	.19	
BXC	137.81	1	137.81	1.18	
AXBXC	577.81	1	577.81	4.96	$< .05$
Within	8381.90	72	116.42		
Total	10000.47	79			

APPENDIX XI

Summary of the Simple Main Effects for Difference in Errors on First Ten Trials Between First and Second List

Source	SS	df	MS	F	P
$A_{B_1C_1}$	217.80	1	217.80	1.87	>.10
$A_{B_1C_2}$	20.00	1	20.00	<1.00	
$A_{B_2C_1}$	672.80	1	672.80	5.77	<.05
$A_{B_2C_2}$	8.45	1	8.45	<1.00	
$B_{A_1C_1}$	72.20	1	72.20	<1.00	
$B_{A_1C_2}$	14.45	1	14.45	<1.00	
$B_{A_2C_1}$	1036.80	1	1036.80	8.90	<.01
$B_{A_2C_2}$	12.80	1	12.80	<1.00	
$C_{A_1B_1}$	42.05	1	42.05	<1.00	
$C_{A_1B_2}$	325.80	1	325.80	3.03	<.107.05
$C_{A_2B_1}$	661.25	1	661.25	5.67	<.05
$C_{A_2B_2}$	101.25	1	101.25	<1.00	

APPENDIX XII

Summary of the 2X2X2 Analysis of Variance for the Number Correct on Associative Matching Task

Source	SS	df	MS	F	p
Group (A)	324.01	1	324.01	42.91	$< .001$
Sex (B)	27.59	1	27.59	3.65	$< .10$
Incentive (C)	4.51	1	4.51	.59	
AXB	1.54	1	1.54	.20	
AXC	9.12	1	9.12	1.20	
BXC	4.54	1	4.54	.60	
AXBXC	2.08	1	2.08	.27	
Within	554.30	72	7.55		
Total	927.69	79			

Means and Standard Deviations for the Number Correct on Associative Matching Task

	Experimental				Control			
	Males		Females		Males		Females	
	$\bar{X}$	S.D.	$\bar{X}$	S.D.	$\bar{X}$	S.D.	$\bar{X}$	S.D.
Incentive	1.80	1.79	3.50	2.01	5.20	3.90	6.80	3.99
Non-Incentive	2.40	2.63	2.50	1.50	6.50	2.67	7.80	2.43

10 Observations per cell

APPENDIX XIII

Raw Data for Number of Errors on First Ten Trials on First List Learned

Subjects	A_1 B_1 C_1	A_1 B_1 C_2	A_1 B_2 C_1	A_1 B_2 C_2	A_2 B_1 C_1	A_2 B_1 C_2	A_2 B_2 C_1	A_2 B_2 C_2
1.	18	18	35	54	15	21	22	6
2.	4	17	17	29	14	7	28	25
3.	10	27	10	16	32	19	48	47
4.	42	32	22	16	24	43	47	39
5.	14	16	19	29	17	52	18	7
6.	12	12	9	12	18	19	37	16
7.	25	45	14	11	63	47	10	14
8.	19	12	25	46	17	13	21	44
9.	21	26	18	9	7	20	22	28
10.	18	17	8	33	28	17	34	7

Raw Data for Number of Trials on Second List Learned

Subjects	A_1 B_1 C_1	A_1 B_1 C_2	A_1 B_2 C_1	A_1 B_2 C_2	A_2 B_1 C_1	A_2 B_1 C_2	A_2 B_2 C_1	A_2 B_2 C_2
1.	6	5	11	6	5	8	6	4
2.	8	8	7	7	4	4	6	6
3.	7	8	3	7	13	7	3	12
4.	8	6	10	3	3	8	7	10
5.	5	5	6	4	8	3	6	3
6.	4	3	5	4	7	8	4	5
7.	3	10	5	3	10	9	4	4
8.	4	3	5	10	4	3	4	6
9.	6	6	10	3	10	3	4	3
10.	5	5	3	8	13	4	4	3

Raw Data For Number of Errors on First

Ten Trials of Second List Learned

Subject	A_1 B_1 C_1	A_1 B_1 C_2	A_1 B_2 C_1	A_1 B_2 C_2	A_2 B_1 C_1	A_2 B_1 C_2	A_2 B_2 C_1	A_2 B_2 C_2
1.	20	12	27	20	17	25	27	4
2.	13	20	14	17	15	15	23	15
3.	20	25	8	20	53	11	15	46
4.	31	23	40	15	10	29	31	30
5.	12	12	18	9	23	12	20	7
6.	16	8	14	13	13	23	17	13
7.	10	27	14	8	71	34	7	11
8.	11	5	16	53	6	8	9	23
9.	5	18	23	8	27	9	19	6
10.	12	13	11	16	34	9	11	15

Raw Data for Difference in Errors on First Ten Trials

Between First And Second List Learned

Subject	A_1 B_1 C_1	A_1 B_1 C_2	A_1 B_2 C_1	A_1 B_2 C_2	A_2 B_1 C_1	A_2 B_1 C_2	A_2 B_2 C_1	A_2 B_2 C_2
1.	27	31	33	59	23	21	20	27
2.	16	22	28	37	24	17	58	35
3.	7	27	27	21	2	33	41	26
4.	36	34	7	26	39	35	23	34
5.	27	29	26	45	19	65	45	25
6.	21	29	20	24	30	21	28	28
7.	40	43	25	28	17	38	37	28
8.	33	32	34	18	36	30	28	46
9.	42	33	20	26	5	36	48	47
10.	31	29	22	42	19	33	30	17

Constant of 50 added

Raw Data for the Number Correct on

Associative Matching Task

Subject	A_1 B_1 C_1	A_1 B_1 C_2	A_1 B_2 C_1	A_1 B_2 C_2	A_2 B_1 C_1	A_2 B_1 C_2	A_2 B_2 C_1	A_2 B_2 C_2
1.	0	3	12	10	1	2	1	3
2.	6	12	3	9	2	0	4	1
3.	12	7	7	7	3	0	6	1
4.	2	6	10	8	4	6	2	5
5.	8	7	12	10	1	6	3	4
6.	10	6	10	9	0	6	2	2
7.	5	3	4	11	0	2	4	1
8.	1	7	2	5	0	2	6	4
9.	3	9	2	5	1	0	1	3
10.	5	5	6	4	6		6	1