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# THE EFFECTS OF PRAISE, CENSURE, AND NOISE ON ELECTRODERMAL AND REACTION TIME MEASURES IN CHRONIC SCHIZOPHRENIC AND NORMAL WOMEN

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LAWRENCE ALLEN PUGH

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THE EFFECTS OF PRAISE, CENSURE, AND NOISE ON ELECTRODERMAL AND REACTION TIME MEASURES IN CHRONIC SCHIZOPHRENIC AND NORMAL WOMEN

APPROVED BY

Carl R. Adams

Thomas S. Kay

John L. Morris

Henry Angelino

DISSERTATION COMMITTEE

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## CHAPTER I

## INTRODUCTION

One of the most consistent and widely observed findings in the study of schizophrenia is that of performance deficit. Much of the earlier literature has been summarized by Hunt and Cofer (1944), who cite numerous studies in the areas of intelligence, conceptual thinking, sustained associative thinking and speed of response, expressive indicators of emotion, perception, memory, and motor responses in which schizophrenics as a group performed more poorly than normal subjects. More recently, Shakow (1963) has summarized some of his own extensive work and that of his collaborators and has again emphasized the extensive deficit in numerous areas of performance as well as the large intra- and interindividual variability in schizophrenia. He adds, however, that some of these initial deficits tend to disappear with practice or time in his subjects.

Explanations which attempt to account for such performance deficits in schizophrenia range along a roughly defined continuum from a purely biological explanation at one extreme to a purely response withholding explanation at the other extreme. Toward the biological side, investigators have searched for disturbed links in the metabolic or biochemical

chain (Freeman, 1958), for disruptions in the organic or neurological systems (Goldstein, 1939; Heath, 1954; Vigotsky, 1934), and for general somatic withdrawal factors (Angyal, Freeman, & Hoskins, 1940; Hoskins, 1946). Although these approaches are perennially popular, they have, on the whole, proved to be generally unfruitful since they have failed to produce either undisputable evidence (Kety, 1959) or broad and productive theory.

More or less diametrically opposed to the biological approach is a response withholding type of explanation. Degree of cooperation, for example, has been found to correlate quite well with various types of motor and conceptual tasks (Shakow, 1946; Wittman, 1937). It has even been suggested that the schizophrenic is deliberately concealing himself and evading any attempt to understand his problems, e.g., the "Dick Tracy" theory (Anonymous, 1958).

Somewhere between the purely biological and the purely response withholding extremes lies a position which stresses the factor of disturbed motivation in the schizophrenic. Generally speaking the motivational disturbance hypothesis assumes that, if the proper motivating conditions were provided, all deficit in task performance would be eliminated. Some investigators consider the motivational problem to be quite general in scope, however, while others stress selective factors, particularly social-interpersonal ones.

Spence, Farber, and McFann (1956) and Farber (1955), for example, stress the general factor of anxiety (high activation) in schizophrenia, while Mednick (1958) assumes that anxiety is high in the early phase of schizophrenia but low in the chronic, regressed phase. Huston, Cohen &

Senf (1955) stress the failure of the schizophrenic to develop and maintain a consistent preparatory set due, at least in part, to disinterest, withdrawal, and preoccupation. The two issues of activation and set failure will be taken up again in another section

Various clinical investigators (Arieti, 1955; Cameron, 1944, 1947; Sullivan, 1947) and experimental investigators (Rodnick & Garmezy, 1957) strongly suggest, however, that the motivational disturbance is not general but is centered mainly around social-interpersonal stimuli. The following section will attempt to review some of the experimental findings regarding the effects of non-social and social stimuli on task performance.

## The Effects of Various Stimuli on Task Performance in Schizophrenia

In the following section, an attempt will be made to distinguish between non-social stimuli and several classes of social stimuli in order to note their relative effects on task performance. While such relatively non-social factors as practice (Shakow, 1963), guidance (Peters, 1953), and material incentives (Topping & O'Connor, 1960) have been found to have beneficial effects on schizophrenic task performance, physical stimulation has been most frequently used.

Physical stimulation. Lang (1959) hypothesized that the sheer exciting or arousing value of a physical stimulus might be sufficient, in itself, to increase the performance of schizophrenics on a reaction time task. He found, in keeping with such a simple stimulus dynamism hypothesis, that schizophrenics improved equally as well where they could escape as where they could not escape a high intensity noise.

Karras (1962) criticized Lang's experiment and his position, however, arguing that reinforcement by escape or avoidance is the determining

factor rather than simple stimulus dynamism. In a study which corrected some of the faults of Lang's experiment he found, as predicted by the reinforcement hypothesis, that under high-intensity noise, where escape was possible, subjects actually did significantly better than a control group which received no noise. Also, in direct contradiction to Lang's data, he found that where no escape was possible his subjects actually did worse than the same control group.

Cohen (1956) found that shock maintained the rate of learning of motor responses in schizophrenics while social rapport actually resulted in a decline in the rate. Pascal and Swenson (1952) found that avoidance of high intensity noise increased the amount of learning to the same level of performance as that of normals. Finally, Rosenbaum, Grisell, and MacKavey (1957a) found that schizophrenics speeded up their reaction time under a shock escape arrangement significantly more than did normals although they noted that the main effect was a reduction of variability.

In summary, it would appear that such non-social physical stimuli as shock and high intensity noise can be effective in improving the psychomotor and learning performance of schizophrenics when used in an escape or avoidance paradigm. The necessity for the escape or avoidance factors suggests that such physical stimuli have noxious properties and therefore, their termination has reinforcing value.

Social stimulation other than praise and censure. In contrast to the generally observed effectiveness of noxious physical stimulation, social stimulation appears to have less certain effectiveness. Positive social rapport between an experimenter and an individual subject, for example, has been found to be either relatively ineffective in improving task performance or to result in a decline in performance (Cohen, 1956;

Pascal & Swenson, 1952; Rosenbaum et al., 1957a). Stotsky (1957), however, set out to insure that social rapport would be maximized by using the patient's therapist to establish rapport, ensuring that a positive relationship did exist between the therapist and patient, and allowing several minutes for the therapist to induce the patient to do better. Under these circumstances he did find that, compared with previous performance, there was a significant improvement in choice reaction time and Purdue Pegboard scores for his total group of regressed and remitted schizophrenics although not for either group separately. Stotsky's experiment suggests, therefore, that social rapport may be effective when properly employed even though it is generally ineffective under ordinary circumstances.

In contrast to social rapport, group influence appears to be more generally effective. Wing & Freudenberg (1961) found, for example, that active supervision plus liberal social incentives increased the output of a chronic schizophrenic work group more than did passive supervision. Lerner (1963) found that the mere presence of other patients would increase the output of chronic schizophrenics on simple tasks. Shakow (1963) also found that the presence of a group of schizophrenics would increase the output of the members on a card sorting task, although it must be kept in mind that he used relatively cooperative patients.

Contrasting the general ineffectiveness of social rapport with the general effectiveness of group influence suggests an important distinction. The studies on group influence were such that the schizophrenic was not directly aware that his behavior was being influenced. Under these circumstances his behavior generally improved. Under social rapport conditions, however, he was generally quite aware of the experi-

menter and the experimenter's desire to manipulate his behavior. Under these circumstances little or no improvement in performance was found except where special care was taken in the establishment and use of such rapport. Awareness of social stimuli designed to modify behavior appears, therefore, to be a factor in determining the schizophrenics behavior.

The factor of direct confrontation with social cues specifically intended to modify performance, i.e. praise and censure, is taken up below following a discussion of the "social" disturbance hypothesis in schizophrenia.

The "social disturbance" hypothesis. Hunt and Cofer concluded their extensive review of the earlier literature on physchological deficit in schizophrenia by suggesting that "the slowness and excessive variability of the reaction times of schizophrenics and their failure to maintain a set to react might be taken to indicate a partial extinction of their responses to social stimuli" (1944, p. 995). Such a conclusion is supported by certain experiments which do indeed demonstrate that social, humanized stimuli are experienced as more difficult by the schizophrenic than relatively non-social, non-humanized ones (Davis & Harrington, 1957; Marx, 1962; Whiteman, 1954).

The hypothesis that social disturbance, and most specifically interpersonal disturbance, forms the core of the schizophrenic disorder has been extended along both clinical and experimental lines. Sullivan (1947) was one of the first to formalize a theory of schizophrenia based on interpersonal threat and anxiety. Many others have been influenced by Sullivan or share his views. Cameron (1947), for example, has attempted to account for schizophrenic withdrawal (and performance deficit) as a defensive response to criticism, failure, and threat.

Cameron concludes that schizophrenic disorganization in thinking is a symptom of social disarticulation "initially occasioned by defective role-taking ability. This isolation leads to a progressive substitution of asocial fantasy resulting in a gradual impairment of organized, socially acceptable thinking" (1944, p. 870).

Fromm-Reichmann has ascribed the seclusiveness of the severe schizophrenic patient to be the wish to avoid "another rebuke in a long row of thwarting rebuffs which the schizophrenic has experienced in childhood and conditioned him to expect in repetition" (1950, p. xii).

Other writers have commented on this matter:

> Dementia-praecox (Schizophrenia) is a defensive reaction in a sensitive human being to a feeling of personal failure. . . . Fundamental to the psychosis is an intolerable loss of self-respect (Hoskins, 1931, p. 1210).

> What does the schizophrenic patient see as he sits before the therapist? Primarily, he sees threat, every human relationship means threat to the schizophrenic person, whether threat of physical or sexual assault, rejection, seduction, misunderstanding, depreciation or great expectation. . . each human contact is frightening in the schizophrenic isolation. . . . Those who work with schizophrenic patients often note the sensitivity so many of them possess! Undoubtedly, this sensitive awareness of another person is a defensive necessity for living in a world seen as threatening (Cholden, 1956, p. 240).

> Thus, the schizophrenic develops the sensitive personality which has been described by many authors. This sensitivity to disapproval persists until it is covered by other defenses. The pre-schizophrenic is never able to tolerate even minor frustrations, because frustrations mean disapproval from other human beings (Arieti, 1955, p. 56).

It should also be noted that the recent therapeutic efforts of Rosen (1947, 1953) are based upon an explicit recognition of the potent consequences of rebuff in evoking maladaptive behavior (i.e., deficit behavior) in schizophrenic patients.

Such clinical evidence suggests that the key factor in the schizo-

phrenic's response to social stimuli is extreme sensitivity to rebuke and disapproval in a direct, interpersonal situation. The major characteristic of schizophrenia, social withdrawal, can thus be seen as a defensive response to criticism, failure, and threat. By replacing positive social relationships with a restricted, autistic process of social disarticulation (Cameron, 1947) the schizophrenic can achieve a partial avoidance of the conflicts associated with affiliations with others. He may even interpret anything from the world as hostile and unpleasant (Arieti, 1955) and, indeed, Silverman (1963) seems to have shown the schizophrenic to be perceptually "vigilant" in regard to negative, unpleasant words.

In regard to the behavioral effects of negative social stimuli (censure) on schizophrenic performance, however, some investigators have found significant improvement under such stimulation while others have found significant deficits. Furthermore, various studies indicate that behavioral withdrawal reactions, as a consequence of censure, occur primarily in poor premorbid (Phillips, 1953) or process patients (Becker, 1959). Good premorbid or reactive patients, in contrast, appear to behave in a more adaptive fashion under censure (Higgins, 1964; Rodnick & Garmezy, 1957). In an attempt to resolve the discrepancies due to performance measures and type of subject, Higgins has suggested the following:

> There is a heightened sensitivity on the part of the process schizophrenics to social censure (as contrasted with social approval) relative to reactive schizophrenics and normal individuals; such sensitivity seems evident in the efficacy of social censure for the modification of the process schizophrenics behavior--whether the modification be labelled "deficit" or "improvement." Regardless of the label, however, the direction of behavioral modification is that of withdrawal from or avoidance of social censure. Thus the censure-deficit vs. censure-improvement controversy becomes reduced to a matter of conven-

> tion: if the experimental paradigm is such that the censure-avoidant behavior interferes with arbitrarily designated "correct" responses the result is recorded as "deficit," while if the censure-avoidant behavior happens to be congruent with desired performance the result is classified as "improvement" (1964, p. 17).

If Higgins' interpretation is correct concerning the process-reactive or highly related good-poor premorbid distinction (Johannson, Friedman, Leitschuh, & Ammons, 1963; Solomon & Zlotowski, 1964) popularized by Rodnick & Garmezy (1957), then it quickly becomes apparent that any comprehensive review of the literature is complicated by the need to consider this interaction between type of subject and type of task.

In addition to the process-reactive and good-poor premorbid distinctions, it is possible to distinguish subjects as to acuteness or chronicity of symptoms. Psychiatrically, the acute patient is considered to show a high degree of floridness of symptoms, accompanied by tension and anxiety, while chronicity frequently implies behavioral regression and a relatively undifferentiated symptom picture. Arieti (1955) has attempted to describe the changes which occur from acute to chronic states, pointing out that some patients can be labelled chronic shortly after the onset of psychosis while others maintain florid symptoms for years, and still others show episodic variations over time. While it would be desirable to have an independent evaluation of the acuteness or chronicity of any patient used for experimentation, research reports have frequently used years of hospitalization as a rough measure of chronicity. Although there is wide variation in deciding what length of hospitalization constitutes chronicity, patients hospitalized less than one year are generally considered acute while longer hospitalization is assumed to correspond to chronicity of symptoms.

Since the process-reactive and good-poor premorbid distinctions were intended, wholely or in part, as prognostic measures it is apparent that there should be a relationship between these distinctions and the acute-chronic distinction (Johanssen, Friedman, & Ammons, 1963). Such a relationship is based on the greater number of process or poor premorbid patients who become chronically hospitalized patients, however. Good premorbid or reactive patients, in contrast, more frequently remit and leave the hospital. Consequently, recently hospitalized patients include large numbers of both good premorbids or reactives, and poor premorbids or process patients. Chronically hospitalized patients, however, tend to be largely poor premorbids or process patients. Since poor premorbids or process patients are those who presumably show behavioral withdrawal tendencies under censure, poor premorbids, process patients, and chronic patients should behave in much the same way.

An attempt will be made in the next section to evaluate these various subject distinctions separately in order to determine if poor premorbid, process and chronically hospitalized patients do indeed behave in a similar fashion under censure and praise.

If censure tends to produce avoidance or withdrawal tendencies it would seem that praise should have reassuring qualities which would lower anxiety and allow the schizophrenic to show an improvement in performance. While such an argument might be plausible for a normal person, the acceptance of such positive, rewarding, social stimulation does not fit with the social withdrawal of the schizophrenic. To accept praise means to accept and value the positive opinions and approval of others which, in a world interpreted as hostile and negative, is not only in-

compatible with withdrawal and social disarticulation as a defense, but may even be seen as scarcely credible to the schizophrenic. In addition, it is perhaps a truism that acceptance of the good opinion of others exposes one, possibly even more acutely, to their bad opinions as well. After long and careful attempts to establish positive rapport, the schizophrenic may feel safe in seeking the approval of others, but such rapport would probably be highly tenuous and quickly turn to indifference if it was felt the person could not be trusted after all (Rodnick & Garmezy, 1957, p. 116).

In summary, censure would appear to threaten the weak self-esteem structure of the poor premorbid, process, or chronically hospitalized patient and lead to a variety of adaptive and maladaptive behavioral withdrawal or avoidance patterns. Whether deficit or improvement occurs, however, appears to depend on whether or not the behavioral withdrawal is consistent with the type of response designated "correct." Praise on the other hand presumably does very little or nothing to induce the schizophrenic to modify his behavior in order to seek out further praise and hence should result in little or no behavioral changes.

Praise and censure. The studies reviewed in this section involve a wide variety of tasks, measure, subjects, and controls making it difficult to evaluate and compare them. Secondly, the dimensions of process-reactive, good-poor premorbid, and recently hospitalized-chronically hospitalized further complicate the picture. Therefore, a simplified tabular summary of the studies reviewed is presented in Table 1 with a more detailed review being presented at the end of this section.

Overall there were 19 studies, 12 dealing with both praise and

Table 1

An Outline of Experimental Literature dealing with Praise and Censure in Schizophrenics

| Author(s) and Year | Process-Poors | | Reactive-Goods | | No Classification | |
|---|---|---|---|---|---|---|
| | Praise | Censure | Praise | Censure | Praise | Censure |
| I. Studies not specifying the degree of chronicity | | | | | | |
| Atkinson, 1957 | | | | | 0[c] | +[c] |
| Goodstein, Guertin & Blackburn, 1961 | | | | | 0 | + |
| Hellman & Kates, 1961 | | + | | 0 | | |
| Robinson, 1958 | | | | | 0 | + |
| Webb, 1952 | | | | | | + |
| II. Studies using schizophrenics hospitalized less than one year | | | | | | |
| Bleke, 1955 | | + | | 0 | | |
| Cohen & Cohen, 1960 | | | | | 0 | |
| Garmezy, 1952a, 1952b | | | | | | + |
| Koppenhaver, 1961 | a | + | a | + | | |
| Leventhal, 1959 | | | | | 0 | + |
| Long[b], 1961 | | | | | 0 | + |
| Losen, 1961 | | | | + | | |
| III. Studies using schizophrenics hospitalized more than one year | | | | | | |
| Cavanaugh, Cohen & Long, 1960 | | | | | 0 | + |
| D'aLessio & Spence, 1963 | | | | | + | |
| Johanssen, 1962 | | | | | + | + |
| Ladd, 1960 | 0 | 0 | 0 | 0 | | |
| Lair, 1954 | | | | | + | 0 |
| Long[b], 1961 | | | | | 0 | 0 |
| Olson, 1958 | | | | | + | + |
| Wells, 1961 | + | + | + | + | | |

a. Process and reactive patients behaved the same under praise.

b. Long, 1961 appears in both sections II and III.

c. + Means stimulation effective in modifying behavior, 0 means not effective.

censure, 5 dealing only with censure, and 2 dealing only with praise. Of the 17 studies dealing with censure 15 showed it to be an effective modifier of the behavior of some, or all, groups of schizophrenics, while of the 14 studies dealing with praise only 5 found it to be effective.

Length of hospitalization appears to be an important dimension. All of the seven studies using recently hospitalized schizophrenics, for example, showed censure to be effective while praise, if used, was not found to be effective. By contrast, of the eight studies dealing with chronically hospitalized schizophrenics only one study showed censure to be effective and praise not effective, three studies showed both praise and censure to be effective, one study showed praise to be effective and censure not effective, and two studies showed neither praise nor censure to be effective. In short, both praise and censure were effective in four cases and noneffective in two cases in chronically hospitalized schizophrenics. It is obvious, therefore, that chronically hospitalized schizophrenics are slightly less affected by either form of evaluation than recently hospitalized patients. Where chronically hospitalized patients are significantly affected, praise and censure appear to be rather equally effective in producing behavioral changes. Since the chronically hospitalized schizophrenic was assumed earlier to be both correlationally and theoretically similar to the process or poor premorbid patient and since the process or poor premorbid patient was assumed to be the most sensitive regarding censure (Bleke, 1955; Hellman & Kates, 1961; Koppenhaver, 1961) this lessened impact of censure relative to praise, appears difficult to explain. There does not, at present, appear to be any adequate rationale to explain this effect.

In keeping with the arguments presented in the previous section, therefore, chronically hospitalized schizophrenics will still be considered to behave similarly to recently hospitalized process, or poor premorbid schizophrenics. That is, they should be responsive to censure but not responsive to praise.

The studies shown in Table 1 are presented below in more detail. Rather than being presented in the order seen in Table 1 these studies are presented in order of the reported effectiveness of censure and praise in modifying schizophrenic behavior.

The first group of studies to be reported are those in which censure was effective in modifying schizophrenic behavior while praise, if used, was either ineffective or was significantly less effective than it was for normals. Atkinson (1957), using a 15 item paired syllable learning task, found that, while verbal praise was more facilitating for her normal women, verbal censure was more facilitating for her schizophrenic women. Robinson (1958) found that paired associate learning was significantly facilitated under censure in schizophrenics but not under praise. In addition, it made no difference in the effectiveness of the censure whether the experimenter told the subject verbally each time he made an error (personal) or whether the subject simply heard the sound of a calculating machine under the same circumstances (impersonal).

Goodstein, Guertin, & Blackburn (1961) found that verbal censure accelerated schizophrenics' choice reaction time significantly compared to a non-evaluative control group while praise did not have a significant effect. Cavanaugh, Cohen, & Long (1960), using chronically hospitalized schizophrenics, found that both verbal censure (personal) and a tone

(impersonal), which were delivered if the subject did not respond faster than a set standard, had equally facilitating effects on reaction time compared to a non-information control group. A group which received praise, however, did not do any better than the same type control group. Such results are, of course, quite similar to Robinson's (1958).

Cohen & Cohen (1960), using a verbal conditioning paradigm with recently hospitalized schizophrenics, reinforced the pronouns "I" and "we" or, in a second group, "he" and "they" by saying "good" each time they were used. Their results indicated no conditioning. Similar results were found by Leventhal (1959) in a group of recently hospitalized schizophrenics in regard to positive reinforcement while negative reinforcement ("not so good") for one class of pronouns did lead to a significant increase in the use of a second class of pronouns. On the other hand Leventhal found that both negative and positive reinforcement were effective for his normal subjects.

Losen (1961), using only recently hospitalized, good premorbid patients, as defined by the Phillips (1953) scale, found that censure did result in significant improvement on arithmetic reasoning and digit span tests compared to an "information only" control group. Koppenhaver (1961) also found that recently hospitalized reactive patients improved on censure, yet process patients were found to show even more improvement on the same visual-motor sequence task. Both process and reactive groups responded alike to praise.

Long (1961) compared the performance of recently and chronically hospitalized schizophrenics on a complex S-R task and found that, while his recently hospitalized group improved significantly under censure,

his chronically hospitalized group showed no significant changes. In fact, the chronic group showed a non-significant tendency to improve under praise and to get worse under censure.

Garmezy (1952a, 1952b) asked a group of recently hospitalized male schizophrenics to discriminate a series of tones from a standard tone by pushing a lever when the tones were similar and pulling the lever when they were different. Under a condition where the word "wrong" was flashed on a screen if they made an incorrect pull response and the word "right" was flashed if they made a correct pull response, he found that his patients tended to give fewer pull responses overall. That is, the pull response, and hence the signal "wrong" appeared to be maladaptively avoided at the expense of improved discrimination. Bleke (1955) investigated the effects of the same type of "wrong" signal on interference in learning. He had his schizophrenic groups learn a set of 14 neutral nouns using the push-pull technique of Garmezy (1952a, 1952b) where one group got the word "right" when correct and a second group got the word "wrong" when incorrect. In addition, he divided his subjects into good and poor premorbids. He found that, following the censure situation, the poor premorbid schizophrenic showed strong reminiscence effects not found in his good premorbids. That is, the poor premorbid subjects had presumably learned more than they revealed during the training period and only demonstrated such learning upon later retesting when the interference-generating censure was removed.

Two studies indicate that censure tends to produce deficit behavior on conceptual type tasks. Webb (1952) found that a censured schizophrenic group showed a decrease in quality of performance (e.g. imprecision and

tangentiality) on a similarities test, while a non-evaluated control group actually improved in performance. Hellman & Kates (1961) concluded from their studies that censure leads to behavioral withdrawal, principally in the poor premorbid schizophrenic, which, added to their already impaired conceptual performance, resulted in a further significant deficit in conceptual ability which was not found in the good premorbid schizophrenic or the normal.

Two studies have shown somewhat mixed results. Johannsen (1962) found that praise improved performance on a letter cancellation task in a group of chronically hospitalized patients compared to a control group. However, he also found that censure was even more effective than praise in improving such performance. Wells (1961), using very long term hospitalized schizophrenics (10.42 years hospitalization), found that praise and censure were equally effective in improving performance on a letter-sorting task. In addition, his good premorbid patients did not differ in the amount of their improvement from the poor premorbid ones.

In contrast to these mixed results, three studies have shown praise to be effective in modifying behavior while censure, if used, was either not effective or was less effective. Lair (1954), using chronically hospitalized schizophrenics, found that praise improved verbal learning and recall compared to a non-incentive control group while censure did not.

D'Alessio & Spence (1963), using a type of pegboard task, found that global praise and encouragement after each trial produced about the same degree of significant improvement in both chronically hospitalized schizophrenics and normals compared to non-praised controls. Olson (1958),

also using chronically hospitalized schizophrenic patients, found that praise produced a significantly greater increase in task performance than did censure, although censure, in turn, was significantly more effective than a non-evaluated control group. Olson's results are not directly comparable to the other studies cited above, however, since he used number of items attempted on a modified digit symbols task rather than the number of items correctly completed. It is possible, for example, that praise could induce the subject to attempt more items on the test while increasing errors at the same time through increased carelessness.

One final study by Ladd (1960) showed no significant effects due to either praise or censure in a group of reactive and process chronically hospitalized schizophrenics (3.2 years) nor in a group of normals on a digit symbol task.

## The Measure of Overt Response

In the literature previously presented, a wide variety of performance tasks were used to assess the effects of various factors on schizophrenic behavior. Since the primary concern of the present thesis is the measurement of covert (electrodermal) responses and since the subjects to be used are extremely disorganized and have been hospitalized for an extremely long period, the choice of a measure of performance is contingent on these factors.

The use of electrodermal measures provides an opportunity to study a wider range of subjects than is possible in a study using overt response only. The reason for this is, of course, that a large number of chronic, disorganized schizophrenics are untestable. That is, they will provide no properly measurable overt response. In addition, the more complex and

demanding the task, the more subjects will be lost due to failure to respond. The measurement of covert response, however, requires little or nothing from the subject overtly. Therefore, in order to obtain the greatest number of subjects for electrodermal measurements, only minimal passive cooperation is needed. If the subject simply shows barely minimal compliance with the gross requirements of the task, such minimal overt response is all that is required to give the experimenter a basis to apply praise, censure, or physical stimulation. In addition, a task designed to assess changes in motivation in schizophrenics ought to be as free as possible of chances for maladaptive response and factors, such as learning, which might produce changes over time not related to changes in motivation. Furthermore, the task response ought to be either directly congruent or directly non-congruent with the presumed behavioral withdrawal tendencies of the poor premorbid, process or chronically hospitalized schizophrenic so that performance can be clearly judged as showing improvement or deficit.

Finally, Huston, Shakow, & Riggs (1937) have stressed the idea that failure to prepare for response and failure to maintain response sets account for much of the poor performance of chronic schizophrenics. They consider reaction time to be one of the best single indicators of such set disturbance. Since electrodermal activity is appropriate to the measurement of numerous, short duration, discrete responses, such as is found in a reaction time task, and since electrodermal activity can also be used to measure anticipatory responses, reaction time and electrodermal measures would appear to be well suited to each other. Reaction time would therefore appear to be a most reasonable measure of overt re-

sponse since (1) it is extremely simple, (2) it involves direct motoric withdrawal tendencies, (3) there is minimal chance for maladaptive response, (4) there is a minimal amount of learning involved, and (5) it is well suited for use with electrodermal measurement.

## The Measure of Covert Response

General measures of central nervous system activity (Hebb, 1955), muscle activity, and autonomic nervous system activity (Duffy, 1962) have all been used and related to changes in the observed amount of stress to which the organism is subjected. Perhaps the most frequently and widely used autonomic measures have been electrodermal ones (galvanic skin response and skin resistance level). Duffy has summarized the essential points:

> "Energy mobilization" refers to the release of potential energy. . . for use in activity or response. This energy may be used for either covert or overt activity. It is the energy used in attending and thinking as well as in locomotion and manipulation. It is the energy used in tensing the muscles in preparation for overt response as well as that used in the preparation for overt response as well as that used in the overt response itself. . . . The energy mobilization itself appears to be directly controlled by the autonomic nervous system. . . . Whatever may be the precise nature of the phenomenon, there appears to be consistent variation in skin resistance with variations in the energy demands of the situation. This fact suggests that the measure may be employed as an indicator of energy mobilization. . . . In other studies the galvanic responses to words have been shown to vary with the meaningfulness and importance of the words. . . . Apparently, activity, or readiness for activity, is the common factor in all situations where low skin resistance is found in a given individual. Relaxation or passivity, on the other hand, appears to be the common factor in all situations where high skin resistance is found. If a decrease in resistance occurs (within certain limitations) whenever there is an increase in energy mobilization, it is not surprising that decreased resistance has been variously considered to be characteristic of emotion, of volition or conation, of a sudden check in the comprehension of problems, and of states of alertness (1951, pp. 33-36).

Various other authors have referred to a similar relationship between electrodermal phenomena, i.e. skin resistance or skin conductance (the reciprocal of resistance), changes in resistance levels, and the state of excitation, arousal, activation, alertness, and performance capability of the individual (Burch & Greiner, 1960; Darrow & Solomon, 1934; Duffy, 1962; Hebb, 1955; Silverman, Cohen, & Shmavanian, 1959; Woodworth & Schlosberg, 1958). Electrodermal phenomena have been widely used in assessing the reactions of individuals to physical stimuli, especially sudden intense and unexpected stimuli (i.e. startle reactions), in responsiveness to emotional or meaningful stimuli such as taboo words, visual scenes, etc., and, as was pointed out above, in the organisms readiness for activity or response. For example, if the individual receives information (anticipatory cues) which leads him to expect that a certain stimulus will be presented or that he will have to respond overtly in some way, he is likely to show certain changes in electrodermal measures prior to the presentation of the stimulus, which suggest that he is anticipating such a stimulus or response.

Physiological activation and responsiveness in schizophrenia. Findings regarding physiological activity level and responsiveness in schizophrenics have varied considerably. Angyal, Freeman, & Hoskins (1940) found schizophrenics to be generally less responsive than normals to various physiological stresses. Hoskins (1946) has even proposed a hypothesis of general somatic withdrawal as a counterpart to the general psychological withdrawal of the schizophrenic. Malmo, Shagass, & Smith, however, conclude:

> Our data do not support the contention that the chronic schizophrenic is generally characterized by low physiological

> responsiveness. . . . One clear instance of low responsiveness in the chronic schizophrenic group was noted in the Pain-Stress test. The schizophrenics did not press the button to signal pain as often as did the normal controls. Here it is tempting to conclude that the pain stimulation was less stressful for the schizophrenic. But this explanation fails to account for the higher level of muscular tension in the right arm, the higher heart rate, and the higher diastolic blood pressure which the schizophrenics showed in comparison with normal controls (1951, pp. 370-372).

In relation to the process-reactive dimension, Gromoll's (1961) study on EEG patterns tended to favor the hypothesis of chronic arousal states in those process patients who are more severely ill, although the data were far from conclusive. Devault (1955) measured the GSR and heart rate responses to conflictual pictures, a loud bell, and a verbal warning preceding the bell, in process, reactive, and normal subjects. His data indicated, contrary to Gromoll's, that process patients tend toward hyponormal reactivity when compared with normals although not when compared to reactives. Since Devault's patients were generally quite chronic (8.7 years hospitalization) with no patient falling below six years hospitalization, the data would seem to contradict Malmo, Shagass, & Smith (1951). A study by Ray (1961), however, should help to clear up the differences.

Ray (1961), using adequate and inadequate verbally responding chronically hospitalized schizophrenic women, found no differences between these two groups and normal women in conductance level or in GSR response to threat of pain or to pain (taking a blood sample). In addition, when asked to simply listen to words, normals and schizophrenics showed the same anticipatory rise in skin conductance prior to actual response. In contrast, when asked to respond (associate) to words, but prior to overt verbal response, schizophrenics showed about

the same amount of anticipatory rise in conductance as when they were simply asked to listen to words while normals showed a significantly greater rise in conductance.

Such data strongly suggest that schizophrenics fail to mobilize sufficiently compared to normals when they are asked to provide overt responses. GSR, or short range, responses to definite externally originating stimuli such as pain or noise (Paintal, 1951; Sands & Rodnick, 1950) are apparently quite adequate in schizophrenics, however.

## CHAPTER II

## STATEMENT OF THE PROBLEM

Several lines of thought and evidence have been developed in the previous chapter. First is the finding that the opportunity to escape from or avoid noxious physical stimulation, such as high intensity noise or shock, can influence schizophrenic behavior. Second is the finding that social stimuli have differing effectiveness in modifying schizophrenic behavior depending on whether or not the subject is aware that he is being influenced.

When the schizophrenic is aware of an attempt to influence him by social stimulation, the specific effects on his behavior appear to be a complex function of the type of individual (process-reactive, good-poor premorbid, recently hospitalized-chronically hospitalized), type of stimulus (positive or negative), and type of performance measure (congruency or non-congruency with behavioral withdrawal tendencies). What evidence and theoretical arguments there are would point to the idea that process, or poor premorbid patients are highly responsive to censure and react to it with behavioral withdrawal. If the response labelled "correct" is congruent with such behavioral withdrawal then "improvement" will occur while if it is not congruent with such tendencies then "deficit" will occur.

The chronically hospitalized schizophrenic has been found to be correlationally, as well as theoretically similar to the recently hospitalized poor premorbid or process patient. If the chronically hospitalized schizophrenic behaves the same as the recently hospitalized process or poor premorbid schizophrenic, then he should be highly responsive to censure, minimally responsive to praise, and as responsive as normal subjects to a non-evaluative motivator such as noise. Further, if there is a direct correspondence between the overt and covert level of response then such a pattern of response should hold at both the overt level of psychomotor performance and the covert level of electrodermal response.

There are some indications in the literature, however, that the chronically hospitalized schizophrenic does not behave in the same way as the recently hospitalized; poor premorbid or process schizophrenic. Specifically, the chronically hospitalized schizophrenic appears less sensitive to censure and more sensitive to praise than the recently hospitalized, poor premorbid or process patient. The literature, therefore, would suggest that, in regard to chronically hospitalized schizophrenics, different hypotheses would need to be formulated than those formulated for recently hospitalized, poor premorbid or process patients. Unfortunately, no theoretical rationale exists which would adequately explain why chronically hospitalized schizophrenics should behave in a different fashion.

Furthermore, none of these studies of chronically hospitalized schizophrenics have presented any information as to the covert responsiveness of the chronically hospitalized schizophrenic to praise, censure, or noise. It is possible that overt response may differ in chronically

hospitalized schizophrenics while covert response may be the same as in recently hospitalized, poor premorbid or process patients. One type of discrepancy between the overt and covert level of functioning in chronically hospitalized schizophrenics is that, while there are serious overt performance deficits, both GSRs to definite, externally originating stimuli and electrodermal levels are in the normal range. In contrast, such patients seem to be sub-normal in electrodermal response to anticipatory cues which signal the need for them to provide overt responses.

Since there is no theoretical position which would account for a difference between chronically hospitalized and recently hospitalized process or poor premorbid schizophrenics in the pattern of reaction to praise, censure, and noise, and since there is no theory which would specify a difference between the overt and covert responsiveness to these stimuli, the same hypothesis should apply to chronically hospitalized schizophrenics as well as to recently hospitalized, poor premorbid or process patients. Furthermore, the same hypothesis that would be applied to overt responses to praise, censure, and noise should be applicable to the covert level of response as well.

## Hypotheses

If chronically hospitalized schizophrenics show the same pattern of response as recently hospitalized, process or poor premorbid schizophrenics, then:

1. Chronically hospitalized schizophrenics will show a significant decrease in lift reaction time under (a) verbal censure, and (b) noise escape, but not under (c) verbal praise. In contrast, normals will show a significant decrease in lift reaction time under (a) verbal censure,

(b) noise escape, and (c) verbal praise.

If covert responses, such as GSRs, are parallel to overt responses, such as lift reaction time, and if chronically hospitalized schizophrenics are as responsive as normals in terms of GSRs to definite externally originating stimuli, then:

2. Relative to normals, chronically hospitalized schizophrenics will show larger GSRs (change in conductance within 15 seconds) to (a) verbal censure, equal GSRs to (b) a ½ second moderate intensity noise, and smaller GSRs to (c) verbal praise.

If covert anticipatory responses are directly related to overt responses, and if chronically hospitalized schizophrenics are, overall, less responsive than normals to anticipatory cues which signal a forthcoming overt response then:

3. Chronically hospitalized schizophrenics will show their largest changes in conductance (including both anticipatory GSRs and longer enduring shifts in conductance level) in anticipation of (a) verbal censure, next largest in anticipation of noise escape, and least in anticipation of (c) verbal praise. In contrast, normals will show anticipatory responses to (a) verbal censure, (b) noise escape, and (c) verbal praise which do not differ.

# CHAPTER III

# METHOD

## Subjects

As part of a larger project concerning the prediction of response to chlorpromazine treatment in chronic schizophrenic women (USPHS Grant MY-4260) a total of 60 female patients were selected at random from that part of the population of Central State Griffin Memorial Hospital (Norman, Oklahoma) which met the following criteria:

Diagnosis: Schizophrenia (diagnosis and subdiagnosis confirmed by ward psychiatrist at the time of selection).
Minimum hospitalization: 5 years.
Age: 25-61.
No recorded evidence of mental deficiency, epilepsy, CNS syphilis, or other types of organic brain disease.
No history of brain surgery of any type.
No record of metabolic disease, liver disease, or heart disease.

These subjects were assembled on a special research ward and removed from all somatic and individual therapies for at least six months prior to testing. It is apparent, therefore, that these subjects, due to their random selection, form a representative sample of chronic schizophrenic women who are free from the effects of any complicating organic problems or mental deficiency and from the effects of any drug or other therapies. Since all these criteria are rarely met in any one study, especially the random selection criterion, the generalization value of the present study is considerably strengthened.

Testing of subjects took place during a period just prior to the initiation of a double-blind administration of chlorpromazine. Out of the 60 subjects available, two subjects were lost due to medical problems and 16 subjects were found to be unusable due to failure to come to the testing room or refusal to cooperate either actively or passively. Since reaction time measures were considered somewhat secondary to the electrodermal measures the criterion of a simple compliance with testing procedures was used without regard to length of reaction time or any other objective criterion. Consequently the 42 subjects used in the present study represent a spread from approximately normal range performance to extremely disturbed behavior and extremely long reaction times. Due to the extremely low level of performance allowed plus the extreme chronicity of these patients, it was expected that the present results would deviate somewhat from those of the majority of studies dealing with schizophrenic performance. The characteristics of the testable sample used here plus those of the unusable sample are presented in Table 2.

The normal control subjects were 24 female employees of Central State Griffin Memorial Hospital including 13 office workers, 4 nurses, 2 recreational therapists, and 5 psychiatric aides. Unfortunately the average age of the controls was much lower than that of the patients involved due primarily to the greater cooperation and interest of the younger employees. Despite this drawback the results for the electrodermal measures compare quite closely with those of Ray (1961) who achieved better control of the age variable.

## Apparatus

The experimental room was located in the same building and on the

Table 2

Characteristics of Experimental and Unusable Subjects

| Variable | Experimental Sample | Unusable Sample |
|---|---|---|
| Number | 42 | 16 |
| Age (Years) | 48.81 | 47.94 |
| Range | 27 - 61 | 25 - 61 |
| Years hospitalized | 18.02 | 23.06 |
| Range | 5 - 33 | 7 - 41 |
| Age first admitted | 30.78 | 24.88 |
| Range | 15 - 56 | 17 - 34 |
| Diagnosis | | |
| Catatonic | 15 | 11 |
| Paranoid | 15 | 2 |
| Hebephrenic | 6 | 1 |
| Simple | 1 | 1 |
| Other | 5 | 1 |
| Marital Status | | |
| Single | 17 | 10 |
| Widowed, divorced | 17 | 3 |
| Married | 8 | 2 |
| Missing data | 0 | 1 |
| Education | | |
| Grade School | 6 | 2 |
| High School | 27 | 12 |
| College | 6 | 1 |
| Missing data | 3 | 1 |
| Occupation | | |
| Semi-skilled or below | 30 | 9 |
| Office, skilled | 8 | 2 |
| Professional, managerial | 2 | 0 |
| Student | 0 | 3 |
| Missing data | 2 | 3 |
| Relatives hospitalized | | |
| Yes | 14 | 9 |
| No | 13 | 5 |
| Missing data | 15 | 2 |

same floor as the ward in which the experimental subjects were housed. Subjects were somewhat familiar with the area although not with the testing room itself.

The apparatus for measuring conductance was a Wheatstone bridge and a D. C. amplifier. One $\frac{1}{4}$" diameter sealed zinc electrode was attached to the first finger and one to the middle finger of the left hand over the apperture of a felt corn pad filled with zinc sulphate electrode paste. Prior to attaching electrodes the fingerprint whorls of the proper fingers were cleansed with alcohol and cotton. The application and properties of these electrodes have been described by Lykken (1959) and are considered to be relatively free from polarization, electrical artifacts, and error due to variation in the area of contact from subject to subject.

Changes in conductance across the electrodes were continuously recorded on a Texas Instruments Graphic Recorder. The apparatus was previously calibrated across the full meter range for each 100,000 ohm null setting with the use of an external decade box. A series of transparent plastic scales was constructed which provided the experimenter with an accurately calibrated and efficient means of reading the values directly in conductance units (expressed as mhos x $10^7$). The graphic recorder was also equipped with an electrically actuated signal pen to record the occurence of any event desired.

The reaction time apparatus consisted of a Standard electric clock recording to .01 second, two Hunter silent interval timers, and a telegraph key. One interval timer controlled the interval between the depression of the telegraph key and both the start of the clock and the

sounding of the buzzer. The clock was stopped when the subject released the telegraph key from the down position. The buzzer was an electromagnetically operated vibrator situated on a board next to the telegraph key and was controlled by the second timer. At .05 second timer setting the buzzer had no opportunity to produce more than a weak "bleep" which was the signal to lift the finger off the key, while at a 20.0 second timer setting the buzzer became the loud, rasping vibration used as the noxious stimulus in the noise escape series.

## Design of the Experiment

The three types of motivators (praise, censure, and noise) were arranged in partially counterbalanced sequences with the noise being last in both sequences. A comparable sequence without the motivators was arranged for the control groups. Both schizophrenic and normal subjects were assigned equally to one of three groups, praise-censure-noise (PC), censure-praise-noise (CP), or control (Co), with 14 schizophrenics and 8 normals in each. As an additional control all subjects received an initial practice period. A base period preceded each of the motivational periods.

Such a design has several advantages from the standpoint of reaction time and electrodermal measures. First, in discussing the effects of order of presentation of conditions on experimental outcome, Rodnick and Garmezy (1957) feel that the mildest stimuli should come first and the most potent stimuli should come last in order to minimize carryover effects. In terms of their conclusions, censure is a more potent stimulus than praise and should therefore come second. However, since it is

not a foregone conclusion that praise is a weaker stimulus than censure, an attempt was made to study order effects by a partially counterbalanced design. Since noise seems to be a rather potent stimulus and since its role in this experiment is secondary to that of praise and censure, it was considered better to avoid confounding its effect with the effects of praise and censure, hence it appears last in both sequences.

Secondly, such a design has the advantage of providing an independent analysis using only the initial condition of praise or censure if the above order effect proved to be present.

Thirdly, the various base periods are included in order to have a reference level in case there are long range trends in reaction time which might obscure relative changes due to praise, censure, or noise. In addition, the base periods can be used to assess the amount of carry-over from the previous motivational condition.

Finally, the use of neutral base periods and neutral statements in the series provides an additional control in terms of electrodermal response to neutral stimuli. If schizophrenics are found to be less responsive compared with normals, then the responses to these neutral stimuli can be used to adjust the responses to the experimental stimuli.

The major drawback of the present design is its length. Rodnick and Garmezy (1957) feel that if a task is too long, especially if it is not very interesting, the schizophrenic will show a decline in performance. On the other hand it was felt that the effects of praise, censure, and noise would be generally cumulative and would require time to approach their maximal effectiveness. With these considerations in mind, the number of trials on the reaction time task was set at 52 which, hope-

fully, would provide a reasonable compromise between these two factors.

## Procedure

It has been noted that the following procedure was part of a larger project. Considerations of the purposes and design of the larger project necessitated some compromises in the design of the present study. One specific consideration of this larger study, for example, was the use of tapping speed as a measure of performance. Reference to Table 3 should help in understanding the following procedures.

Preliminary. Subjects were brought into a small room and seated in a comfortable stuffed chair. Preliminary instructions were given as follows:

> All right, now, you just relax for a moment while I tell you about what we're going to do. All the equipment you see here might look like a great deal but actually we are only going to use part of it. Also, as complicated as it all looks none of the equipment in the room will shock you or hurt you in any way. For about the next hour I simply want to find out at what rate of speed you can tap and how long it takes you to lift your finger after you hear a little buzzer. After that there are a few other simple things I want you to do such as listening to words. There is really nothing to these little tasks. They are very simple and easy to do and you should have no trouble with them.

Immediately following this the instructions for the warm-up task (tapping speed) were given:

> You see these two little telegraph keys on the board here. (Place board on Ss lap) When I say "start," but not before, I want you to tap first one key and then the other, back and forth, as fast as you can. All right? I'll give you five seconds in which to tap. Five seconds isn't very long so you'll need to hurry. All right--are you ready? (2-3 seconds delay) Start! (Timing starts the moment the first key is struck.)

Three trials, at five seconds each, were given with one trial following almost immediately after the previous one. Prior to the second

Table 3

An Outline of the Experimental Sequence

| Condition | Reaction Time Trials | Events[a] | |
|---|---|---|---|
| | | Experimental Groups | Control Group |
| Preliminary | | Three tapping speed trials | |
| Instructions | | Initial instructions[b] | |
| Practice | 1-10 | 10 R.T. trials[c] | |
| Relax period[d] | | Relax | |
| Base 1 | 11-15 | 5 R.T. trials | |
| Relax period | | Relax | |
| Series 1 | 16-24 | Neutral<br>Set for Praise(PC), for Censure(CP)<br>Praise 1 (PC), Censure 1 (CP)<br>3 R.T. trials<br>Praise 2 (PC), Censure 2 (CP)<br>3 R.T. trials<br>Praise 3 (PC), Censure 3 (CP)<br>3 R.T. trials | Neutral<br>9 R.T. trials |
| Relax period | | Relax | Relax |
| Base 2 | 25-29 | Nonevaluation<br>5 R.T. trials | 5 R.T. trials |
| Relax period | | Relax | Relax |
| Series 2 | 30-38 | Neutral<br>Set for Censure(PC), for Praise(CP)<br>Censure 1 (PC), Praise 1 (CP)<br>3 R.T. trials<br>Censure 2 (PC), Praise 2 (CP)<br>3 R.T. trials<br>Censure 3 (PC), Praise 3 (CP)<br>3 R.T. trials | Neutral<br>9 R.T. trials |
| Relax period | | Relax | Relax |
| Base 3 | 39-43 | Nonevaluation<br>5 R.T. trials | 5 R.T. trials |
| Relax period | | Relax | Relax |

(Table continued on next page)

An Outline of the Experimental Sequence--Continued

| Condition | Reaction Time Trials | Events[a] | |
|---|---|---|---|
| | | Experimental Groups | Control Group |
| Series 3 | 44-52 | Neutral<br>Nonevaluation<br>Demonstration<br>Noise<br>Escape instructions<br>9 R.T. trials (with noise escape) | Neutral<br>9 R.T. trials |
| Relax period | | Relax | Relax |

[a]Conductance levels immediately before and changes in conductance occurring with 15 seconds (GSR) were recorded for each underlined event listed as well as for each phase of a reaction time trial described in Note [c].

[b]Changes in conductance level were measured from just before instructions to the highest point within the instructions.

[c]A reaction time trial included (1) The signal "Ready" followed by sufficient time to allow any changes in conductance to reach their full extent, (2) The signal "start," following which the subject put her finger on the key and waited from one to three seconds for either the buzzer or noise signal. Changes in conductance level were recorded from just prior to the "ready" signal to the highest point before the response to "start" and from just prior to the response to "start" to the highest point reached within 15 seconds of leaving the key.

[d]Relax periods lasted from 1½ to 2 minutes on the average.

and third trials the instructions were simply "ready (2-3 seconds delay) start." The score is the total number of taps in each five second trial.

Instructions. Next the tapping speed board was taken away, the electrodes for electrodermal recording were hooked up, and the reaction time (R.T.) board with a telegraph key and buzzer mounted on it was placed on the Ss lap with the following initial instructions:

> Now I want to find out how long it takes you to lift your finger off this key here (point to telegraph key) and move it

over to this circle (1½" circle drawn on board 2½" left of key) after you hear a little buzzer. The buzzer is right here in this little box but it is not very loud, in fact it sounds just like a little "bleep." Don't worry about the sound so much as what you are going to do. Concentrate on getting your finger off the key just as soon as you hear the "bleep." Remember, though, that we are going to be doing this for a while, so try not to get tired either. All right now--when I say "start" but not before, you press your finger down on that key (point to key) and hold it there until you hear the little "bleep." As soon as you hear the "bleep" you jump over into that circle as fast as you can. Remember not to get tired. All right, ready--start!

In a randomly selected sequence, which was the same for all Ss, the buzzer sounded for .05 second either 1, 2, or 3 seconds after the key was depressed. After the "ready" signal was given, approximately five seconds were allowed to determine if S would give a GSR to the signal. If an electrodermal response had begun within five seconds, the response was allowed to go to its peak before the "start" signal was given. After each reaction no less than 15 seconds were allowed for electrodermal responses to dissipate or stabilize. Such a 15 second (or longer) period was standard after every stimulus or response except the "ready" signal.

The score on this lift reaction time task is always the time between the start of the buzzer signal and the lifting of the finger from the key recorded in .01 seconds. A maximum limit on reaction times of 15.00 seconds was used throughout.

Practice series. Following the initial "ready-start" statement, 10 reaction time (R.T.) trials were given observing the timing described above. Fifteen seconds after the 10th R.T. trial the relax statement was given:

All right now you just relax for a minute.

Following the relax statement a 1½ to 2 minute relax period was given during which no talking or other disturbances were allowed.

Base 1. Following the relax period the signal "All right, ready, let's try it again--start," was given, followed by R.T. trials 11-15 in uninterrupted succession. Fifteen seconds after the 15th trial the relax statement was given again, followed by a relax period as before.

Series 1. At the end of this relax period the neutral statement was given: "Just keep on relaxing for a while." Further instructions and procedures in this series varied depending on the group.

1. Praise-Censure group (PC). Fifteen seconds after the neutral statement a set for praise statement was given:

> All right, now we're going to start doing the same thing again, only on this series I'm going to tell you from time to time when I think you are doing well. That is, when you get a good score I'll tell you.

Fifteen seconds after the set for praise statement the praise 1 statement was given:

> You know, I've just been looking at your performance this last time and I think you've done pretty well. Keep it up and see if you can do even better.

Fifteen seconds after the praise 1 statement the signal "ready--start" was given followed by R.T. trials 16-18. Fifteen seconds after the 18th trial the praise 2 statement was given: "I think you're doing rather well now," or "You're getting a pretty good score now. Keep it up." Fifteen seconds after the praise 2 statement the signal "ready--start" was given followed by R.T. trials 19-21. Again 15 seconds after the 21st trial the praise 3 statement, which was the same as the praise 2 statement, was given. Fifteen seconds after the praise 3 statement R.T. trials 22-24 were given, followed by the relax statement 15 seconds after the 24th trial.

2. Censure-Praise group (CP). All sequences were the same as in

the PC group except that set for praise became set for censure and praise 1, 2, and 3 became censure 1, 2, and 3.

> Set for censure: All right, now we're going to start another series of reactions, only on this series I'm going to tell you from time to time when I think you're not doing well enough.
>
> Censure 1 statement: In fact, I've just been looking at your performance this last time and I'm afraid you didn't do very well. See if maybe you can do a little better this next time.
>
> Censure 2 statements: I'm afraid you're still not doing well, or, You'll really have to do better to get a good score.
>
> Censure 3 statements: Same as censure 2 statements.

Fifteen seconds after the 24th trial the relax statement was given followed by a relax period.

Control group (Co). The control group sequence was the same as for the experimental group except that only the neutral and relax statements were given.

Base 2. Base 2 was exactly the same as base 1 except that it was opened by the non-evaluation statement:

> All right, now we're going to start a new series of reactions. This time, however, I will not say anything if you do well or if you do poorly. In fact I won't say anything at all in that regard.

Fifteen seconds following the above statement the first "ready--start" statement was given followed by R.T. trials 25-29. Fifteen seconds after the 29th trial the relax statement was given, followed by the relax period.

Series 2. Series 2 was the same as series 1 except that the instructions for the PC groups and the CP group were reversed for R.T. trials 30-38.

Base 3. Base 3 was the same as base 2 for R.T. trials 39-43.

Series 3. A neutral statement was given following the end of the base 3 relax period. Fifteen seconds after the neutral statement the non-evaluation statement was given, followed 15 seconds later by the demonstration statement: "All right, now I want you to listen to a noise. You'll hear this noise instead of the little "bleep" on this new series." Fifteen seconds after the demonstration statement the noise was sounded for ½ second immediately preceded by the warning "Now listen to this noise." Again 15 seconds later the following escape instructions were given:

> As I said you'll hear that same noise each time you put your finger down on the key instead of the little "bleep." Now the noise will stop as soon as you take your finger off the key. This means that the faster you get your finger off the key the sooner the noise will stop. Do you see that? All right, we'll start in just a minute.

With these instructions the timer which controlled the buzzer duration was set at 20.0 seconds while the interval between the depression of the key and the start of the buzzer continued to be set at preselected intervals of 1, 2, or 3 seconds as described earlier. That is, at the end of the 1, 2, or 3 second delay the buzzer would sound loudly and continuously as long as the key remained depressed within the 15 second time limit arbitrarily set.

Fifteen seconds after the end of the above instructions the experimenter announced the first "ready—start" followed by R.T. trials 43-52 without further break or comment. Again 15 seconds after the end of trial 52 the relax statement was given followed by a 1½ to 2 minute relax period.

# CHAPTER IV

# RESULTS

## Lift Reaction Time

The median lift reaction time was obtained for each subject for each of the seven conditions (practice, base 1, series 1, base 2, series 2, base 3, series 3). The distribution of these median reaction times showed an extreme positive skew and a wide range in the schziophrenic sample (Range = .04 to 15.00 secs.). This skew contrasted markedly with the nearly symmetrical distribution and narrow range of median reaction times in the normal group (Range = .02 to .26 sec.), hence a log transformation was applied to the reaction time scores (in .01 sec. x 100) to reduce both the skew and the accompanying heterogeneity of variance. While the log transformation reduced the heterogeneity of variance to an acceptable degree and tended to normalize the schizophrenic distribution, the differences between the normals and schizophrenics were still marked, hence the two groups were analyzed separately. A Mann-Whitney U test revealed that the schizophrenics were significantly slower compared to the normals with only three schizophrenic subjects overlapping the normal subjects ($U = 1002$, $Z = 6.638$, $P$ .0003).

Schizophrenic groups. Fig. 1 displays the mean of the log median reaction times for the PC, CP, and Co groups for all seven conditions. It

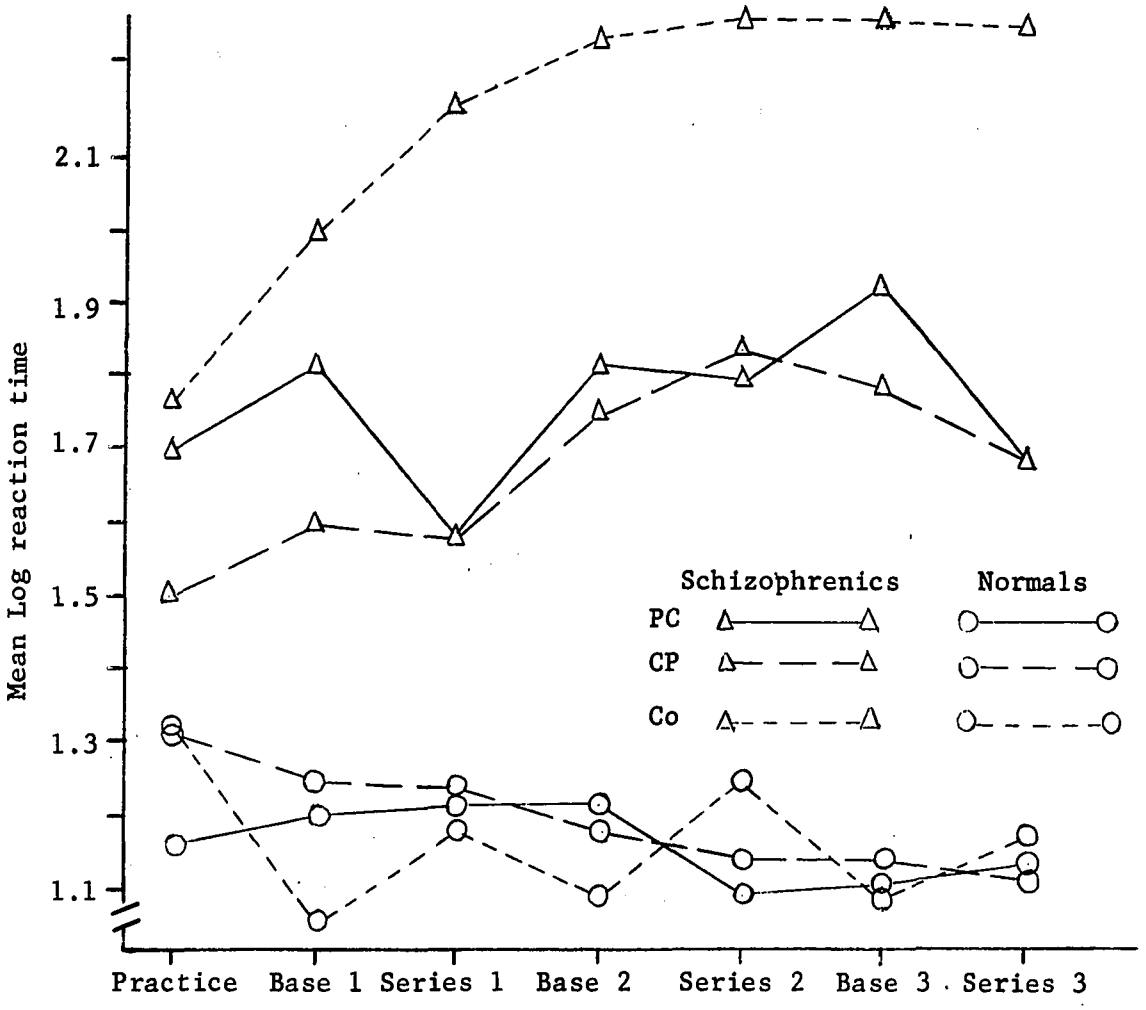


Fig. 1. Log median reaction times for schizophrenics and normals for both experimental groups praise-censure-noise escape (PC) and censure-praise-noise escape (CP) and for the control groups (Co).

## Duncan Test Results

The results of Duncan Multiple Range Tests of the schizophrenic control and experimental groups by conditions. All conditions over the same line are not significantly different from each other (P greater than .05). Results for the combined schizophrenic control and experimental groups are given in Appendix A. The smallest means always appear on the left.

Control: Practice Base 1 Series 1 Base 2 Series 3 Base 3 Series 2

Experimental: Series 1 Practice Series 3 Base 1 Base 2 Series 2 Base 3

is obvious from Fig. 1 that all three groups tended to become slower in reaction time from the practice to the base 1 condition.

From base 1 on, however, the three groups tended to behave in quite different ways. The control group, for example, tended to give slower and slower reaction times until they apparently reached an asymptote on Series 2. The PC group, instead of showing a lengthening of reaction times on series 1 as did the control group, actually attained the shortest reaction times it showed on any of the conditions, including the first or practice condition. This apparent effect of praise did not seem to carry over to the base 2 condition, however, since the reaction times on base 2 were as long as they were on base 1. Moreover, the application of censure on series 2 did not appear to produce the same striking reduction in reaction times as did praise on series 1 and the carryover was even less since base 3 had the longest reaction times of any of the conditions. Finally, the noise escape on series 3 did produce the same striking reduction in reaction time as was seen on series 1 for praise.

The pattern of changes in reaction time for the CP group parallels the changes in the PC group fairly closely except for the extent of the changes. That is, censure produced only a slight shortening of reaction times on series 1 compared to base 1 while praise resulted in some lengthening of reaction times from base 2 to series 2 though not as much as from series 1 to base 2. Again there was a fairly large drop in reaction times from base 3 to series 3 much like the drop from base 1 to series 1. Overall, it is obvious that the CP group was simply less responsive than the PC group to all classes of stimuli.

It is apparent from Fig. 1, therefore, that the order effects of

praise preceding censure or censure preceding praise as well as the effectiveness of praise and censure themselves were far overshadowed by two factors: (1) a general tendency toward slower and slower reaction times in all groups, and (2) the lesser effectiveness of either praise or censure to inhibit this tendency when such evaluation was given a second time. That the lesser effectiveness of praise or censure the second time presented (series 2) can be attributed to the lesser impact of evaluation and not the lessened impact of any type of stimulus with time is demonstrated by the fairly strong impact of noise escape on performance. That is, such noise escape had an impact despite the fact that it came last in the sequence of events.

An analysis of variance (Table 4), of the log reaction time data

Table 4

Analysis of Variance of Log Median Reaction Times for the Schizophrenic Groups

| Source | df | MS | F | P |
|---|---|---|---|---|
| Total | 293 | | | |
| Between Subjects | 39 | | | |
| Groups (G) | 2 | 5.860 | 5.65 | .01 |
| Error (b) | 37 | 1.038 | | |
| Within Subjects | 254 | | | |
| Conditions (C) | 6 | 0.483 | 4.02 | .01 |
| G x C | 12 | 0.155 | 1.29 | - - |
| Error (w) | 236 | 0.120 | | |

indicated that there was a significant groups effect and a significant conditions effect although no groups by conditions interaction effect. A Duncan Multiple Range Test (Edwards, 1962, p. 136) of the significant

conditions effect (see Appendix A) indicated that the median reaction times on series 2 were significantly longer than those on series 1 (P less than .05) while the reaction times on series 3 were not significantly different from those on series 1. Since extremely little change occured in the control group from base 3 to series 3 it is obvious that the reduction in reaction times on series 3 was due to changes which occured in the experimental groups. The failure of the difference in behavior of the control and experimental groups on series 3 to be reflected in the analysis of variance is, at least partly, a function of the fact that the interaction term is a "purified" residual term. That is, overall groups differences and overall conditions differences were removed from it. The overall groups and condition differences were, however, partially interactive differences, thus leaving a spuriously small residual. It was deemed advisable, therefore, to apply the Duncan test to the control and experimental groups separately. The results of these Duncan tests are shown at the bottom of Fig. 1.

The Duncan test of the control group indicated that a significant (P less than .05) increase in reaction times took place from the practice to the series 1 condition. In contrast, the Duncan test of the experimental groups indicated that the practice and series 1 conditions did not differ significantly. By inference, therefore, the introduction of praise and censure on series 1 in the experimental groups reversed the trend toward increasing reaction times which occured from the practice to the base 1 condition in all groups, and which continued to occur from base 1 to series 1 in the control group. Praise and censure did not, however, result in a significant decrease in reaction times in the experimental groups.

The Duncan test of the experimental groups further indicated that reaction times on series 2 were significantly longer than those on series 1. Such results would seem to indicate that social evaluation was significantly less effective in reversing the tendency toward increasing reaction times when applied a second time (series 2).

Finally, the Duncan test of the experimental groups indicated that the reaction times on series 3 were not significantly different from those on either series 1 or series 2. That is, noise escape would appear to have been, at least partially, effective in reversing the significant increase in reaction times which took place from series 1 to series 2.

Normal groups. Fig. 1 also displays the mean of the log median reaction times for the PC, CP, and Co groups for all seven conditions in the normal group. In contrast to the behavior of the schizophrenic groups, the normal groups showed some tendency toward decreased reaction times across conditions. There was even a slight tnedency toward greater response to praise and censure the second time it was applied (series 2) than the first time, again in contrast to the schizophrenics.

Despite these trends, an analysis of variance (Table 5) using all conditions revealed a rather complete lack of significance for the groups, the conditions, and the groups by conditions interaction.

Hypothesis 1. Schizophrenics will show a decrease in reaction time under verbal censure and noise, but not under verbal praise, while normals will show a decrease under all three motivators. Obviously neither praise, censure, or noise reduced reaction times in the schizophrenic group. In the normal group the decrease in reaction times under the three motivators fell far short of significance. In addition, the

Table 5

Analysis of Variance of Log Median Reaction Times for the Normal Groups

| Source | df | MS | F | P |
|---|---|---|---|---|
| Total | 167 | | | |
| Between Subjects | 21 | | | |
| Groups (G) | 2 | .2250 | 1.08 | - - |
| Error (b) | 19 | .2079 | | |
| Within Subjects | 146 | | | |
| Conditions (C) | 6 | .0600 | 1.46 | - - |
| G x C | 12 | .0033 | - - | - - |
| Error (w) | 128 | .0412 | | |

effect of censure before praise or praise before censure appeared to be of little consequence in the present experiment. Indeed, there were only slight differences between praise and censure in their effects on reaction time.

In the schizophrenic group, however, praise, censure and noise escape were about equally effective in reversing a significant trend toward increased reaction times when first applied (series 1 and 3). Praise and censure unexpectedly lost their effectiveness in reversing this lengthening trend on second application (series 2). In view of these results, hypothesis 1 is rejected as it was originally stated.

## GSRs to Experimental Stimuli

The GSRs to experimental stimuli involve the GSRs to praise 1, 2, and 3, to censure 1, 2, and 3 and to the ½ second noise demonstration in the schizophrenic and normal experimental groups only. A strong correlation between means and variances was found in the GSR data and hence a

log transformation was used to reduce both this correlation and the accompanying heterogeneity of variance to an acceptable level. An analysis of variance of the log transformed data (Table 6) indicated both a significant conditions and a significant groups by conditions effect but no significant groups effect. The data are shown graphically in Fig. 2 accompanied by the results of Duncan Multiple Range Tests relevant to hypothesis 2. (A full description of the Duncan Test results is given in Appendix A).

Table 6

Analysis of Variance of GSRs to the Experimental Stimuli

Log (Conductance change)

| Source | df | MS | F | P |
|---|---|---|---|---|
| Total | 307 | | | |
| Between Subjects | 43 | | | |
| Groups (G) | 1 | 1.060 | -- | -- |
| Error (b) | 42 | 1.850 | | |
| Within Subjects | 264 | | | |
| Conditions (C) | 6 | 2.920 | 5.75 | .01 |
| G x C | 6 | 1.173 | 2.31 | .05 |
| Error (w) | 292 | 0.508 | | |

Hypothesis 2a. Verbal censure will produce larger GSRs in schizophrenics than in normals. Fig. 2 indicates that the mean log GSRs for the schizophrenic and normal groups were virtually identical on censure 1 and censure 2. On censure 3, however, the normal group continued to show a further reduction in GSR amplitudes while the schizophrenic group showed an increase in GSR amplitudes. The results of the Duncan test

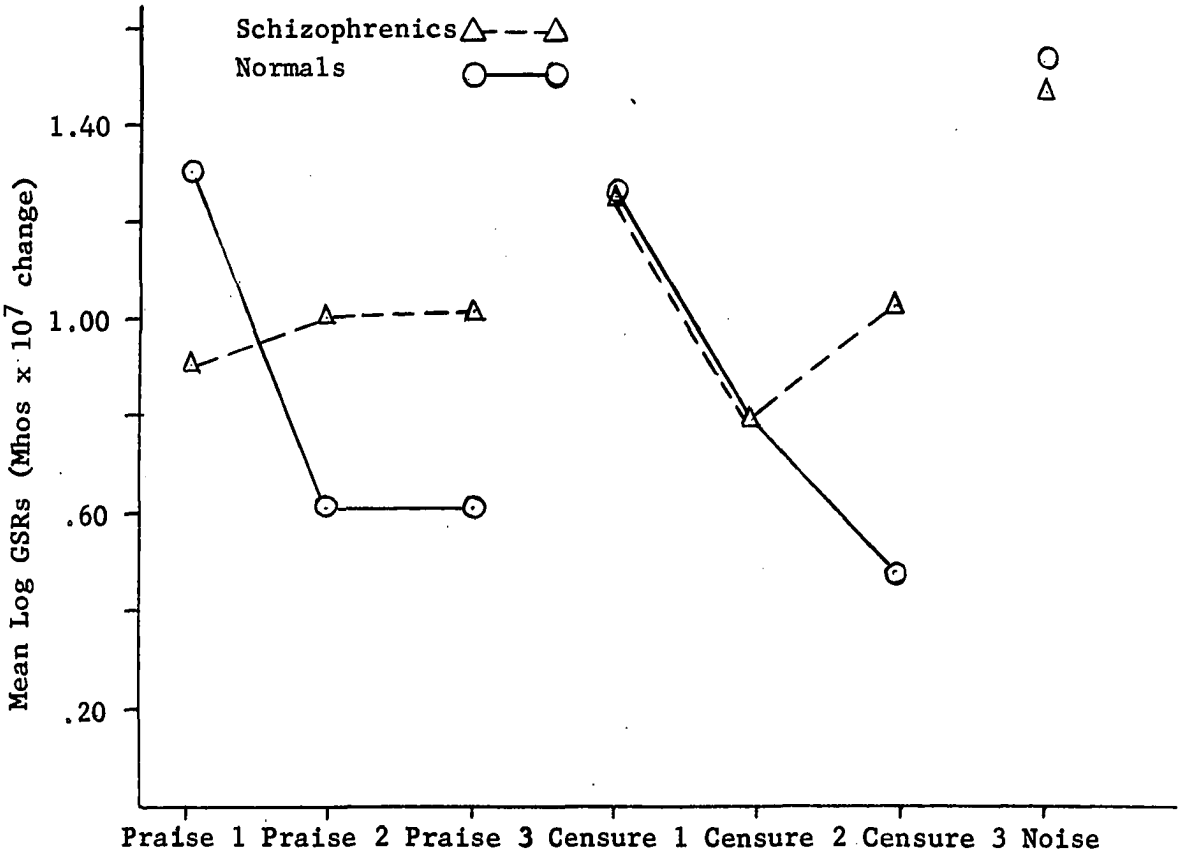


Fig. 2. GSR amplitudes to three repetitions of praise, three repetitions of censure, and a half second noise demonstration in schizophrenic and normal experimental groups.

## Duncan Test Results

The results of Duncan Multiple Range Tests of the significant conditions and groups by conditions interaction are given in Appendix A. Those parts of the Duncan Test of the groups by conditions interaction which were applicable to hypothesis 2 are given below. All groupings over the same line are not significantly different from each other (P greater than .05). The smallest means always appear on the left. The letter n means normals, the letter s means schizophrenics. The letter C means censure, the letter P means praise, the letter N Means noise.

Hypothesis 2a: Cn3 Cs2 Cn2 Cs3 Cs1 Cn1

2b: Ns Nn

2c: Pn3 Pn2 Ps1 Ps2 Ps3 Pn1

relevant to hypothesis 2a, shown at the bottom of Fig. 2, indicated that a significant amount of adaptation or reduction in GSR amplitudes occured from the first to the third application of censure in the normal group. Since no such reduction occured in the schizophrenic group the result was a significant difference between the normal and schizophrenic group on censure 3. Hypothesis 2a is therefore supported but for reasons other than those expected.

Hypothesis 2b. A one-half second moderate intensity noise demonstration will produce GSR amplitudes in the schizophrenic group no different from those in the normal group. The Duncan test results relevant to hypothesis 2b, shown at the bottom of Fig. 2, indicated no significant difference between the normals and schizophrenics on the noise demonstration hence the hypothesis is supported.

Hypothesis 2c. Verbal praise will produce smaller GSRs in schizophrenics than in normals. Again Fig. 2 indicates that normals showed a reduction of GSR amplitudes from praise 1 to praise 3 which was not seen in the schizophrenic group. In fact, the schizophrenic group showed a slight tendency toward increasing GSR amplitudes from praise 1 to praise 3. Graphically, therefore, although the schizophrenics tend to be, at first, less responsive to praise than normals, as was predicted, the pattern of response to both praise and censure are quite similar in the schizophrenic group. Indeed, the schizophrenics are giving virtually identical GSRs to both praise and censure by the third application (praise 3 and censure 3).

The Duncan test results relevant to hypothesis 2c, also shown at the bottom of Fig. 2, indicated that there was a significant amount of adaptation in GSR amplitudes in the normal group from praise 1 to praise 2 but

not in the schizophrenic group. Despite the significant adaptation in the normal group, however, there were no significant differences between the normals and schizophrenics at any point in the series, hence hypothesis 2c is rejected.

It seems apparent from the above results that the significant adaptation in the normal group under both praise and censure, and the lack of such adaptation in the schizophrenic group, accounted for the significant difference between normals and schizophrenics on censure 3. By the same reasoning there should have been a significant difference between normals and schizophrenics on praise 3 except for the lesser adaptation in the normal group at that period. Presumably, if a fourth praise had been included, the normals would have continued to adapt, thus producing a significant difference between normals and schizophrenics at such a point. Furthermore, it seems apparent from the GSRs to noninitial "ready" discussed below that the failure of the schizophrenics to show adaptation in GSR amplitudes is a general characteristic not particularly related to censure or praise.

## Electrodermal Response to Anticipatory Cues

The GSRs and shifts in level in response to anticipatory cues, considered below, involve schizophrenic and normal experimental groups only. All GSRs have been transformed to log units while longer range shifts in conductance level have been retained in conductance units. Since the results examined below follow a definite pattern, the implications for hypothesis 3 will be considered after a review of each variable separately.

There are three sets of anticipatory cues of concern here: (1) the instructions presumed to establish a set for praise, a set for censure, or

a set for noise, (2) the initial "ready" statement on each condition (practice, base 1, series 1, base 2, series 2, base 3, series 3), and (3) the noninitial (i.e. other than initial) "ready" statements in each of these conditions.

GSRs to initial set. GSRs to set for praise, to set for censure, and to the non-evaluation statement on the third or noise series.) An analysis of variance (Table 7) indicated that there were no significant differences

Table 7

Analysis of Variance of GSRs to Initial Set

log (conductance change)

| Source | df | MS | F | P |
|---|---|---|---|---|
| Total | 131 | | | |
| Between Subjects | 42 | | | |
| Groups (G) | 1 | 2.080 | 1.94 | - - |
| Error (b) | 41 | 1.070 | | |
| Within Subjects | 89 | | | |
| Conditions (C) | 2 | 0.290 | 1.01 | - - |
| G x C | 2 | 0.075 | - - | - - |
| Error (w) | 85 | 0.286 | | |

anywhere. The GSR amplitudes to all three statements were about of equal amplitude and were generally higher than the GSR amplitudes to praise, censure, noise, and to the initial and noninitial "ready" statements. In that sense, they are quite comparable to the GSRs to initial "ready" on base 1 since they all represent the first verbal statement of any significance following their respective relax periods.

GSRs to initial "ready." (GSRs to the first "ready" statement in each

condition, i.e. practice, base 1, praise 1, base after praise, censure, base after censure, noise.) It should be kept in mind that the initial "ready" differs in one important respect from the noninitial "ready" considered below. That is, the initial "ready" not only signalled the beginning of a reaction time trial but the actual beginning of the work period, as contrasted with the prework or instruction period. The noninitial "ready" was a relatively superfluous anticipatory cue, however, since the initial "ready" had presumably already established a general state of readiness for response.

The initial "ready" statement was immediately preceded by instructions on the practice condition, by non-evaluative statements on base 2 and 3, by praise or censure on series 1 and 2, and by "escape" instructions on series 3. No such preliminary statement preceded the initial "ready" on base 1, hence the large GSRs on base 1 (see Fig. 3) were associated with the subjects moving directly from the relax period into the task without any preliminary preparatory stages.

Fig. 3 displays the mean log GSRs to initial "ready" for the practice, base 1, praise, base after praise, censure, base after censure, and noise conditions. Aside from the large GSRs on base 1, which was commented on above, the GSR amplitudes on each of the conditions vary within rather narrow limits. Such a trend suggests a rather consistent degree of preparation for each work period contrary to hypothesis 3.

An analysis of variance (Table 8) indicated that there was a significant conditions effect but no groups or groups by conditions effect. The results of a Duncan test applied to the conditions variable is shown at the bottom of Fig. 3 and indicates, as might have been expected, that the GSR

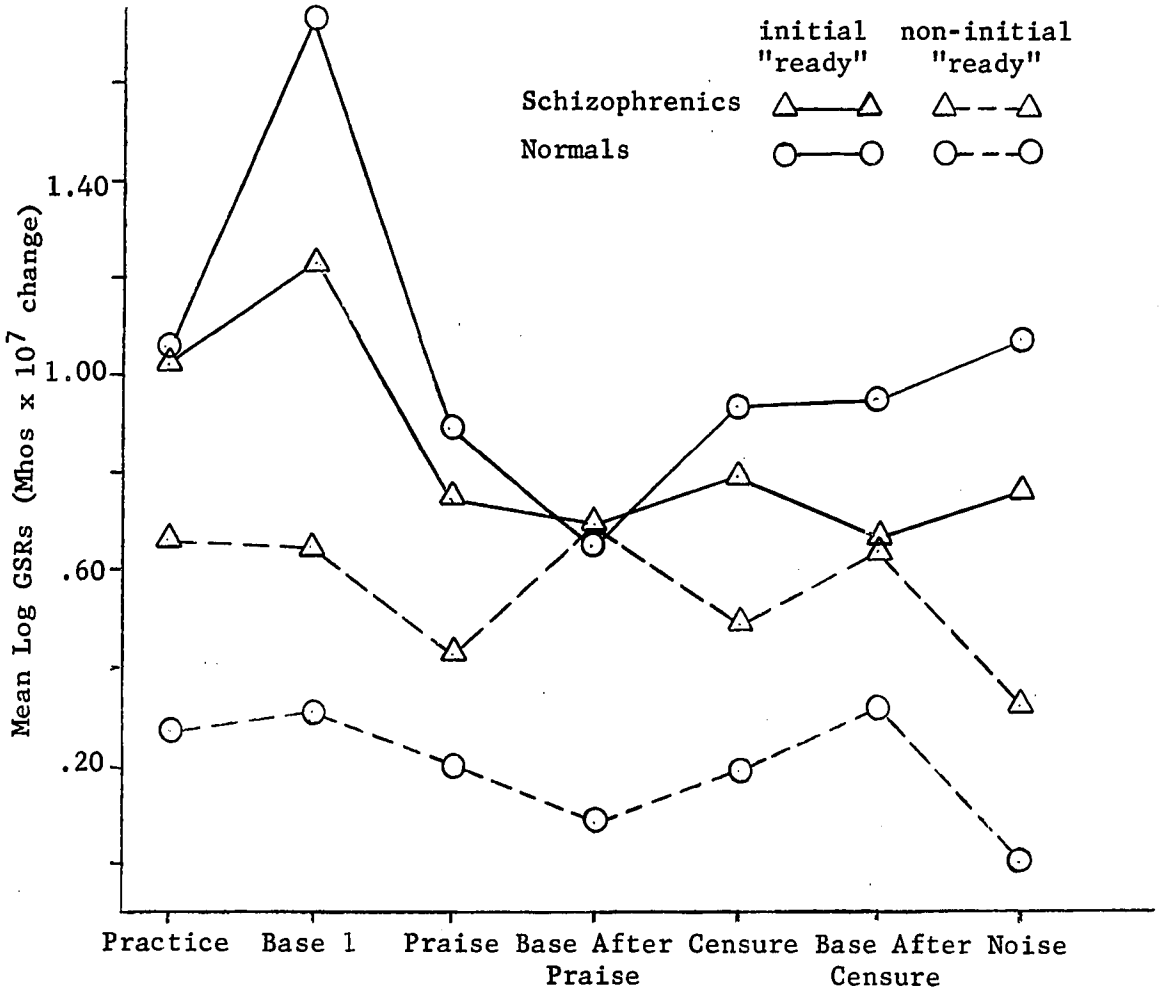


Fig. 3. GSR amplitudes to the first, or initial, "ready" in each condition and to the median of the remaining GSRs to "ready" (non-initial "ready") in each condition for the normal and schizophrenic experimental groups.

## Duncan Test Results

The results of Duncan Multiple Range Tests of the significant conditions effects for the initial and non-initial "ready" variables. All conditions over the same line are not significantly different from each other (P greater than .05). The smallest means always appear on the left. The letter P means praise, C means censure, N means noise.

Initial "Ready": After P After C P C N Practice Base 1

Non-initial "Ready": N P C After P After C Practice Base 1

Table 8

Analysis of Variance of GSRs to Initial "Ready"

Log (conductance change)

| Source | df | MS | F | P |
|---|---|---|---|---|
| Total | 307 | | | |
| Between Subjects | 42 | | | |
| Groups (G) | 1 | 2.64 | 1.58 | - - |
| Error (b) | 41 | 1.67 | | |
| Within Subjects | 265 | | | |
| Conditions (C) | 6 | 2.657 | 6.73 | .01 |
| G x C | 6 | 0.423 | 1.07 | - - |
| Error (w) | 253 | 0.395 | | |

response to base 1 was significantly larger than the GSRs to any of the other conditions. In addition, the GSR to the base after praise condition was significantly smaller than the GSR to the practice condition but was not significantly different from any of the remaining conditions.

GSRs to noninitial "ready." (For each condition the GSRs to the initial "ready" were deleted and the median of the remaining GSRs to "ready" was obtained for each subject. These noninitial "ready" scores were obtained for the following conditions: practice, base 1, praise, base after praise, censure, base after censure, noise.) It should be kept in mind when considering the noninitial "ready" variable that the noninitial "ready" statement is analogous to the superfluous "get ready" in the statement "get ready, get set, go" given when the individual is already generally prepared. That is, the signal "ready" (get ready) was followed by "start" (get set) which was in turn followed by the depression of the reaction time key and a one to three second wait for the buzzer (go) which was the reaction signal.

In short, the noninitial "ready" has very little significance to the subject since nothing was required of him until after the "start" signal, so long as he was already in a general state of readiness. The initial "ready" statement, in contrast, had already established the general state of readiness for work.

Fig. 3 presents a graphic display of the log median GSRs to the noninitial "ready" statements. It is obvious from Fig. 3 that the schizophrenics gave larger GSRs to the noninitial "ready" statement than did the normals. Indeed it is apparent that the schizophrenics gave GSR amplitudes which were only slightly smaller than their GSR amplitudes to the initial "ready" statements.

An analysis of variance (Table 9) of the GSRs to noninitial "ready"

Table 9

Analysis of Variance of GSRs to Noninitial "Ready"

Log (conductance change)

| Source | df | MS | F | P |
|---|---|---|---|---|
| Total | 307 | | | |
| Between Subjects | 42 | | | |
| Groups (G) | 1 | 9.24 | 8.80 | .01 |
| Error (b) | 41 | 1.05 | | |
| Within Subjects | 265 | | | |
| Conditions (C) | 6 | 0.61 | 3.39 | .01 |
| G x C | 6 | 0.18 | 1.00 | - - |
| Error (w) | 253 | 0.18 | | |

data indicated that there was, in fact, a significant groups difference as well as a significant conditions effect but no significant groups by condi-

tions effect. The results of a Duncan test of the conditions effect are shown at the bottom of Fig. 3 and indicate that the GSRs to noninitial "ready" in the noise condition were significantly smaller than those for all except the praise and censure conditions. The GSRs to noninitial "ready" in the praise and censure conditions were, in turn, not significantly different from any of the five other conditions.

Neutral to "ready" shift in conductance levels. (Difference between the untransformed conductance level before the beginning of any condition, i.e. before the neutral statement, and the level before the initial "ready" statement in that condition for the following conditions: praise, censure, and noise and for initial instructions.) For the initial instructions the neutral to "ready" shift was the difference in conductance levels between the level before instructions and the level before the initial "ready" for the first reaction time trial. Shifts in level represent, therefore, fairly long range adjustments in conductance level as contrasted with the more momentary GSRs, which were changes within 15 seconds.

Fig. 4 displays the mean changes in conductance between the neutral and "ready" signals. It is obvious from Fig. 4 that, except for the relatively larger shift on the initial instructions the schizophrenic and normal groups appear quite similar in pattern. It is also interesting to note that the schizophrenic group actually shows a negative shift in levels on the praise condition, indicating a slight degree of relaxation or lowering of anticipation rather than the expected increase in anticipation.

An analysis of variance (Table 10) indicated that there was a highly significant groups effect but no conditions or groups by conditions effect. That is, while the normal group showed larger shifts in conductance than

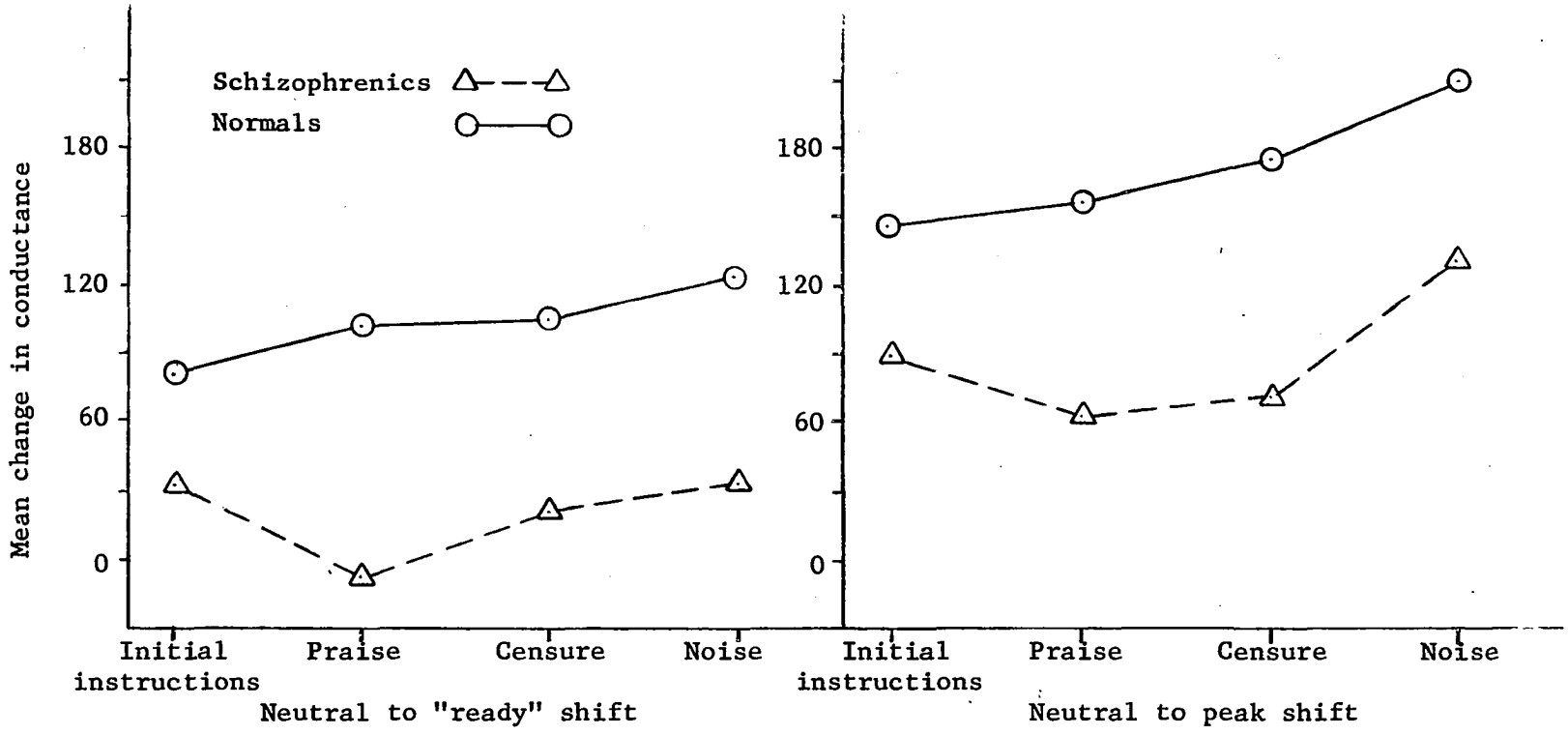


Fig. 4. Shift in conductance levels from just prior to the beginning of each condition listed (end of relax period) to just before the initial "ready," for the neutral to "ready" variable, and to the highest conductance level reached between these two points for the neutral to peak variable.

Duncan Test Results

The results of a Duncan Multiple Range Test of the significant conditions effect on the neutral to peak variable. All conditions over the same line are not significantly different from each other (P greater than .05). The smallest mean appears on the left.

Neutral to peak: Praise Initial Instructions Censure Noise

Table 10

Analysis of Variance of Neutral to "Ready" Shifts in Conductance Level

| Source | df | MS | F | P |
|---|---|---|---|---|
| Total | 175 | | | |
| Between Subjects | 42 | | | |
| Groups (G) | 1 | 276,225 | 27.94 | .001 |
| Error (b) | 41 | 9,887 | | |
| Within Subjects | 133 | | | |
| Conditions (C) | 3 | 7,595 | 1.74 | - - |
| G x C | 3 | 6,122 | 1.40 | - - |
| Error (w) | 127 | 4,359 | | |

the schizophrenic group, there were no differences between the shifts in levels to praise, censure, noise or initial instructions despite the graphical trends.

Neutral to peak shift in conductance levels. (Difference between the conductance level before the beginning of any condition, i.e. before the neutral statement, and the highest or peak level attained between the neutral statement and the first trial in any condition for the praise, censure, and noise conditions and for initial instructions.) Since the neutral to peak score was intended as a measure of maximal arousal due to instructions, only positive scores were considered. In most cases there was an upward shift between the level before the neutral statement and the level before the initial "ready" statement, and a still higher peak in between. The difference between the level before the neutral statement and this peak constitutes the neutral to peak measure. It should be noted, therefore, that the neutral to peak shift can never be smaller than the neutral to ready shift

and that both are measured from the same point. As in the neutral to ready score, the neutral to peak score for the initial instructions was the difference between the level before initial instructions and the highest level reached during the initial instructions. Fig. 4 also displays the mean neutral to peak shifts in conductance for the normal and schizophrenic groups. The pattern of changes is quite similar to the pattern for the neutral-ready shift except that it is slightly steeper. An analysis of variance (Table 11) indicated that there was a significant groups as well as

Table 11

Analysis of Variance of Neutral to Peak Shifts in Conductance Level

| Source | df | MS | F | P |
|---|---|---|---|---|
| Total | 175 | | | |
| Between Subjects | 42 | | | |
| Groups (G) | 1 | 280,584 | 8.35 | .01 |
| Error (b) | 41 | 33,610 | | |
| Within Subjects | 133 | | | |
| Conditions (C) | 3 | 34,844 | 5.20 | .01 |
| G x C | 3 | 3,535 | - - | - - |
| Error (w) | 127 | 6,696 | | |

conditions effect, but no groups by conditions effect. A Duncan test, the results of which are shown at the bottom of Fig. 4, indicated that the reponses to the noise condition were significantly larger than those to the initial instructions and the praise and censure conditions, all of which were not significantly different from each other.

By comparing the results for the five measures of response to the three sets of anticipatory cues a very definite trend emerges. The most

important finding is that there was no significant groups by conditions interaction on any of the variables, the F values being, in general, barely above 1.00 in any of the analyses (Tables 7 - 11). It seems apparent, therefore, that schizophrenics show the same general pattern of response to anticipatory cues as do normal subjects. Schizophrenics and normals differ considerably, however, in the size of their response on some variables.

The second definite trend is the fact that schizophrenics were not significantly below normals on any of the GSR measures. They were definitely below the normals, however, on the two measures of shift in levels. That is, the momentary increase in levels involved in the GSR was not sustained in terms of a longer acting elevation or carryover of such responses. Such a distinction between momentary and long range response suggests an important difference between schizophrenics and normals and will be considered in more detail in the discussion section.

Hypothesis 4, that schizophrenics will give largest responses to censure, next to noise, and least to praise, while normals will give responses to censure, noise, and praise which do not differ, must be rejected. There were, on the contrary, no detectable tendencies for a groups by conditions interaction and only one instance of a difference between praise, censure, and noise. The one difference between motivating conditions showed the neutral to peak response to the noise condition to be greater than that to the praise or censure conditions, which is contrary to hypothesis four.

# CHAPTER V

## DISCUSSION

Reaction time. In regard to lift reaction time in schizophrenics, four patterns stand out: (1) a significant lengthening of reaction times during the experimental session, (2) a significant tendency for praise, censure, and noise to be effective in reversing the trend toward lengthened reaction times on first application (series 1 and 3), (3) the finding that praise and censure showed a significant failure to reverse such a trend on second application (series 2), and (4) a general lack of difference between praise and censure in affecting reaction times. Furthermore, the serial order of praise and censure did not seem to make any difference.

Only one report in the literature (Cohen, 1956) makes definite mention of a decline in the performance (learning) of schizophrenics during an experimental session, and this occured under social rapport. There were no reports where lengthening of reaction times occured during an experimental session. Consequently, there is nothing in the literature to which this aspect of the present results can be compared. In an attempt to account for the difference between the literature and the present results several features of the present study suggest possibilities. Among these are the extreme chronicity and disorganization of the subjects used, the

general nature of the task situation, the simple testability criterion used in selecting subjects, and the long maximum allowed for reaction times.

The chronicity of the subjects used in the present study, for example, was far greater (18.02 years hospitalization) than in any of the studies reported in the literature. The requirements of electrodermal measurement resulted in long periods of silence, and occasionally a good deal of delay between responses, creating a somewhat strained and boring situation for the subjects. In addition, a frequent response pattern observed, especially in the more disorganized patients, was extreme variability in reaction times from one trial to the next. That is, the subject was likely to respond either within .06 of a second or, if she failed to respond within this period, to continue holding the key until the 15.00 second limit was reached. While such a 15.00 second cutoff point was used because it represented the preselected time limit for electrodermal response, it is obvious that such long latencies must be considered as due to disorganization and lack of cooperation rather than as measures of reaction times. The strong relation between long reaction times, set disorganization, and poor ego intactness reported by Rosenthal, Lawlor, Zahn, and Shakow (1960) supports such an interpretation.

Finally, the fact that subjects yielding such long response times are included in the present sample is both a failing and an improvement on the reported literature. It is a failing because such long latencies of response cannot reasonably be considered as reaction times, but it is an improvement because the selection of only reasonably intact, fast responding, and cooperative subjects is obviously only a study of intact, cooperative schizophrenics, not schizophrenics as a whole.

It seems likely, therefore, that the extreme disorganization of the subjects, the boredom of the task, and the extremely long response time limit all contributed to the progressive tendency toward increasing reaction times. Any motivational stimuli used were, therefore, required to work against such a lengthening tendency.

The decreasing impact of praise and censure on reaction time in the schizophrenics can be compared to the apparent, though also nonsignificant, tendency for praise and censure to have even more impact on second application (series 2) in the normal group. Furthermore, this decreasing impact of praise and censure in the schizophrenic group can be compared with the shortening of reaction times under noise escape. Indeed, the similarity between the relative (basic to series) decrease in reaction time under noise escape and that under the first application of praise and censure (series 1) suggests a possible explanation.

While noise escape differed from praise and censure in that it was applied on every trial and was therefore a constant reminder to the subject to escape the noise as fast as possible, it was also a type of stimulation which differed from that used in the earlier series. That is, while praise and censure both fall within the classification of social evaluation, noise, under non-evaluative circumstances, is a different kind of stimulus. It is possible, therefore, that a change in the general type of experimental stimulation could produce temporary effects on behavior. As the new type of stimulus became a regular and repititious part of the situation, however, it could easily tend to lose its effectiveness. By such reasoning, noise escape, or even shock escape, should lose its impact on repeated application in a manner similar to that found for praise and censure.

The lack of any even reasonably striking tendency for censure to have greater impact than praise on reaction time in the schizophrenic group would appear to be in some accord with the review of literature provided in the introduction. It was noted in this review that chronically hospitalized schizophrenics appear more equally affected by praise and censure while censure appeared to have relatively overwhelming effects, compared to praise, in recently hospitalized, poor premorbid, or process schizophrenics. Since Koppenhaver's (1961) study, in particular, indicated that censure had the greatest impact in recently hospitalize, poor premorbid or process schizophrenics and since these patients are most likely to become chronic it would seem that chronicity implies something more than years in the hospital--presumably a reduction in the disturbance created by "censure."

Electrodermal response. In regard to electrodermal response, several patterns stand out: (1) the finding that schizophrenics show the same overall pattern of electrodermal response to praise, censure, and noise as do normals, (2) the finding that schizophrenics tend not to adapt to repeated stimuli, (3) the finding that schizophrenics tend to overrespond to minor and relatively inconsequential cues (i.e. GSR to noninitial "ready"), and (4) the finding that, while at no point were the schizophrenics significantly less responsive than normals in terms of momentary response to momentary stimuli (i.e. GSR), they were considerably below normals in terms of sustaining such changes of conductance in anticipation of a coming event (i.e. shift in levels).

The first pattern mentioned is indicated in the quite consistent tendency of both schizophrenics and normals to respond slightly, but not significantly, more to censure than to praise. The second, third and fourth

patterns suggest an underlying factor which could account for such behavior as well as the reaction time performance. Such an underlying factor can be conceptualized in terms of preoccupation.

Preoccupation implies concern and attention with an ongoing internal process. External events distract from this internal process while, in turn, the internal process distracts from the external events. Preoccupation implies a number of related phenomena, therefore, such as the intrusion of this ongoing cognitive process into external events, lack of continuity in the individual's experience of external events, and a certain rigidity in behavior due to a failure to change one's expectation in regard to external events (i.e. failure to anticipate sufficiently and to show reduced anticipation under non-demanding situations).

Such an ongoing, intruding cognitive process would imply that tasks requiring cognitive functioning, such as conceptual tasks, would be most likely to suffer compared to tasks requiring little cognitive effort. Hunt & Cofer (1944) concluded in their review of the earlier literature that conceptual performance is indeed quite impaired in schizophrenics compared to relatively non-conceptual performance. The study by Bleke (1955) would further suggest that censure brings about an increase in irrelevant and distracting covert responses which detract from conceptual performance (e.g. generates reminiscence effects) in poor premorbid schizophrenics primarily. That is, censure may increase the intrusion of this ongoing process into the task and detract from efficient performance.

The phenomenon of lack of experiential continuity is illustrated by the greater GSR responsiveness of the schizophrenics to the noninitial "ready" compared to normals. As was pointed out earlier, the noninitial "ready" signal was more in the nature of the "get ready" in "get ready,

get set, go" rather than in "get ready, go." The normal subjects quickly picked up such a distinction and therefore showed little tendency to respond to the noninitial "ready" signals. The schizophrenics, however, behaved as though each "ready" signal implied the necessity for immediate response and, most importantly, as though they were not maintaining a general readiness for performance but had to shift from an internal to an external frame of reference over and over again.

Furthermore, lack of experiential continuity would be most likely to contribute to poor preformance where the task itself lacked continuity of expectancy. Reaction time lacks good continuity of expectancy since the subject must shift his expectancy from a relatively low level to a very efficient peak, very rapidly, and very frequently, throughout a series of reaction times. Tapping speed, on the contrary, requires no sudden buildup, and once the subject is set for the work, he can perform at a relatively steady level of expectancy. It could be noted in passing, for example, that the schizophrenics showed almost a 50% increase in tapping speed from the first to the last (third) trial during the preliminary or warm-up period. Such results can, of course, be compared to the significant lengthening of reaction times during the main experimental session of the schizophrenic group.

Rigidity, or failure to sufficiently adjust expectations in regard to changes in external events, is primarily evident in the present data in the significantly smaller shift in levels to initial instructions, praise, censure, and noise in schizophrenics as compared to normals. It is important to compare such underresponsiveness in terms of an anticipatory rise in levels in schizophrenics to the finding that schizophrenics

were at no point significantly less responsive than normals in terms of GSRs. That is, the schizophrenic fails to sustain the increase in levels (GSRs) which he shows in response to momentary stimuli.

The implication of such a response pattern is that a definite stimulus is attended to and reacted to by the schizophrenic but, subsequently, he fails to act sufficiently on the information conveyed in the stimulus. That is, he fails to anticipate where external events would indicate the need for some change in expectancy (i.e. anticipation). The question, therefore, is not whether the schizophrenic grasps the significance of a momentary stimulus, a question which appears to have been largely settled by Ray (1961), but what he does about the information.

It could be mentioned in passing that there is evidence in the present data that schizophrenics do not show as much reduction in conductance levels during the relax period as do normals. That is, in addition to a failure to sufficiently anticipate in regard to specific task performance, schizophrenics do not appear to lower their general level of expectancy sufficiently where the circumstances indicate that nothing will happen for a period of time.

Overt vs. covert level of response. Concentrating on the reaction times and electrodermal responses given under praise and censure (series 1 and 2), and ignoring the various baselines, it is apparent that both schizophrenics and normals show very similar patterns of behavior. While censure did not differ from praise for either reaction time or electrodermal response, both schizophrenics and normals showed a quite consistent tendency to respond slightly more to censure than to praise. That is, for reaction time measures, schizophrenics and normals showed a very

slight tendency to be faster under censure than under praise. Correspondingly, GSRs and shifts in levels were generally greater under censure than under praise, the only really noticeable reversal being for the GSRs to initial set in the schizophrenic group. On this variable the schizophrenic group did give longer GSRs to set for praise than to set for censure while the normal group showed the opposite trend. Such trend differences fell far short of significance, however (see Table 7).

Such data indicate quite strongly that the overt and covert level of response provide a very similar picture of the pattern of response of chronically hospitalized schizophrenic and normal subjects to praise and censure. It would seem safe to conclude, therefore, that the electrodermal reactions of subjects provide a relatively good index as to the kind of overt responses which can be expected.

Chronically hospitalized vs. recently hospitalized, poor premorbid, or process schizophrenics. The present study does not support the idea that chronically hospitalized schizophrenics are hyperresponsive to censure and hyporesponsive to praise. In fact, it would seem, from the present study, and from the review of the literature provided in the introduction, that the overwhelming impact of censure, so apparent in recently hospitalized, poor premorbid or process patients, has been largely resolved or defended against, in the chronically hospitalized patient. It is evident, therefore, that current theory regarding the effects of praise and censure on schizophrenics will need to be modified to account for the behavior of chronically hospitalized schizophrenics.

It would seem reasonable to hypothesize that the recently hospitalized, poor premorbid or process schizophrenic is so highly sensitive to

censure and expectation of such negative stimulation. As the recently hospitalized poor premorbid or process schizophrenic moves into the chronically hospitalized phase, however, anxiety, and particularly anxiety over censure apparently diminishes somewhat, allowing for the possibility of a greater response to positive stimulation (C. F. Mednick, 1958). A greater elucidation of the over-responsiveness to censure and under-responsiveness to praise in recently hospitalized poor premorbid or process patients and the reasons why anxiety over censure should decrease in the chronically hospitalized phase may have an important bearing on why such schizophrenics tend to become chronic patients. The above interpretation suggests, for example, that the psychosis has some, at least secondary, defense value against censure anxiety which then tends to perpetuate itself since it is preferable to a non-psychotic state.

Furthermore, the above interpretation suggests that the recently hospitalized, poor premorbid or process schizophrenic tends to experience his world rather negatively. That is, he is constantly reacting against and avoiding stimuli rather than seeking for goals and positive stimuli.

# CHAPTER VI

## SUMMARY AND CONCLUSIONS

A general deficit in the overt psychological functioning of schizophrenics has frequently been reported in the literature. Other studies, however, indicate that schizophrenics will generally modify their overt behavior under the impact of various stimuli, suggesting that part or all of the difficulty may be motivational. Two classes of stimuli have been most frequently used to modify the schizophrenics behavior--escape or avoidance of noxious physical stimuli, such as high intensity noise or shock, and social stimuli, primarily negative and positive social evaluation. In regard to social stimuli there would appear to be a difference depending on whether the subject knows he is being influenced or not.

A review of much of the literature dealing with direct confrontation with social evaluation of performance (e.g. praise and censure) indicated that recently hospitalized schizophrenics, particularly poor premorbid or process patients, respond quite consistently to censure, but not to praise. On the other hand, the literature indicated that chronically hospitalized schizophrenics either do not respond at all, or respond to praise as well as censure. Despite the apparently more equal effectiveness of both praise and censure in chronically hospitalized schizophrenics, hypotheses were developed which assumed that the present sample of chronic

schizophrenic women would behave like recently hospitalized, poor premorbid or process patients and hence show significantly greater response to censure than normals, response to noise which did not differ from normals, and response to praise which was less than that given by normals.

These hypotheses were based on the theory that poor premorbid, process, and chronically hospitalized schizophrenics are highly sensitive to censure and react to such stimulation with behavioral withdrawal but do little to seek out social praise. Noise, being socially neutral in the context of the present experiment, was therefore expected to be equally as significant to schizophrenics and normals. Furthermore, if such behavioral withdrawal is congruent with responses designated "correct," then improvement is likely to occur, while if such behavioral withdrawal is not congruent with the performance designated "correct," then performance deficit is more likely. The performance measure of lift reaction time was selected in anticipation that improvement in performance would occur under the experimental stimuli (i.e. decrease in reaction time). In addition, hypotheses concerning covert behavior, which were similar to those for lift reaction time, were tested with various electrodermal measures.

Subjects were 42 randomly selected chronic schizophrenic women free from complicating organic problems, mental deficiency, or psychiatric treatments. For comparison, 24 female employees of the hospital were used as a normal controls. Subjects were distributed equally into three groups with 14 schizophrenics and 8 normals in each group. One experimental group (PC) received a practice period of 10 reaction times, a baseline period of 5 reaction times, a series of 9 reaction times under praise, 5 more baseline reaction times, 9 reaction times under censure, 5 more baseline reaction

times, and 9 more reaction times under noise-escape. A second experimental group (CP), received the same procedure except that censure was given where praise was given above and praise was given in place of censure above. A control group (Co group) received the same procedure without either praise, censure, or noise.

In regard to lift reaction time praise, censure, and noise were not found to be effective in decreasing reaction time in either schizophrenics or normals. The schizophrenics were found to show a definite lengthening of reaction times throughout the experiment while normals showed a trend toward decreasing reaction times. The tendency towards lengthened reaction times was reversed in the schizophrenic experimental groups under the first application of praise and censure, but not under the second application. Noise escape also tended to reverse the tendency toward lengthened reaction times. The lesser effectiveness of praise and censure on second application in the schizophrenic group can be compared to the slight tendency for praise and censure to be more effective on second application in the normal group. Praise and censure were also found, contrary to expectations, to be equally effective in both the schizophrenic and normal groups.

In regard to electrodermal measures it was found that both schizophrenics and normals gave GSRs to censure which were slightly, but not significantly, larger than those to praise. In addition, normals and schizophrenics did not differ in the size of their overall GSRs to praise and censure. Furthermore, neither schizophrenics nor normals showed any strong tendency toward greater anticipation under censure than under praise. Schizophrenics did differ from normals by showing less adaptation in response to repeated stimuli, by giving larger responses to relatively in-

consequential anticipatory cues, and by failing to sustain their anticipatory rise in electrodermal (conductance) levels to signals indicating a forthcoming reaction time or work period.

It can be concluded from the present study that chronically hospitalized schizophrenics do not show any tendency to be hyperresponsive to censure and hyporesponsive to praise as was hypothesized. Furthermore, they do not differ from normals in the pattern of their overt (reaction time) or covert (electrodermal) responsiveness to praise and censure. Since the present results are congruent with the majority of the literature on chronically hospitalized schizophrenics, and since such literature disagrees with the concensus of findings on recently hospitalized, poor premorbid or process patients, it would appear that chronicity means more than years in the hospital. Presumably the overwhelming impact of censure in recently hospitalized, poor premorbid or process schizophrenics is reduced by some as yet not understood mechanism such that chronically hospitalized patients are more equally sensitive to both praise and censure.

When using relatively unbiased and broad samples of long term chronically hospitalized schizophrenics, there appears to be a considerable degree of disorganization at both the overt and covert level. The progressive lengthening of reaction times, the lessened impact of social evaluation on second application, the lack of GSR adaptation, the overresponsiveness to relatively inconsequential cues (e.g. noninitial "ready"), and the failure to sustain increases in electrodermal levels in anticipation of task performance all seem explainable on the basis of a single concept--preoccupation.

A better understanding of the mechanisms whereby censure anxiety

appears to decrease in chronic schizophrenics may be relevant to understanding why schizophrenics so frequently become chronic wards of the state. A further elaboration of the concept of preoccupation may prove to be very helpful in understanding the nature of schizophrenic withdrawal.

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# APPENDIX A. RESULTS OF DUNCAN NEW MULTIPLE RANGE TESTS

Results of the Duncan New Multiple Range Tests

Lift reaction times

1. Conditions effect: schizophrenic control and experimental groups. Standard error of the mean = .054.

Practice Series 1 Base 1 Series 3 Base 2 Series 2 Base 3

2. Conditions effect: schizophrenic control group. Standard error of the mean = .093.

Practice Base 1 Series 1 Base 2 Series 3 Base 3 Series 2

3. Conditions effect: schizophrenic experimental groups. Standard error of the mean = .065.

Series 1 Practice Series 3 Base 1 Base 2 Series 2 Base 3

GSRs to the experimental stimuli

1. Conditions effect: schizophrenic and normal experimental groups. Stardard error of the mean = .107.

Censure 2 Censure 3 Praise 2 Praise 3 Praise 1 Censure 1 Noise

2. Groups by conditions effect: schizophrenic and normal experimental groups. Standard error of the mean = .156. P is praise, C is censure, N is noise, n is normals, s is schizophrenics.

C3n P3n P2n C2s C2n P1s P2s P3s C3s C1s C1n P1n Ns Nn

GSRs to initial "ready"

1. Conditions effect: schizophrenic and normal experimental groups. Standard error of the mean = .095. Pr is praise, Ce is censure.

Base after Pr  Base after Ce  Pr  Ce  Noise  Practice  Base 1

GSRs to noninitial "ready"

1. Conditions effect: schizophrenic and normal experimental groups. Standard error of the mean = .064. Pr is praise, Ce is censure.

Noise  Pr  Ce  Base after Pr  Base after Ce  Practice  Base 1

Neutral to peak shift in levels

1. Conditions effect: schizophrenic and normal experimental groups. Standard error of the mean = 12.34.

Praise  Initial instructions  Censure  Noise

Note: All groupings which are over the same line are not significantly different from each other. ($P$ greater than .05 level). Lowest mean values appear on the left, highest on the right.

# APPENDIX B. MEANS, STANDARD DEVIATIONS, AND INDIVIDUAL SCORES

Means, Standard Deviations (S.D.) and Individual Median Lift Reaction Times in .01 Seconds

| Group | S no. | Practice | Base 1 | Series 1 | Base 2 | Series 2 | Base 3 | Series 3 |
|---|---|---|---|---|---|---|---|---|
| | | | | Normal subjects | | | | |
| PC | 1 | 0.60 | 1.30 | 1.30 | 1.20 | 1.26 | 1.20 | 1.18 |
| | 2 | 1.26 | 1.26 | 1.18 | 1.18 | 1.23 | 1.23 | 1.20 |
| | 3 | 1.23 | 1.40 | 1.15 | 1.15 | 1.20 | 1.20 | 1.18 |
| | 4 | 1.30 | 0.70 | 1.20 | 1.20 | 0.30 | 0.30 | 0.70 |
| | 5 | 1.15 | 1.26 | 1.15 | 1.15 | 1.15 | 1.11 | 1.18 |
| | 6 | 1.30 | 1.26 | 1.26 | 1.26 | 1.20 | 1.26 | 1.20 |
| | 7 | 1.26 | 1.23 | 1.20 | 1.18 | 1.20 | 1.26 | 1.18 |
| | 8 | 1.28 | 1.20 | 1.23 | 1.32 | 1.20 | 1.23 | 1.20 |
| Mean | | 1.17 | 1.20 | 1.21 | 1.20 | 1.09 | 1.10 | 1.13 |
| S.D. | | 0.24 | 0.21 | 0.04 | 0.04 | 0.32 | 0.32 | 0.17 |
| CP | 1 | 1.38 | 1.28 | 1.26 | 1.23 | 1.26 | 1.23 | 1.18 |
| | 2 | 1.30 | 1.23 | 1.28 | 1.26 | 1.26 | 1.28 | 1.20 |
| | 3 | 1.26 | 1.18 | 1.15 | 0.60 | 1.26 | 1.23 | 1.20 |
| | 4 | 1.26 | 1.20 | 1.18 | 1.28 | 0.30 | 0.30 | 0.30 |
| | 5 | 1.30 | 1.32 | 1.32 | 1.28 | 1.28 | 1.30 | 1.30 |
| | 6 | 1.32 | 1.28 | 1.26 | 1.26 | 1.26 | 1.28 | 1.26 |
| | 7 | 1.34 | 1.26 | 1.26 | 1.28 | 1.26 | 1.23 | 1.23 |
| | 8 | 1.28 | 1.30 | 1.23 | 1.23 | 1.23 | 1.23 | 1.20 |
| Mean | | 1.30 | 1.26 | 1.24 | 1.18 | 1.14 | 1.14 | 1.11 |
| S.D. | | 0.04 | 0.03 | 0.04 | 0.23 | 0.34 | 0.34 | 0.33 |
| Co | 1 | 1.23 | 1.28 | 1.20 | 1.30 | 1.26 | 1.28 | 1.26 |
| | 2 | 1.34 | 0.60 | 1.38 | 0.60 | 1.36 | 0.48 | 0.60 |
| | 3 | 1.38 | 1.38 | 1.38 | 1.30 | 1.30 | 1.32 | 1.34 |
| | 4 | 1.20 | 0.60 | 0.48 | 0.48 | 1.00 | 0.48 | 1.15 |
| | 5 | 1.36 | 1.40 | 1.34 | 1.34 | 1.34 | 1.34 | 1.34 |
| | 6 | 1.26 | 0.60 | 1.18 | 1.30 | 1.28 | 1.34 | 1.32 |
| | 7 | 1.32 | 1.23 | 1.26 | 1.23 | 1.20 | 1.20 | 1.26 |
| | 8 | 1.42 | 1.38 | 1.20 | 1.18 | 1.18 | 1.20 | 1.15 |
| Mean | | 1.31 | 1.06 | 1.18 | 1.09 | 1.24 | 1.08 | 1.18 |
| S.D. | | 0.07 | 0.38 | 0.29 | 0.34 | 0.11 | 0.37 | 0.24 |
| | | | | Schizophrenic subjects | | | | |
| PC | 1 | 1.52 | 1.78 | 1.79 | 1.51 | 1.57 | 1.67 | 1.28 |
| | 2 | 0.90 | 1.18 | 1.86 | 1.00 | 1.72 | 1.62 | 1.15 |
| | 3 | 1.64 | 1.57 | 1.57 | 1.60 | 1.57 | 1.52 | 1.77 |
| | 4 | 1.40 | 1.60 | 1.63 | 1.28 | 1.61 | 1.64 | 1.63 |

(Table continued on next page)

Lift Reaction Times--Continued

| Group | S no. | Practice | Base 1 | Series 1 | Base 2 | Series 2 | Base 3 | Series 3 |
|---|---|---|---|---|---|---|---|---|
| | | | | Schizophrenic subjects--Continued | | | | |
| PC | 5 | 1.49 | 1.59 | 1.54 | 1.57 | 1.59 | 1.59 | 1.66 |
| | 6 | 2.19 | 2.15 | 2.15 | 2.26 | 2.10 | 2.10 | 1.80 |
| | 7 | 1.72 | 1.92 | 1.80 | 1.88 | 2.09 | 3.18 | 1.96 |
| | 8 | 1.65 | 2.14 | 2.01 | 2.27 | 1.90 | 2.40 | 1.91 |
| | 9 | 1.56 | 1.42 | 1.43 | 1.46 | 1.32 | 1.42 | 1.34 |
| | 10 | 1.15 | 1.32 | 1.36 | 1.38 | 1.40 | 1.46 | 1.38 |
| | 11 | 1.20 | 1.48 | 0.70 | 1.59 | 1.43 | 1.48 | 1.00 |
| | 12 | 2.11 | 2.03 | 1.84 | 2.47 | 1.97 | 1.79 | 1.78 |
| | 13 | 3.18 | 3.18 | 0.60 | 3.18 | 3.18 | 3.18 | 3.18 |
| | 14 | 2.00 | 1.98 | 1.82 | 1.84 | 1.66 | 1.76 | 1.69 |
| Mean | | 1.70 | 1.81 | 1.58 | 1.81 | 1.79 | 1.92 | 1.68 |
| S.D. | | 0.55 | 0.50 | 0.45 | 0.57 | 0.47 | 0.60 | 0.52 |
| CP | 1 | 1.53 | 1.57 | 1.62 | 1.59 | 1.57 | 1.51 | 1.51 |
| | 2 | 1.34 | 1.40 | 1.43 | 1.48 | 1.54 | 1.56 | 1.43 |
| | 3 | 0.60 | 1.30 | 1.63 | 2.45 | 3.16 | 2.73 | 2.42 |
| | 4 | 1.57 | 1.86 | 2.06 | 2.04 | 2.22 | 2.77 | 2.24 |
| | 5 | 1.72 | 1.60 | 1.40 | 2.40 | 1.78 | 1.90 | 1.64 |
| | 6 | 1.38 | 1.56 | 1.32 | 1.28 | 1.40 | 1.38 | 1.18 |
| | 7 | 1.64 | 1.56 | 1.49 | 1.59 | 1.49 | 1.51 | 1.42 |
| | 8 | 1.34 | 0.60 | 1.54 | 1.93 | 2.10 | 1.94 | 1.75 |
| | 9 | 1.38 | 1.49 | 1.34 | 1.32 | 1.34 | 1.34 | 1.34 |
| | 10 | 1.66 | 1.63 | 1.61 | 1.63 | 1.62 | 1.62 | 1.79 |
| | 11 | 1.70 | 1.82 | 1.72 | 1.88 | 1.89 | 1.90 | 1.89 |
| | 12 | 2.00 | 2.66 | 1.73 | 1.64 | 1.81 | 1.11 | 1.70 |
| | 13 | 1.38 | 1.38 | 1.42 | 1.42 | 1.60 | 1.66 | 1.59 |
| | 14 | 1.78 | 1.93 | 1.78 | 1.76 | 2.04 | 2.04 | 1.79 |
| Mean | | 1.50 | 1.60 | 1.58 | 1.74 | 1.83 | 1.78 | 1.69 |
| S.D. | | 0.33 | 0.45 | 0.20 | 0.36 | 0.47 | 0.49 | 0.33 |
| Co | 1 | 2.18 | 3.18 | 3.13 | 2.92 | 2.62 | 2.75 | 2.76 |
| | 2 | 1.34 | 2.03 | 2.68 | 2.81 | 3.18 | 3.18 | 3.12 |
| | 3 | 2.29 | 2.69 | 2.61 | 2.78 | 2.84 | 2.79 | 3.18 |
| | 4 | 0.78 | 2.77 | 3.18 | 3.18 | 3.18 | 3.18 | 3.18 |
| | 5 | 2.11 | 1.68 | 1.88 | 1.88 | 2.97 | 2.84 | 2.66 |
| | 6 | 1.76 | 1.84 | 1.75 | 1.66 | 1.72 | 1.73 | 1.73 |
| | 7 | 1.58 | 1.54 | 1.52 | 1.83 | 1.69 | 1.69 | 1.67 |
| | 8 | 1.95 | 1.85 | 1.86 | 1.81 | 1.94 | 1.86 | 1.89 |
| | 9 | 2.27 | 1.92 | 2.15 | 2.04 | 1.80 | 1.72 | 1.72 |
| | 10 | 2.16 | 2.06 | 2.08 | 1.90 | 1.84 | 1.89 | 1.85 |

(Table continued on next page)

Lift Reaction Times--Continued

| Group | S no. | Practice | Base 1 | Series 1 | Base 2 | Series 2 | Base 3 | Series 3 |
|---|---|---|---|---|---|---|---|---|
| | | | | Schizophrenic subjects--Continued | | | | |
| Co | 11 | 1.08 | 1.28 | 2.04 | 2.97 | 2.20 | 2.36 | 2.19 |
| | 12 | 1.83 | 1.68 | 1.76 | 1.81 | 1.88 | 1.86 | 1.79 |
| | 13 | 1.90 | 1.92 | 1.95 | 1.84 | 1.83 | 1.88 | 1.91 |
| | 14 | 1.62 | 1.58 | 1.62 | 1.62 | 1.64 | 1.58 | 1.54 |
| Mean | | 1.78 | 2.00 | 2.16 | 2.22 | 2.24 | 2.24 | 2.23 |
| S.D. | | 0.46 | 0.53 | 0.54 | 0.57 | 0.58 | 0.59 | 0.62 |

Individual Log GSRs to Experimental Stimuli

(Units are log of Mhos x $10^7$ change)

| Group | S no. | Praise 1 | Praise 2 | Praise 3 | Censure 1 | Censure 2 | Censure 3 | Noise |
|---|---|---|---|---|---|---|---|---|
| | | | | Normal subjects | | | | |
| PC | 1 | 1.88 | 0.70 | 1.30 | 1.60 | 0.00 | 1.78 | 2.15 |
| | 2 | 2.59 | 1.78 | 1.95 | 2.40 | 2.40 | 0.00 | 2.18 |
| | 3 | 2.23 | 0.00 | 0.00 | 2.26 | 0.00 | 0.00 | 2.26 |
| | 4 | 0.00 | 0.70 | 0.00 | 1.00 | 0.00 | 0.00 | 1.65 |
| | 5 | 0.00 | 0.00 | 0.00 | 1.54 | 1.40 | 1.30 | 1.40 |
| | 6 | 1.85 | 0.00 | 2.34 | 1.30 | 1.30 | 0.00 | 2.34 |
| | 7 | 1.70 | 1.60 | 1.00 | 1.60 | 1.00 | 1.90 | 2.63 |
| | 8 | 0.70 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.70 |
| Mean | | 1.37 | 0.60 | 0.82 | 1.46 | 0.76 | 0.62 | 1.91 |
| S.D. | | 1.00 | 0.74 | 0.88 | 0.70 | 0.90 | 0.88 | 0.62 |
| CP | 1 | 1.18 | 1.40 | 0.00 | 2.46 | 1.18 | 0.00 | 1.00 |
| | 2 | 1.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 1.00 |
| | 3 | 2.11 | 1.00 | 0.00 | 2.33 | 1.70 | 1.48 | 2.32 |
| | 4 | 1.78 | 1.95 | 1.70 | 1.00 | 2.04 | 0.00 | 0.00 |
| | 5 | 0.00 | 0.00 | 0.00 | 0.70 | 0.00 | 0.00 | 1.54 |
| | 6 | 0.00 | 0.00 | 0.00 | 0.00 | 0.70 | 0.00 | 1.00 |
| | 7 | 2.36 | 0.00 | 1.48 | 0.00 | 1.00 | 0.00 | 1.60 |
| | 8 | 1.30 | 0.70 | 0.00 | 1.70 | 0.00 | 0.70 | 0.70 |
| Mean | | 1.22 | 0.63 | 0.40 | 1.02 | 0.83 | 0.27 | 1.14 |
| S.D. | | 0.88 | 0.76 | 0.74 | 1.04 | 0.80 | 0.55 | 0.69 |
| | | | | Schizophrenic subjects | | | | |
| PC | 1 | 0.00 | 0.00 | 0.70 | 0.00 | 0.00 | 0.70 | 1.70 |
| | 2 | 1.00 | 1.00 | 1.48 | 0.00 | 1.18 | 0.00 | 1.60 |
| | 3 | 2.02 | 2.00 | 1.95 | 2.10 | 2.04 | 2.06 | 1.98 |
| | 4 | 1.40 | 0.70 | 1.30 | 0.00 | 1.85 | 1.30 | 1.48 |
| | 5 | 1.30 | 0.00 | 1.40 | 0.00 | 1.00 | 0.00 | 2.13 |
| | 6 | 2.11 | 1.70 | 1.48 | 2.08 | 1.18 | 1.85 | 1.85 |
| | 7 | 1.98 | 1.18 | 0.70 | 2.23 | 1.85 | 1.70 | 2.19 |
| | 8 | 1.40 | 1.48 | 0.00 | 0.00 | 1.40 | 1.70 | 2.06 |
| | 9 | 1.00 | 1.30 | 1.60 | 0.70 | 1.30 | 0.00 | 1.18 |
| | 10 | 0.00 | 0.00 | 0.00 | 1.70 | 0.00 | 0.00 | 0.00 |
| | 11 | 1.85 | 0.00 | 0.00 | 1.78 | 0.00 | 0.00 | 1.00 |
| | 12 | 0.00 | 2.27 | 0.70 | 0.00 | 1.48 | 0.00 | 1.74 |
| | 13 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 1.00 |

(Table continued on next page)

GSRs to Experimental Stimuli--Continued

| Group | S no. | Praise 1 | Praise 2 | Praise 3 | Censure 1 | Censure 2 | Censure 3 | Noise |
|---|---|---|---|---|---|---|---|---|
| | | | | Schizophrenic subjects--Continued | | | | |
| PC | 14 | 0.00 | 2.02 | 1.98 | 2.35 | 0.00 | 2.18 | 0.00 |
| Mean | | 1.00 | 0.98 | 0.95 | 0.92 | 0.95 | 0.82 | 1.42 |
| S.D. | | 0.85 | 0.86 | 0.74 | 1.03 | 0.79 | 0.92 | 0.71 |
| CP | 1 | 1.18 | 0.00 | 1.48 | 0.70 | 0.00 | 1.40 | 2.22 |
| | 2 | 2.34 | 1.95 | 2.66 | 2.08 | 2.00 | 2.04 | 2.08 |
| | 3 | 0.00 | 2.30 | 1.00 | 1.90 | 0.00 | 2.11 | 2.20 |
| | 4 | 0.00 | 0.00 | 1.30 | 1.30 | 0.00 | 1.00 | 2.19 |
| | 5 | 0.00 | 1.18 | 1.00 | 1.90 | 0.00 | 1.81 | 1.00 |
| | 6 | 0.70 | 1.00 | 0.00 | 1.18 | 0.00 | 1.48 | 0.70 |
| | 7 | 0.00 | 1.18 | 1.00 | 1.40 | 0.70 | 1.30 | 1.30 |
| | 8 | 1.48 | 0.00 | 1.18 | 1.48 | 0.00 | 0.70 | 0.00 |
| | 9 | 2.22 | 0.00 | 0.00 | 2.08 | 2.24 | 2.29 | 2.06 |
| | 10 | 1.65 | 2.11 | 1.95 | 1.48 | 0.70 | 1.18 | 2.40 |
| | 11 | 0.00 | 1.30 | 0.00 | 1.54 | 0.00 | 0.00 | 0.00 |
| | 12 | 0.00 | 1.00 | 0.70 | 0.70 | 1.65 | 0.00 | 1.00 |
| | 13 | 0.00 | 1.30 | 1.00 | 1.48 | 0.00 | 1.74 | 2.20 |
| | 14 | 1.48 | 1.00 | 1.60 | 2.18 | 1.60 | 0.00 | 1.18 |
| Mean | | 0.79 | 1.02 | 1.06 | 1.53 | 0.64 | 1.22 | 1.47 |
| S.D. | | 0.91 | 0.79 | 0.76 | 0.47 | 0.86 | 0.79 | 0.84 |

Individual Log GSRs to Initial Set

(Units are log of Mhos x $10^7$ change)

| Group | S no. | Set for Praise | Set for Censure | Nonevaluation (Noise) |
|---|---|---|---|---|
| | | Normal subjects | | |
| PC | 1 | 1.85 | 2.06 | 2.00 |
| | 2 | 1.60 | 1.95 | 2.15 |
| | 3 | 0.00 | 1.65 | 1.48 |
| | 4 | 1.74 | 1.74 | 0.00 |
| | 5 | 1.54 | 1.00 | 0.70 |
| | 6 | 2.41 | 2.32 | 2.28 |
| | 7 | 1.95 | 2.20 | 1.95 |
| | 8 | 0.70 | 0.00 | 0.70 |
| Mean | | 1.47 | 1.62 | 1.41 |
| S.D. | | 0.77 | 0.77 | 0.84 |
| CP | 1 | 1.54 | 2.26 | 0.00 |
| | 2 | 1.54 | 1.65 | 1.70 |
| | 3 | 2.23 | 2.26 | 2.30 |
| | 4 | 2.35 | 2.38 | 2.26 |
| | 5 | 1.18 | 1.00 | 1.78 |
| | 6 | 1.54 | 1.00 | 1.30 |
| | 7 | 1.48 | 1.54 | 1.30 |
| | 8 | 0.70 | 0.70 | 1.40 |
| Mean | | 1.57 | 1.60 | 1.51 |
| S.D. | | 0.53 | 0.66 | 0.73 |
| | | Schizophrenic subjects | | |
| PC | 1 | 1.30 | 1.18 | 0.00 |
| | 2 | 1.30 | 1.00 | 1.48 |
| | 3 | 2.19 | 1.78 | 2.04 |
| | 4 | 1.18 | 0.00 | 0.70 |
| | 5 | 1.54 | 1.70 | 1.54 |
| | 6 | 1.00 | 1.88 | 1.90 |
| | 7 | 2.23 | 1.00 | 1.00 |
| | 8 | 1.18 | 1.60 | 1.18 |
| | 9 | 1.40 | 0.70 | 1.85 |
| | 10 | 2.00 | 1.00 | 2.26 |
| | 11 | 2.26 | 1.48 | 1.95 |
| | 12 | 1.65 | 1.18 | 0.00 |
| | 13 | 1.00 | 0.70 | 0.00 |

(Table continued on next page)

GSRs to Initial Set--Continued

| Group | S no. | Set for Praise | Set for Censure | Nonevaluation (Noise) |
|---|---|---|---|---|
| | | Schizophrenic subjects--Continued | | |
| PC | 14 | 1.78 | 2.51 | 2.38 |
| Mean | | 1.57 | 1.26 | 1.31 |
| S.D. | | 0.45 | 0.62 | 0.85 |
| CP | 1 | 1.70 | 0.70 | 0.00 |
| | 2 | 1.90 | 2.30 | 1.78 |
| | 3 | 2.29 | 2.08 | 2.32 |
| | 4 | 0.00 | 0.00 | 0.00 |
| | 5 | 1.70 | 1.90 | 1.48 |
| | 6 | 0.00 | 0.70 | 0.00 |
| | 7 | 1.00 | 1.54 | 0.70 |
| | 8 | 1.18 | 1.30 | 0.00 |
| | 9 | 2.36 | 2.06 | 1.95 |
| | 10 | 1.70 | 1.30 | 1.40 |
| | 11 | 0.00 | 0.00 | 2.36 |
| | 12 | 0.70 | 1.48 | 0.00 |
| | 13 | 0.00 | 1.00 | 1.00 |
| | 14 | 1.60 | 1.70 | 1.30 |
| Mean | | 1.15 | 1.29 | 1.02 |
| S.D. | | 0.88 | 0.73 | 0.91 |

Individual Log GSRs to Initial "Ready"

(Units are log of Mhos x $10^7$ change)

| Group | S no. | Practice | Base 1 | Praise | Base After Praise | Censure | Base After Censure | Noise |
|---|---|---|---|---|---|---|---|---|
| | | | | Normal subjects | | | | |
| PC | 1 | 0.00 | 1.60 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 2 | 1.48 | 1.98 | 1.90 | 1.48 | 0.00 | 1.78 | 0.00 |
| | 3 | 1.60 | 2.26 | 1.90 | 1.18 | 1.60 | 1.30 | 1.48 |
| | 4 | 1.18 | 1.54 | 1.18 | 0.00 | 0.70 | 0.00 | 1.00 |
| | 5 | 0.70 | 1.85 | 1.00 | 0.70 | 1.30 | 1.40 | 1.48 |
| | 6 | 1.74 | 2.34 | 0.00 | 0.00 | 1.30 | 0.00 | 1.00 |
| | 7 | 1.60 | 1.60 | 0.00 | 0.00 | 0.00 | 1.00 | 1.48 |
| | 8 | 1.18 | 0.00 | 0.70 | 0.00 | 0.00 | 0.00 | 0.70 |
| Mean | | 1.18 | 1.65 | 0.84 | 0.42 | 0.61 | 0.68 | 0.89 |
| S.D. | | 0.58 | 0.73 | 0.81 | 0.62 | 0.70 | 0.76 | 0.62 |
| CP | 1 | 0.00 | 1.85 | 2.24 | 1.70 | 2.08 | 1.40 | 1.70 |
| | 2 | 1.00 | 1.78 | 1.60 | 0.00 | 1.00 | 1.30 | 1.30 |
| | 3 | 1.78 | 2.30 | 0.00 | 1.30 | 2.24 | 1.60 | 1.93 |
| | 4 | 1.30 | 2.68 | 1.78 | 2.11 | 2.55 | 2.00 | 2.00 |
| | 5 | 0.00 | 1.30 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 6 | 1.00 | 2.10 | 0.70 | 1.65 | 0.00 | 1.18 | 1.74 |
| | 7 | 1.70 | 1.18 | 0.00 | 0.00 | 1.54 | 1.00 | 1.30 |
| | 8 | 0.00 | 1.70 | 1.00 | 0.00 | 0.70 | 1.40 | 0.00 |
| Mean | | 0.85 | 1.86 | 0.92 | 0.84 | 1.26 | 1.24 | 1.25 |
| S.D. | | 0.75 | 0.50 | 0.89 | 0.93 | 0.99 | 0.58 | 0.81 |
| | | | | Schizophrenic subjects | | | | |
| PC | 1 | 1.00 | 1.60 | 1.30 | 1.30 | 0.00 | 0.70 | 0.00 |
| | 2 | 1.70 | 1.48 | 1.00 | 0.70 | 1.40 | 0100 | 1.30 |
| | 3 | 0.70 | 1.18 | 0.00 | 1.48 | 0.70 | 1.60 | 1.90 |
| | 4 | 1.00 | 0.00 | 0.00 | 0.00 | 1.18 | 0.00 | 1.40 |
| | 5 | 1.00 | 1.00 | 1.00 | 1.18 | 1.40 | 0.00 | 1.54 |
| | 6 | 1.18 | 1.18 | 0.00 | 1.30 | 1.40 | 1.00 | 1.40 |
| | 7 | 0.00 | 1.74 | 1.54 | 1.00 | 0.00 | 0.00 | 0.00 |
| | 8 | 0.00 | 1.60 | 1.54 | 0.00 | 0.00 | 0.00 | 1.60 |
| | 9 | 1.18 | 1.48 | 1.70 | 1.48 | 1.30 | 1.40 | 1.00 |
| | 10 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.70 | 0.00 |
| | 11 | 1.30 | 1.30 | 1.60 | 0.00 | 1.85 | 0.00 | 0.00 |
| | 12 | 1.60 | 0.00 | 0.00 | 1.18 | 0.00 | 0.00 | 0.70 |
| | 13 | 1.00 | 0.70 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

(Table continued on next page)

GSRs to Initial "Ready"--Continued

| Group | S no. | Practice | Base 1 | Praise | Base After Praise | Censure | Base After Censure | Noise |
|---|---|---|---|---|---|---|---|---|
| | | | | Schizophrenic subjects--Continued | | | | |
| PC | 14 | 0.00 | 1.95 | 0.00 | 0.00 | 0.00 | 1.30 | 2.41 |
| Mean | | 0.83 | 1.09 | 0.69 | 0.69 | 0.66 | 0.48 | 0.95 |
| S.D. | | 0.60 | 0.66 | 0.74 | 0.65 | 0.72 | 0.62 | 0.82 |
| CP | 1 | 1.00 | 1.60 | 1.40 | 0.00 | 1.60 | 1.85 | 0.00 |
| | 2 | 1.85 | 2.46 | 1.30 | 2.08 | 2.42 | 2.11 | 1.78 |
| | 3 | 2.64 | 2.40 | 1.60 | 2.08 | 1.85 | 1.00 | 1.70 |
| | 4 | 1.78 | 1.18 | 1.48 | 1.48 | 0.00 | 0.00 | 0.00 |
| | 5 | 1.48 | 1.00 | 1.85 | 0.00 | 1.30 | 1.30 | 1.30 |
| | 6 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 7 | 1.85 | 1.18 | 0.00 | 1.48 | 1.30 | 0.00 | 1.00 |
| | 8 | 1.30 | 0.00 | 1.00 | 0.00 | 0.00 | 1.18 | 0.00 |
| | 9 | 1.70 | 2.22 | 0.00 | 0.00 | 1.88 | 0.00 | 0.00 |
| | 10 | 0.00 | 1.54 | 1.18 | 1.48 | 1.88 | 1.93 | 0.00 |
| | 11 | 0.00 | 1.30 | 0.70 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 12 | 1.70 | 1.00 | 0.00 | 0.00 | 0.70 | 0.00 | 1.48 |
| | 13 | 1.48 | 1.30 | 0.00 | 0.00 | 0.00 | 2.04 | 1.18 |
| | 14 | 0.00 | 1.78 | 1.00 | 1.18 | 0.00 | 0.00 | 0.00 |
| Mean | | 1.20 | 1.35 | 0.82 | 0.70 | 0.92 | 0.82 | 0.60 |
| S.D. | | 0.87 | 0.75 | 0.69 | 0.87 | 0.91 | 0.90 | 0.75 |

Individual Log GSRs to Noninitial "Ready"

(Units are log of Mhos x $10^7$ change)

| Group | S no. | Practice | Base 1 | Praise | Base After Praise | Censure | Base After Censure | Noise |
|---|---|---|---|---|---|---|---|---|
| | | | | Normal subjects | | | | |
| PC | 1 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 2 | 0.70 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 3 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 4 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 5 | 0.70 | 0.00 | 1.00 | 0.30 | 0.00 | 0.70 | 0.00 |
| | 6 | 1.00 | 0.00 | 0.30 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 7 | 0.00 | 0.00 | 0.00 | 0.00 | 0.70 | 1.30 | 0.00 |
| | 8 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Mean | | 0.30 | 0.00 | 0.16 | 0.04 | 0.09 | 0.25 | 0.00 |
| S.D. | | 0.42 | 0.00 | 0.35 | 0.10 | 0.24 | 0.49 | 0.00 |
| CP | 1 | 0.00 | 0.70 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 2 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.30 | 0.00 |
| | 3 | 0.00 | 1.54 | 0.00 | 0.00 | 0.90 | 0.00 | 0.00 |
| | 4 | 0.90 | 1.58 | 1.58 | 0.00 | 1.40 | 1.45 | 0.00 |
| | 5 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 6 | 0.90 | 1.18 | 0.30 | 0.90 | 0.00 | 0.00 | 0.00 |
| | 7 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 1.18 | 0.00 |
| | 8 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Mean | | 0.22 | 0.62 | 0.24 | 0.11 | 0.29 | 0.37 | 0.00 |
| S.D. | | 0.41 | 0.72 | 0.56 | 0.32 | 0.55 | 0.60 | 0.00 |
| | | | | Schizophrenic subjects | | | | |
| PC | 1 | 0.00 | 0.00 | 0.00 | 0.70 | 0.00 | 0.00 | 0.00 |
| | 2 | 1.00 | 1.30 | 1.00 | 0.30 | 1.08 | 1.00 | 0.70 |
| | 3 | 1.40 | 1.18 | 1.62 | 1.70 | 1.45 | 1.26 | 1.65 |
| | 4 | 0.70 | 1.26 | 0.00 | 0.90 | 0.00 | 0.00 | 0.00 |
| | 5 | 0.00 | 0.90 | 0.90 | 0.90 | 1.00 | 0.70 | 0.00 |
| | 6 | 0.70 | 1.00 | 0.00 | 0.00 | 0.70 | 1.00 | 0.00 |
| | 7 | 0.00 | 0.30 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 8 | 0.00 | 0.00 | 1.30 | 1.18 | 0.00 | 1.51 | 1.30 |
| | 9 | 1.18 | 1.34 | 1.08 | 1.00 | 1.26 | 1.34 | 1.18 |
| | 10 | 0.00 | 0.00 | 0.30 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 11 | 0.70 | 0.00 | 0.00 | 0.70 | 0.00 | 0.00 | 0.00 |
| | 12 | 1.30 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 13 | 0.00 | 0.00 | 0.00 | 0.70 | 0.00 | 0.00 | 0.00 |

(Table continued on next page)

GSRs to Noninitial "Ready"--Continued

| Group | S no. | Practice | Base 1 | Praise | Base After Praise | Censure | Base After Censure | Noise |
|---|---|---|---|---|---|---|---|---|
| | | | | Schizophrenic subjects--Continued | | | | |
| PC | 14 | 0.00 | 0.00 | 0.30 | 1.40 | 0.00 | 0.00 | 1.30 |
| Mean | | 0.50 | 0.52 | 0.46 | 0.68 | 0.39 | 0.49 | 0.44 |
| S.D. | | 0.56 | 0.59 | 0.58 | 0.56 | 0.57 | 0.61 | 0.64 |
| CP | 1 | 0.70 | 0.30 | 1.26 | 0.00 | 0.00 | 0.70 | 0.00 |
| | 2 | 2.02 | 1.78 | 2.11 | 1.48 | 2.35 | 1.65 | 0.00 |
| | 3 | 1.00 | 1.30 | 1.30 | 1.83 | 0.00 | 1.68 | 0.00 |
| | 4 | 0.30 | 0.70 | 0.00 | 1.18 | 0.00 | 1.34 | 1.26 |
| | 5 | 1.00 | 1.26 | 0.70 | 0.70 | 0.70 | 0.70 | 0.00 |
| | 6 | 1.08 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 7 | 0.70 | 1.34 | 0.00 | 0.00 | 1.18 | 1.30 | 0.30 |
| | 8 | 1.18 | 0.30 | 0.00 | 0.70 | 0.00 | 0.00 | 0.30 |
| | 9 | 1.18 | 1.74 | 0.00 | 1.30 | 1.08 | 1.08 | 1.08 |
| | 10 | 1.48 | 1.00 | 0.00 | 1.00 | 1.30 | 0.30 | 0.00 |
| | 11 | 0.70 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 12 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 13 | 0.00 | 0.90 | 0.00 | 0.90 | 0.00 | 0.90 | 0.00 |
| | 14 | 1.00 | 0.00 | 0.00 | 1.26 | 1.00 | 1.08 | 0.30 |
| Mean | | 0.83 | 0.76 | 0.38 | 0.74 | 0.54 | 0.77 | 0.23 |
| S.D. | | 0.60 | 0.66 | 0.69 | 0.64 | 0.74 | 0.62 | 0.42 |

Individual Neutral to "Ready" Shifts in Conductance Levels

(Units are Mhos x $10^7$ change)

| Group | S no. | Initial Instructions | Praise | Censure | Noise |
|---|---|---|---|---|---|
| | | Normal subjects | | | |
| PC | 1 | 105 | 105 | 85 | 350 |
| | 2 | 80 | 240 | 260 | 140 |
| | 3 | - 10 | 140 | 165 | 260 |
| | 4 | 55 | 35 | 60 | 10 |
| | 5 | 50 | 10 | 25 | 80 |
| | 6 | 85 | 160 | 120 | 130 |
| | 7 | 110 | 110 | 130 | 370 |
| | 8 | 30 | 5 | 0 | 5 |
| Mean | | 63.1 | 100.6 | 105.6 | 168.1 |
| S.D. | | 40.4 | 81.3 | 83.1 | 143.4 |
| CP | 1 | 0 | - 10 | 270 | 50 |
| | 2 | 70 | 40 | 80 | 40 |
| | 3 | 240 | 245 | 170 | 100 |
| | 4 | 250 | 175 | 215 | 180 |
| | 5 | 10 | 10 | 10 | 45 |
| | 6 | 45 | 5 | 0 | 10 |
| | 7 | 130 | 330 | 60 | 180 |
| | 8 | 45 | 20 | 30 | 15 |
| Mean | | 99.4 | 101.9 | 104.4 | 77.5 |
| S.D. | | 99.7 | 130.2 | 101.3 | 68.9 |
| | | Schizophrenic subjects | | | |
| PC | 1 | 35 | - 20 | - 15 | 5 |
| | 2 | 20 | 40 | 5 | 0 |
| | 3 | 5 | 15 | - 80 | 85 |
| | 4 | - 15 | 20 | 5 | 25 |
| | 5 | - 20 | - 15 | 10 | 60 |
| | 6 | 60 | 5 | 20 | 0 |
| | 7 | 0 | 90 | 150 | 40 |
| | 8 | 100 | - 25 | 235 | 75 |
| | 9 | 10 | 5 | 5 | 45 |
| | 10 | - 15 | 20 | 30 | 15 |
| | 11 | - 40 | 70 | 50 | 30 |
| | 12 | 40 | 5 | 40 | - 5 |
| | 13 | 15 | 20 | - 5 | - 25 |

(Table continued on next page)

Neutral to "Ready" Shifts--Continued

| Group | S no. | Initial Instructions | Praise | Censure | Noise |
|---|---|---|---|---|---|
| | | Schizophrenic subjects--Continued | | | |
| PC | 14 | 200 | 0 | 60 | 25 |
| Mean | | 28.2 | 16.4 | 36.4 | 26.8 |
| S.D. | | 61.1 | 32.3 | 75.9 | 31.8 |
| CP | 1 | 20 | - 15 | - 25 | 20 |
| | 2 | 60 | 0 | -130 | 120 |
| | 3 | -130 | -100 | 40 | 110 |
| | 4 | - 25 | - 70 | 5 | - 20 |
| | 5 | 120 | - 15 | - 30 | - 5 |
| | 6 | 0 | - 10 | 35 | - 10 |
| | 7 | 10 | - 40 | 15 | 20 |
| | 8 | 20 | - 10 | 30 | 0 |
| | 9 | 45 | 75 | - 50 | 70 |
| | 10 | 45 | - 10 | - 25 | 190 |
| | 11 | 100 | - 35 | - 10 | - 20 |
| | 12 | 15 | - 30 | 5 | 30 |
| | 13 | 105 | 15 | 130 | 40 |
| | 14 | 125 | -150 | 130 | - 25 |
| Mean | | 36.4 | - 28.2 | 8.6 | 37.1 |
| S.D. | | 67.2 | 53.1 | 67.0 | 63.9 |

Individual Neutral to Peak Shifts in Conductance Levels

(Units are Mhos x $10^7$ change)

| Group | S no. | Initial Instructions | Praise | Censure | Noise |
|---|---|---|---|---|---|
| | | Normal subjects | | | |
| PC | 1 | 120 | 115 | 105 | 450 |
| | 2 | 30 | 410 | 380 | 240 |
| | 3 | 180 | 260 | 205 | 340 |
| | 4 | 65 | 50 | 65 | 30 |
| | 5 | 70 | 40 | 45 | 110 |
| | 6 | 185 | 250 | 190 | 340 |
| | 7 | 110 | 130 | 140 | 610 |
| | 8 | 35 | 10 | 0 | 10 |
| Mean | | 99.4 | 158.1 | 141.2 | 266.2 |
| S.D. | | 44.9 | 137.6 | 119.4 | 210.2 |
| CP | 1 | 30 | 165 | 400 | 100 |
| | 2 | 80 | 80 | 120 | 60 |
| | 3 | 490 | 365 | 350 | 320 |
| | 4 | 415 | 235 | 570 | 400 |
| | 5 | 50 | 20 | 10 | 80 |
| | 6 | 50 | 25 | 70 | 35 |
| | 7 | 380 | 310 | 95 | 200 |
| | 8 | 55 | 30 | 55 | 30 |
| Mean | | 193.8 | 153.8 | 208.8 | 153.1 |
| S.D. | | 197.1 | 136.8 | 190.6 | 139.9 |
| | | Schizophrenic subjects | | | |
| PC | 1 | 50 | 5 | 10 | 35 |
| | 2 | 50 | 50 | 30 | 50 |
| | 3 | 55 | 130 | 35 | 205 |
| | 4 | 20 | 20 | 20 | 60 |
| | 5 | 50 | 20 | 45 | 215 |
| | 6 | 0 | 115 | 115 | 130 |
| | 7 | 40 | 165 | 180 | 180 |
| | 8 | 225 | 10 | 235 | 155 |
| | 9 | 65 | 55 | 25 | 145 |
| | 10 | 25 | 115 | 60 | 175 |
| | 11 | 0 | 160 | 120 | 130 |
| | 12 | 60 | 30 | 40 | 35 |
| | 13 | 15 | 20 | 0 | 0 |

(Table continued on next page)

Neutral to Peak Shifts--Continued

| Group | S no. | Initial Instructions | Praise | Censure | Noise |
|---|---|---|---|---|---|
| | | Schizophrenic subjects--Continued | | | |
| PC | 14 | 275 | 120 | 230 | 280 |
| Mean | | 66.4 | 72.5 | 81.8 | 128.2 |
| S.D. | | 81.2 | 58.7 | 80.9 | 81.7 |
| CP | 1 | 40 | 45 | 15 | 65 |
| | 2 | 400 | 200 | 130 | 310 |
| | 3 | 170 | 30 | 210 | 340 |
| | 4 | 5 | 25 | 15 | 150 |
| | 5 | 180 | 55 | 50 | 55 |
| | 6 | 0 | 10 | 35 | 30 |
| | 7 | 35 | 5 | 35 | 30 |
| | 8 | 60 | 40 | 30 | 80 |
| | 9 | 140 | 215 | 95 | 175 |
| | 10 | 65 | 25 | 50 | 250 |
| | 11 | 115 | 0 | 45 | 175 |
| | 12 | 20 | 0 | 40 | 60 |
| | 13 | 110 | 100 | 0 | 180 |
| | 14 | 170 | 0 | 150 | 0 |
| Mean | | 107.9 | 53.6 | 64.3 | 135.7 |
| S.D. | | 105.0 | 70.7 | 60.2 | 107.9 |