CONCEPT IDENTIFICATION AND PSYCHOPHYSIOLOGICAL PARAMETERS IN DEPRESSED SCHIZOPHRENICS AS FUNCTIONS OF IMIPRAMINE AND NIALAMIDE*

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PROBLEM

There is considerable evidence of improvement in psychotic and psychoneurotic states of depression after treatment with either Imipramine or Nialamide. Improvement has been documented on the bases of clinical[2, 6, 7, 17], behavioral[5, 8, 9, 16], and psychomotor studies[1, 12, 15]. Both antidepressants also have been utilized successfully to treat reactive depression, depressed phase of manic-depressive reactions, senile depressions, and involutional melancholia as well as depression associated with schizophrenia[10]. The evaluations of the drugs typically have been global, based on punctate clinical impressions or behavioral indices such as affect, motility, cooperation and communication of hospitalized patients. As is the case with many psychotropic agents, very little is known about the two antidepressants in terms of their influence upon higher mental processes, such as information processing and attention. It is well known that psychotropic medications have been utilized primarily for treatment and control of *undesirable, overt, behavioral* manifestations with little regard for possible adverse effects in the spheres of cognitive functioning. Accordingly, this study was conceived specifically to compare the effects of the two drugs on cognitive and electrodermal (GSR) parameters of information processing in chronic schizophrenics who were characterized as demonstrating predominantly depressive features. The GSR measure was chosen because it has been demonstrated previously that changes in skin resistance are reliably associated with efficiency of information processing, in addition to the fact that they constitute one of the traditional parameters in the assessment of autonomic levels of activation[14].

METHOD

Procedure. The *S*s were 72 male, depressed VA psychiatric patients with the current diagnosis of schizophrenic reaction, chronic undifferentiated type and who were described by the responsible ward psychiatrist as manifesting either helplessness, suicidal tendencies, despondency, psychomotor retardation or general lack of interest. All *S*s were between 45 and 50 years of age, had not been treated with any psychotropic drugs for at least 2 months at the time of the study, and had no CNS pathology or history of brain syndrome. The overall treatment milieu was uniform for all *S*s, who were divided randomly into three drug groups (Imipramine, Nialamide or placebo) of 24 *S*s each. The three groups were matched on age and education (no significant *t*s between any pair of groups). This was a double-blind design; all *S*s were placed on the drug regimen for 6 weeks. The drugs and placebo were administered orally in two equal, daily doses to the *S*s as follows: 1st and 2nd week, 50 mg; 3rd and 4th week, 100 mg; 5th and 6th week, 200 mg. The capsules of the two drugs and placebo were identical in appearance.

All *S*s performed on the concept identification (CI) task during the 7th and 8th weeks of the study while they were on the 200 mg regimen. The task was a two-choice CI problem that required *S*s to categorize geometric patterns in accordance with the relevant dimension. After each response, the feedback lights programmed on the Western Union tape transmitter automatically indicated the correct response to the *S*. In addition, the CI task was designed to vary information load by pro-

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ducing either one, three, or five irrelevant dimensions; form or number dimension was relevant for each half of the *S* population. The CI procedure, the dimensions utilized and the complexity (irrelevant dimensions) matrix were described in detail in an earlier paper[11]. Concurrent with CI performance, continuous recordings of skin conductance were obtained. The CI and GSR procedures as well as the apparatus were identical to those utilized in an earlier drug study[3, 13]. The GSRs were recorded as DC resistance changes and converted to conductance changes. The active electrode was a 5/8" × 1" silver plate electrolytically coated with AgCl anodized in 1 M NaCl (3 milliamperes for 5 minutes). It was applied to the volar surface of the middle phalanx of the middle finger, left hand.

Design. This was a 3 × 3 factorial design with three drug conditions (Imipramine, Nialamide or placebo) and three levels of complexity (1, 3, or 5 irrelevant dimensions), with 8 *S*s assigned randomly to each of the nine independent conditions. Analyses of variance were performed on the CI (errors to solution) and GSR (spontaneous conductance changes) data. These two parameters were examined as functions of the three CI problem complexities and the three drug conditions.

Results and Discussion

The number of errors prior to solution (16 consecutive, correct responses) and the number of spontaneous GSRs were the dependent variables subjected to the analysis of variance. The main effects of Complexity ($F = 15.83$, $df = 2/63$, $p < .001$), Drug ($F = 14.31$, $df = 2/63$, $p < .01$) and Complexity × Drug Interaction ($F = 5.81$, $df = 4/63$, $p < .05$) were significant in CI performance. Fig. 1 shows that the overall number of errors increased as a function of the number of irrelevant CI dimensions. In addition, the drug groups out-performed the placebo groups. Subsequent *t*-tests indicated that although there were no significant differences in CI performances between the drug groups ($t = .92$, $df = 70$, $p > .05$), the placebo group was significantly inferior in its problem solving to both the Imipramine ($t = 11.05$, $df = 46$, $p < .001$) and the Nialamide ($t = 13.08$, $df = 46$, $p < .001$) patients.

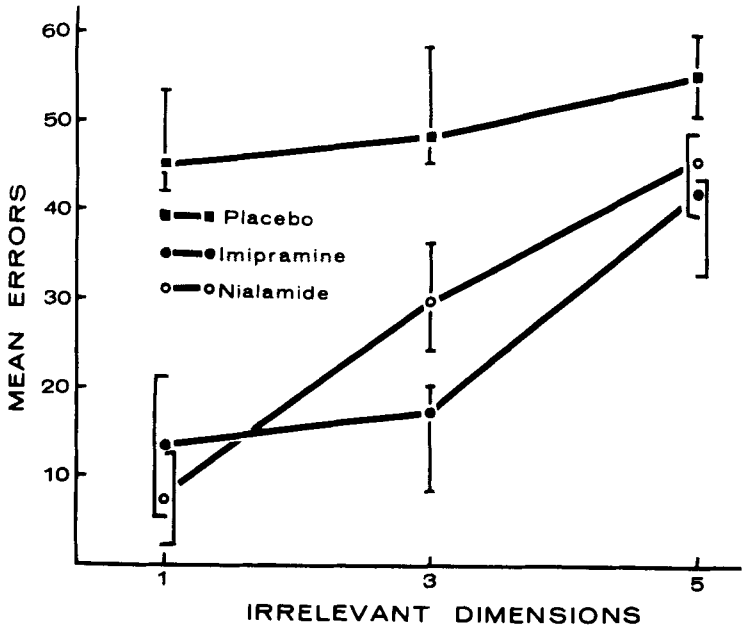

Fig. 1. Mean Errors and Ranges as Functions of Complexity Produced by the Three Drug Groups.

Analysis of variance also was performed on the conductance change (ΔC) which was derived by Edelberg[4]:

$$\Delta C = \Delta R/R^2$$

In this equation, ΔR was the resistance change and R^2 was the square of basal resistance at the point of GSR onset. Only those GSRs equal to or greater than .001 of the basal resistance were considered as spontaneous GSRs in the analysis throughout the CI performance. The main effect of Complexity ($F = 12.08$, $df = 2/63$, $p < .001$) and Drug ($F = 8.29$, $df = 2/63$, $p < .001$) were significantly reliable — which indicates that as complexity of the CI problem increased, the number of spontaneous GSRs decreased (Fig. 2). It is also noteworthy that the Nialamide group produced the greatest number of spontaneous GSRs and the placebo group the least. The Imipramine *S*s were between the two groups in terms of their GSR rates. The interaction effect was not significant. All groups differed significantly from each other: Imipramine *vs.* Nialamide ($t = 3.09$, $df = 46$, $p < .05$), Imipramine *vs.* placebo ($t = 2.86$, $df = 46$, $p < .05$), and Imipramine *vs.* Nialamide ($t = 4.01$, $df = 46$, $p < .05$).

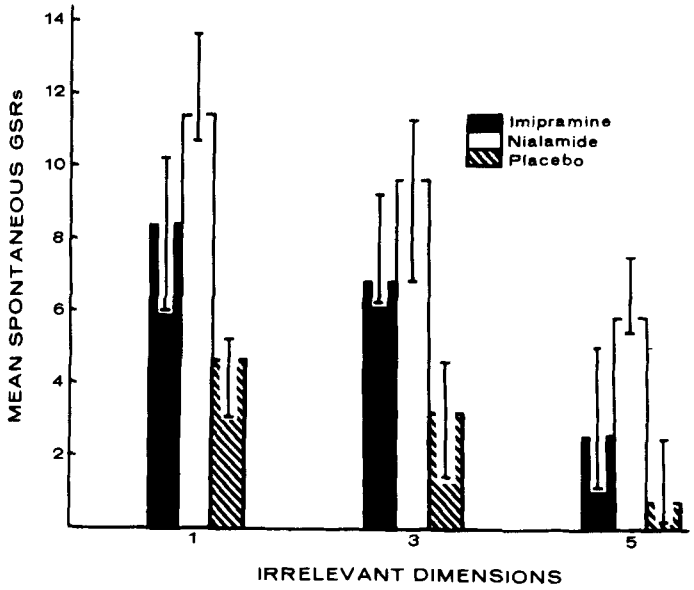

FIG. 2. MEAN SPONTANEOUS GSRS AND RANGES PRODUCED BY THE THREE DRUG GROUPS IN EACH OF THE THREE COMPLEXITY CONDITIONS

On the whole, four major findings emerged from this study. First, the administration of the two depressants resulted in more efficient information processing, as reflected in the CI performance, of depressed schizophrenics when compared to the placebo conditions. Second, it was demonstrated that decrease in information load (complexity) produced a reliable, linear decrease in errors in the two antidepressant drug groups, whereas the placebo group manifested lack of complexity effect, *i.e.*, the three complexity groups (1, 3, or 5 irrelevant dimensions) performed at the same inferior level, regardless of the amount of irrelevant information. Moreover, it is noteworthy that the active drug groups performed in the same manner as normal, non-patient college populations[11] and demonstrated error increase (complexity effect) with increase in number of irrelevant dimensions. Third, activation levels during CI, as reflected by spontaneous GSRs, were influenced differentially by the information complexity as well as by the drugs. Increase in number of irrelevant CI

dimensions was accompanied by marked decrease in GSRs, *i.e.*, the performances on the simplest (one irrelevant dimension) and the most difficult (five irrelevant dimensions) problems were associated with the greatest and the least skin conductance changes, respectively. Equally important was the fourth finding that the Nialamide group produced most GSRs, Imipramine group the next, and the placebo group manifested the lowest level of autonomic activation. This result conforms to an earlier conclusion that Nialamide improves attention span to a higher level than does Imipramine, as measured by a visual-choice reaction time task. This finding is also consistent with the CI data that reveal that the placebo *S*s were least efficient in their performance. Furthermore, a correlation of $-.63$ ($p < .01$) between CI errors and spontaneous GSRs supports the notion proposed in an earlier paper that GSRs are monotonically related to successful problem solution and openness of the organism to new information [14].

On the whole, it can be concluded that both Imipramine and Nialamide facilitate cognitive functioning of depressed schziophrenics. Moreover, Nialamide was found to facilitate autonomic activation to a greater degree than Imipramine, although there were no significant differences in cognitive performances of the two drug groups. On the other hand, the placebo group was not only inferior in information processing, but it also revealed the lowest rate of GSRs. It is probably a valid assumption that the present data demonstrate low channel capacity for information processing of depressed schizophrenics, which is accompanied by marked reduction in autonomic activation level. Nevertheless, it is indicated that both antidepressants facilitate cognitive functioning, although Nialamide increases GSR activity to a greater degree than does Imipramine.

Summary

Depressed, male, chronic schizophrenics (N = 72) participated in a double-blind, placebo-controlled study of Imipramine and Nialamide. The *S*s performed on concept identification (CI) tasks that varied in complexity; concomitant measures of electrodermal activity were obtained. Major findings were: (a) both antidepressants facilitated CI performance; (b) there was a negative relationship between CI errors and spontaneous GSRs; (c) the placebo *S*s produced the least and the Nialamide *S*s the most GSRs; (d) CI errors increased monotonically with increasing problem complexity in the antidepressant groups, but not in the placebo conditions.

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AGE AND A GROUP TEST BATTERY AS PREDICTORS OF TYPES OF CRIME

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PROBLEM

Attention presently is focused upon the prevention of crime, and many methods are being explored to determine the causes of criminal behavior. The majority of persons already in prison have yet to be studied in a systematic scientific manner except for those incarcerated in the California Penal System[2]. A great deal of folklore and speculation is offered by those who are working within correctional settings in an attempt to correlate personality characteristics of the offender to his crime. This research is an attempt to validate some of these speculations. Workers in the field have categorized offenders into various groups for research purposes. Two-way classifications such as violent-nonviolent or crimes against persons-crimes against property do not offer sufficient refinement. Others[4, 6] have used multiple groupings that become unwieldy and too narrow for many research purposes. The following classification of offenders is a compromise, but useful, manageable, and pragmatic.

Crimes Against Persons: (Group A). Inmates convicted of the most serious crimes such as murder or manslaughter are often in prison for the first time. Often these men never return to prison when they are released, and if they return it is for some lesser offense[4, 7, 8]. The types of crimes classified in this group were first-degree burglary, assault with intent to commit a felony, manslaughter, statutory rape, forcible rape, kidnapping, attempted murder, robbery and attempted robbery, solicitation of a child under 18, maiming and wounding another, child molestation, child abuse, murder and assaulting an officer.

Crimes Against Property: (Group B). The majority of property crimes are committed by younger offenders. Peer-group pressure, financial problems, alcohol, drugs, and overt expressions of anger typically are given as causes of this behavior[4]. This group included felons who committed second- and third-degree burglary, grand larceny, shoplifting, receiving stolen property, pickpocketing and arson (when the building was unoccupied).

Paper-and-Pencil Crimes: (Group C). The man who writes insufficient fund checks is generally a passive, dependent person. When incarcerated, check writers typically express anger in passive resistant ways, are depressed and emphatically say they will never find themselves in prison again. The basic features of passivity