RESPONSE DIFFERENCES BETWEEN PROCESS AND REACTIVE SCHIZOPHRENICS AS INDUCED BY MAGAZINE PHOTOGRAPHS

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RESPONSE DIFFERENCES BETWEEN PROCESS AND REACTIVE SCHIZOPHRENICS AS INDUCED BY MAGAZINE PHOTOGRAPHS

BY

John Mark Reisman

AN ABSTRACT

Submitted to the School for Advanced Graduate Studies of Michigan State University of Agriculture and Applied Science in partial fulfillment of the requirements for the degree of

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ABSTRACT

On the assumption that changes in motivation occur as symptoms persist over long periods of time, it was hypothesized that reactive schizophrenics would avoid while process schizophrenics would not avoid photographs considered to represent areas of frustration, conflict, and/or threat.

To test this hypothesis, thirty-six male hospitalized veterans diagnosed as schizophrenic were classified as reactive and thirty-six as process. A comparison group consisted of thirty-six male veterans hospitalized for physical ailments and not considered psychotic. The three groups were controlled for age, IQ estimates, and length of hospitalization. The experimental task was to sort an ordinary deck of playing cards onto a board divided into quadrants for eleven trials. On trials 1 and 9 - 11, subjects were requested to sort fast. From trials 2 - 8, subjects were allowed to sort fast or slow under one of four conditions: FP subjects were told they would see pictures after each trial during which they sorted fast; SP subjects were to see pictures after each trial during which they sorted slowly; FL subjects were to see a light turned on after each trial during which they sorted fast; SL subjects were to see a light after each trial during which they sorted slowly. Fast and slow were defined in relation to the subject's speed on the immediately preceeding

trial. The pictures were magazine photographs, mainly of people, previously judged by five clinicians as to whether they represented an area of frustration, conflict, and/or threat. Pictures so judged were presented first, in sets of five, when appropriate. The light was a small flashlight bulb. It was predicted reactives would sort cards so as to avoid seeing pictures while process would not.

In a sub-experiment, ten process and ten reactives who performed under the light conditions were used as subjects. A pile of 33 pictures was presented to each subject who was told to simply look at them for as long as he liked. Eleven of these pictures were photos of people judged to represent an area of frustration, conflict, and/or threat; eleven were photos of people judged non-threatening; eleven were photos of scenery or inanimate objects. It was predicted that process subjects would look at the three types of pictures for about the same length of time but that reactives would look at pictures judged threatening less than the other two types.

Generally, the results supported the hypothesis. As was predicted, reactives who sorted under FP were slower than under any other condition. They saw significantly fewer pictures than process subjects and less than would have been expected from their performance under the light conditions. Reactives were significantly more variable under FP and SP than under FL or SL. In the sub-experiment, reactives looked at photographs for a significantly shorter period of time than

process subjects. As was expected, non-threatening and inanimate photos had a significant positive effect on the length of time that reactives looked at pictures but there was no differential effect with process subjects. It was also found that the sorting time differences between the groups, normals sorted faster than reactives who sorted faster than process subjects, seemed to be more a reflection of differences in motivation than of a deficit in psychomotor ability in schizophrenia.

The major conclusions with respect to the population employed were:

1. Schizophrenics may be fruitfully divided into process and reactives.
2. Reactive schizophrenics avoid pictures considered to represent areas of frustration, conflict, and/or threat while process schizophrenics do not.
3. Duration of symptoms is a crucial variable in the investigation and understanding of schizophrenia.

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INTRODUCTION

A. Development of the Process - Reactive Concept

One of the stimulating facets of psychological research ... perhaps of all scientific research ...is that each new bit of knowledge welds into a key that unlocks more distant horizons of ignorance. Perhaps no other area better illustrates that advances may at once illuminate and perplex than the study of schizophrenia. While it has become the object of ever-increasing scientific scrutiny, it has also become the source of an alarming body of equivocal and contradictory experimental evidence, and the subject of a vast number of free-floating theories.

It was only about a hundred years ago, in 1860, that Morel described a form of stupidite associated with progressive mental and emotional deterioration by the term demense precoce. He referred to a phenomenon in which young adults who as children seemed intelligent and teachable had matured to become stupid and dull (40). Toward the end of the nineteenth century the term was popularized by Kraeplin in its Latinized form, dementia praecox (33). Under this rubric he subsumed disorders which until then had been considered separate clinical entities: catatonia, hebephrenia, and certain delusional states. The beauty of his classification ...of seeing a unifying thread coursing through diverse forms of behavior ...was an advantage

which psychiatrists were loathe to give up even when they recognized that the illness did not always progress to dementia nor always begin in youth. Rather the term had to be changed and some new fundamental aspect brought into focus.

In 1924, Bleuler advocated the term schizophrenia and stated that the fundamental symptom of the disorder was a splitting of the personality ...a splitting among the thought, motor, and emotional processes ...a splitting of the mind (5). If this caused any satisfaction, it was short-lived. Just four years later, Strecker and Wiley stated that schizophrenics formed into two psychotic groups, a poor prognostic group which was composed of patients who seemed to have a basic and constitutional seclusive make-up, and a better prognostic group which was composed of patients whose psychosis was acute with a stormy onset precipitated by some significant situation (46). Rumblings were heard from the psychoanalysts who not only berated the term itself as superficial and grossly inadequate but who felt that it embraced a number of conditions which varied widely in psychosexual level and stage of libidinal fixation (16, 19).

It became increasingly evident that a heterogeneous population was encompassed under the label of schizophrenia. Kraeplin's nosology was repudiated by many and all that remained was to find a new conceptualization. Thus there began to emerge

a distinction between schizophrenics which held great promise: process vs. reactive.

The process-reactive concept did not spring full-grown from the head of Zeus but is an evolution from the thinking of a number of men. It was Sullivan who believed that schizophrenia should be reserved as a label for those disorders of living which have an acute onset due to some situational stress and a good prognosis, while the term "dementia praecox" should be applied to that disorder which has an insidious onset, poor prognosis, and seems to be an organic, degenerative disease (47). In a similar vein were the comments of Strecker and Wiley (46). Differences in recovery rates among schizophrenics impressed Langfeldt and he introduced the term "process" to designate those patients whose chances of improvement were worse than the acute or "schizophreniform" (35). D. E. Cameron focused on early symptoms and distinguished among schizophrenics on this basis: hypoactive behavior present for a long time versus hyperactive behavior present for a relatively shorter time prior to hospitalization (8). The prepsychotic personality was emphasized by Darrah, who felt that dementia praecox implied not only an insidious onset progressing to deterioration but also a schizoid prepsychotic personality. Schizophrenia, however, implied, in addition to an abrupt onset with a milder nondeteriorating course, a usually adequate prepsychotic personality (12).

In a study of fifty-nine case histories, Wittman and Steinberg found some confirmation for Darrah's views. They noted that about 50% of these histories described a life-long introverted personality with no specific onset while the other half described disorders apparently based on environmental factors (52).

The continuum approach was applied by Bellak in considering etiological factors in schizophrenia. He believed that these factors ranged from the completely organic to the completely psychogenic with the two polar types having different prognoses. The favorable prognostic group is psychogenic and has an acute onset, an atypical (not schizoid) personality, precipitating factors and confusion are present, while affect is, more or less adequate. Many of these phenomena, he felt, could be understood in terms of psychological dynamics (3). Thus the conception of two different groups unfortunately sharing the same diagnostic label grew. Briefly stated, the process or true or chronic schizophrenic was considered to be the patient with a long history of poor psychlogical adjustment which eventually culminated in hospitalization; the reactive or benign or acute schizophrenic was one with an overtly good psychological adjustment prior to hospitalization whose psychotic onset was sudden with some traumatic factor usually evident.

B. Functions and Limitations of the Process - Reactive Concept

Utilizing this distinction, Kantor, et. al. found that process patients gave psychotic Rorschachs while reactives seemed to give relatively nonpsychotic Rorschachs (29); Brackbill and Fine reported that the Rorschachs of process and organic patients were virtually indistinguishable indicating the possibility of central nervous system pathology in process schizophrenia (7); Devault found that differences in physiological responsiveness exist between the two groups (13). Though these results have been encouraging, the distinction itself has been attacked. Becker has strongly made his point that process and reactive patients do not exist as pure types. Dismayed by difficulties in classification and overlapping etiological factors in case histories, he has advocated the abandonment of considering the process-reactive distinction as a dichotomy and has offered in its stead the view that they be considered end-points along a continuum of personality adjustment (2). Becker's criticisms appear justified and henceforth by "process" and "reactive", the author wishes to imply "predominantly process" and "predominantly reactive." However, there is at least one alternative to considering the distribution along a process-reactive continuum as normal and that is to consider the distribution as bimodal. Such an alternative seems more in keeping with

the spirit of the work already done in this area and with the very conception of process and reactive schizophrenia itself.

The experiment which is to be described in this paper was primarily empirical not because there is a lack of theoretical formulations in this area but because there is a veritable host of differing explanations with varying degrees of verifiability and probability. Virtually every conceivable brain anomoly has been proposed as an explanation for schizophrenic behavior. These have been dutifully recorded by Brackbill (6) and it is to his credit that he has emerged from the welter of positive, negative, and ambiguous results with a feeling of optimism about research in this area. Similarly, psychological explanations have ranged from adjustive responses to painful problems of modern life (39) to the contention that the schizophrenic is preoccupied with his visceral sensations and that his symptoms lack purpose (38). It would appear logical that prior to championing any theoretical position with regard to schizophrenia, some attempt should be made to ascertain the nature of the beast and whether or not theories are being built on quicksand. The clarification of the nature of schizophrenia is one of the functions which it is hoped the process-reactive classification will achieve; the explanation of conflicting experimental findings is another.

It is difficult to conceive of anything that is more frustrating or disheartening to the scientist than similar experiments with dissimilar results. Though research in schizophrenia cannot claim any monopoly on such conundrums, it has had more than its share. In particular, the question of whether schizophrenics suffer any real psychological deficit has long been a subject for investigation and has produced its quota of mixed findings.

Layman investigated this problem by administering the Stanford-Binet, Rorschach, and various performance tests to twenty schizophrenics before, during, and after the administration of sodium amytal. In general, the performance of the patients under amytal was superior and afterwards, it tended to revert to their previous level of functioning. He attributed the changes to the removal and restoration of inhibitions (36). So far no irreversible deficit and this seemed to also be the conclusion of Shakow and Goldman who studied speed of tapping. They found that schizophrenics tapped significantly less and were more variable than normals. However with practice the scores of the schizophrenics showed some improvement and became less variable. It was reported that the diagnostic types of schizophrenia distinguished themselves in various ways, e.g., catatonic patients did best and the authors considered a major part of the differences to be due to the attitudes and degree of

cooperation of their schizophrenic subjects (44).

Essentially the same results were found by Huston, et. al. with respect to reaction time (28) and by Huston and Shakow with respect to performance on the pursuit rotor and prod learning. The latter authors attributed the poor performance of their patients on the pursuit rotor to an impaired ability to assume and maintain a set (26). They gained indirect support for this view from Freeman, et. al, who claimed their patients had a heightened reaction to external stimulation which was greater than that of normals (17) and from Chapman, who found that schizophrenics were more easily distracted than normals (10). However, when Huston, et. al. directly tested it, they reported their schizophrenics apparently unimpaired in the ability to shift set and maintain goal orientation (25).

A recent study by H. E. King produced familiar results but a different interpretation. Using chronic schizophrenics who performed such psychomotor tasks as reaction time, speed of tapping, and finger dexterity, he reported his psychotic group retarded on all tests (32). So impressed was he by these findings that he concluded psychomotor capacity was disturbed in a fundamental sense, that it was " ...a reflection of defect at the core"(32, 156)", and that " ...retarded and faulty psychomotor response is regarded as a basic indication of this state of psychobiologic maladaptation" (32, 156).

A subsequent study (31) used acute schizophrenics with an operant motor task of pulling a plunger for rewards of candy and cigarettes. Its hypotheses were a logical extension of H. E. King's conclusion: clinical improvement will be positively related to an increased operant rate; severity of illness will be inversely related to operant rate of response. Neither hypothesis was supported.

After reviewing a number of studies in this area, Hunt and Cofer concluded that the deficit of schizophrenics was not due to any loss in fundamental capacity but rather to defective motivation and control of performance (24). Defective motivation might explain Winer's findings that, except for paranoids, schizophrenics did poorer on incidental learning than normals (51). Yet defective motivation would not seem omnipresent, since Greenberg did not find any great impairment in incidental learning with paranoid and acute schizophrenics (20).

It would be expected from Hunt and Cofer's conclusion that increasing motivation should result in better performance. Cohen reported that increasing motivation had a mild but insignificant facilitative effect (11); Stotsky reported that he considered his findings on the relationship between motivation and reaction time unclear (45); Lair found that praise was better than reproof but reproof was better than nothing in learning verbal materials but that praise and reproof had no effect on card sorting performance (34). The matter does not seem to gain too much in clarity by considering what sort of stimulus constituted

an effective motivator since Garmezy, simply by illuminating the word "WRONG", produced sufficient punishment to cause avoidant responses (18) while Hirschman's personal entreaties had little effect on the patients in his experiment (23).

The belief that conflicting experimental results may be largely ascribed to a heterogeneous schizophrenic population has given additional impetus to process-reactive research. This is a second function which it is considered this new form of classification will achieve: a means of explaining divergent and ambiguous findings and of increasing reliability in experimentation. Nevertheless, dichotomization of a schizophrenic sample is still no guaranty of clear-cut results.

Following the completion of this experiment, an article appeared by Rodnick and Garmezy (42) in which they discussed a number of experiments conducted primarily at Duke University. On the assumption that psychological deficit in schizophrenia was due to faulty motivation, they predicted that social censure would produce deficit performances in schizophrenics. Subjects were divided into good and poor premorbids based on ratings of the case histories in terms of adolescent and recent sexual adjustment, social aspects of recent sexual life, and past and recent adjustment in social relations. There is considerable similarity between good premorbid schizophrenics and reactives and poor premorbids and process. This the authors recognized

and were of the opinion that the poor premorbids might be viewed as organic since there is some evidence to suggest that process patients are organic.

Because the poor premorbids have been subjected to social censure over a long period of time, the authors hypothesized that these patients would be more sensitive to social censure and thus exhibit greater deficit in performance than good premorbids under some sort of punishment condition. The illogicality of this line of reasoning is that, if the poor premorbids were constitutional or organic, then less rather than more sensitivity to psycho-social factors would be expected. Nevertheless, they have reported several studies to be described below, which they believe support their hypothesis.

Bleke (4) had assumed that reminiscence is a function of dissipation of interference and that censure would produce interference. Therefore, he hypothesized that poor premorbid schizophrenics would have more interference during learning under censure and so show more reminiscence than good premorbid schizophrenics. The subjects were presented with a list of fourteen nouns and had to pull and push a lever in a certain pattern for each. Under the reward condition, when they manipulated the lever correctly, the word "RIGHT" was illuminated and, when they were incorrect, an empty slot was illuminated. Under the censure condition, when they manipulated the lever

incorrectly, the word "WRONG" was illuminated, and when they were correct, an empty slot was illuminated. Three measures of reminiscence were obtained: retention, relearning, and improvement in recall. The retention and relearning data were ambiguous and not reported. Using improvement in recall as a measure, the poor premorbids under the censure condition showed more reminiscence than the other groups. Just as significant, though not commented on, the good premorbids under censure were the only group whose score was negative (avoidance?). Rodnick and Garmezy state later in their article that a flaw was found in the design of Bleke's list which caused subjects who were stereotypic in their movements to have higher scores than those who were variable. Thus they now consider Bleke's results to be equivocal.

An experiment by Alvarez, which is unpublished, is also reported by Rodnick and Garmezy (42). The dependent variable was shifts in preference judgments as a measure of aversion toward previously neutral stimuli which had been associated with censure. Good and poor premorbids and normals ranked six pictures in terms of preference. The four of the six which were not ranked highest or lowest were assumed to be neutral. Two of these four were then associated with "WRONG" and two with "RIGHT". Then rankings of the six pictures in terms of preference were again made. Results were that poor premorbids

showed significant decrements in preference for the censured photographs and did not react as effectively to the "rewarded" photos as goods and normals. The authors interpret this second result as generalization of aversive tendencies among the poor premorbids. However, since the subjects saw the four "neutral" pictures more often than the two extreme ones and there was no control for this variable, it is just as possible to interpret the results in terms of the poor premorbids showing less preference for pictures they have seen more frequently.

In a third experiment by Dunn (14) the schizophrenics were not classified into good and poor premorbids. However, after the experiment was completed, Rodnick and Garmezy made this classification. Three silhouetted scenes depicting a mother and a young boy in a scolding, feeding, and whipping relationship were used along with a control picture of a house and tree. Five variations of each standard picture were made by, for example, varying the position of the mother's arm over a 45° arc. The problem which confronted the subjects was one of discrimination. If the subject thought the comparison picture was the same as the standard, he pulled a lever; if he did not, he pushed the lever. Results of this experiment were that there were no significant differences. However, on the scolding pictures the schizophrenics were less discriminative than the normals which was significant between the 5% and 10%

levels. Dunn believed that in those cases where the relationship with the mother constituted a problem area, the subject tended to perform less adequately on the scolding series. He does not state why this problem area should only be manifested in scolding and not in feeding and whipping pictures. When Rodnick and Garmezy classified Dunn's subjects into good and poor premorbids, they found that the poors tended to discriminate less than the goods. This difference was not significant nor can it be interpreted since not only could it have been due to aversion but also to deficit in discriminative ability and/or indifference on the part of the poor premorbids to the task.

These, then, are the experiments which Rodnick and Garmezy offer in support of their hypothesis that poor premorbids are more sensitive to social censure than good premorbids. However, they also report several studies which are in line with the results of this experiment. An unpublished study by Ussery involved the analysis of TAT stories. He found that the good premorbids were more productive, were more socially and emotionally oriented, and showed more stivings for independence than the poor premorbids. A study by Harris, which is as yet unpublished had the following results: good premorbids tended to underestimate the sizes of mother-child pictures (avoidance?) while poor premorbids tended to overestimate the sizes of all

pictures including a neutral one (approach?). The hypothesis of Rodnick and Garmezy seems to have little evidence to support it and some evidence which is against it.

C. Formulation of the Hypothesis

The essence of this process-reactive concept is that the former represents a chronic schizophrenic illness which becomes progressively more severe, while in the latter, an individual with an apparently satisfactory adjustment "suddenly" becomes psychotic. In dividing a schizophrenic sample according to this concept, two groups are formed:

1. Predominantly process: those patients whose case histories indicate reason for and behavior characteristic of unsatisfactory psychological adjustment over a long period of time.
2. Predominantly reactive: those patients whose case histories indicate a relatively satisfactory psychological adjustment with a mental illness seeming to occur over a short period of time.

It was this difference in length of time during which symptoms are manifested which was regarded as a key variable in this experiment and in the formation of its hypothesis.

Duration of symptoms had been recognized as a probable means of explaining the continuation of maladaptive behavior

long after the individual had been placed in a safe, permissive environment and the conditions which precipitated these symptoms were removed. It was during this length of time that certain changes were postulated to occur in the motivation of the symptomatic behavior. Cameron and Magaret stated:

> "The persistence of regressive behavior, once it has developed, will depend in part upon the persistence of the conditions precipitating it and in part upon the degree to which it satisfies the individual as a way of life or leads to secondary gains. If the conditions responsible for regression last a long time, the regressive pattern are likely to become established through long practice and to be integrated with the rest of a person's organized habitual behavior. And even though these conditions disappear, there is always the possibility that regressive reactions may in themselves prove rewarding (functional autonomy)." (9, p. 225).

Similarly, Tilton attempted to explain the persistence of withdrawn behavior from the framework of elicitation theory. He assumed chronic schizophrenics had a strongly conditioned avoidant attitude and that a strong relaxational pattern elicited approach responses to the safety of withdrawal (49). What is to be noted is again the relevance of the time variable. It is over a long period of time that certain changes were assumed to occur in maladaptive behavior: integration, functional autonomy, or/and a change in direction from escape or avoidance to approach.

If these assumptions were valid, if chronic deviant be-

havior became over-learned, intrinsically satisfying; or/and altered in aim, then it was logical to assume that differences in the character of schizophrenic behavior existed between process and reactives. For since the process pattern of regression and withdrawal is considered to be of long duration whereas the reactive pattern is supposed to occur in a brief period of time, then the above changes which were believed to take place should be found in the process group but not in the reactive. In other words, though the process schizophrenic originally responded to his noxious environment with regressive and withdrawn behavior, as time passed, this behavior either became habitual or/and more elicited by the relaxation and safety it afforded than by existing environmental pressures i.e. it changed from predominantly escape and avoidance to approach.

However the withdrawn and regressed behavior of the reactive schizophrenic is not only of insufficient duration to allow such changes to take place but virtually by the definition of the concept itself, is a response made in adulthood to an environment that is over-whelmingly unbearable i.e. it is predominantly escape and avoidant. Some support for this view was afforded by an experiment by G. F. King, who investigated physiological responsiveness to mecholyl among process and reactives. He found that the process but not the reactives seemed similar to normals in their reactions to the drug. King

explained these results with the assumption that the gradual onset in process schizophrenia allowed these patients to adjust to their psychoses whereas the sudden onset in reactives upset their homeostatic mechanisms. This made it more difficult for the reactives to return to a stage of physiological equilibrium after stimulation with mecholyl than was the case with process patients (30).

On the basis of these considerations, the following hypothesis was proposed for investigation:

1. Schizophrenics who are predominantly reactive will respond to stimuli which are considered to represent areas of frustration, conflict, and/or threat with avoidant responses.

Now if these same stimuli were presented to process schizophrenics, avoidance responses would not be anticipated. Drawing from the previous discussion, this would be expected because the patients have been withdrawing since childhood and thus their withdrawal is probably no longer in response to an environment of frustration, conflict, and/or threat. Implicit in this was the conviction that many of the areas which are noxious for the reactive would be of no consequence to the process. For example, it seemed unlikely that the process schizophrenic should find vocational failures distressing simply because he had never really entered that area with any

high degree of ego-involvement. In addition, there was some experimental evidence to suggest that process schizophrenics would not avoid such stimulation.

As was previously mentioned, DeVault found a smaller GSR-amplitude to TAT-like cards representing dependency, agression, and sex with process than with reactive subjects (13). More evidence became available when it was considered that chronic schizophrenics might be similar to process and acute schizophrenics similar to reactives. A study by Greenberg used undirected or incidental learning as a measure of interest in the environment. He reported that chronic schizophrenics are impaired in undirected learning but that acute schizophrenics are not (20). Garmezy, who worked with acute schizophrenics, found that punishment which consisted of lighting a box marked "WRONG" resulted in the patients having greater difficulty in differentiating a standard auditory stimulus from other comparison stimuli. He interpreted this increased difficulty as a manifestation of avoidance responses (18). However, Lair, working with chronic schizophrenics, found that punishment which consisted of verbal reproof either had no effect on their performance or, in some cases, improved it (34).

Therefore, the following hypothesis was proposed:

2. Schizophrenics who are predominantly process will not avoid stimuli which are considered to represent areas of frustration, conflict, and/or threat.

These two hypotheses may be combined into the single hypothesis which follows:

Schizophrenics who are predominantly reactive will avoid while predominantly process subjects will not avoid stimuli considered to represent areas of frustration, conflict, and/or threat.

The stimuli were magazine photographs judged as to whether or not they represented such areas. The experimental task, consisted of sorting an ordinary deck of playing cards onto a board divided into quadrants according to certain directions. This was done for eleven trials. On the first trial and on the last three trials, the subject was requested to sort fast. However, during trials 2-8, the subject was told he could sort fast or slow but that he would be shown pictures depending on his speed of sorting. There were two picture conditions. In one, subjects were shown the photographs after each trial they sorted fast; in the other, they saw the pictures after each trial they sorted slow. Avoidance was determined by whether the subject performed so as not to see the pictures.

A control group was shown a light instead of pictures and was divided as above. "Fast" and "slow" were defined as faster than or slower than the time on the preceeding trial. Though normals were not necessary for testing the hypothesis, they were included so that more meaningful comparisons could be made.

Procedure

A. Main Experiment:

A running-matching technique was employed to equate the experimental groups with respect to age, IQ estimate, and length of hospitalization. Following an introduction, the subject was taken to a room and seated before an empty table. An interview was conducted in which the patient's illness was discussed and an effort made to put him at ease. With normal subjects, this phase lasted about five minutes. With schizophrenics, it lasted about twenty minutes and had additional purposes; to determine if the patient were too confused to participate in the experiment; to obtain amplification and clarification of case history material; to determine if there might be errors or omissions in the records. After the interview was completed, the Vocabulary Scale of the Wechsler-Bellevue, Form I, was introduced in the following manner:

> I have some words that I'd like to ask you and I'd like you to tell me what they mean. Some of the words are very difficult and nobody gets them all. Just do the best you can and don't be discouraged if you miss a few. Do you understand?

When the test was finished, a twenty-two inches square board was placed on the table before the subject. This board was divided into quadrants each of which was clearly marked by a symbol of a suit of cards: clubs, hearts, diamonds, or

spades. The subject was then handed an ordinary deck of cards and told the following:

> You will notice that this board is divided into four parts; hearts, diamonds, clubs, and spades. When I say 'GO', turn over the top card of the deck and throw it face up into the upper left hand section. Notice the suit of that card, find the part of the board that's the same suit, and then throw the next card into it. The suit of your last card tells you where the next card goes. For example, if the first card that you throw into the upper left hand section is a spade, then your next card goes into the spade section, and if that is a diamond, then your next card goes into the diamond section, and so on. If a card is the same suit as the section into which it's thrown, then the next card is thrown into that same section, and that's continued until a new suit turns up. I want you to work as fast as possible and to correct any mistakes you make. Do you understand? (If he did not, a brief demonstration was given.) Go!

After the first trial, an effort was made to equate the groups with respect to initial sorting time but this consideration was secondary to age, IQ estimate, and length of hospitalization. The subject was then assigned to one of the four conditions.

Fast-Picture: In this condition, the subject was told:

> From now on you're going to sort the cards seven more times. You can sort them fast or slow. It's up to you. Whenever you sort them fast, I'll show you some pictures of people and things we've often seen in the world. Whenever you sort them slow, I won't show you the pictures. In other words, you can sort the cards fast or slow. It makes no difference to me. But if you sort the cards fast, I'll show you the pictures and, if you sort the cards slow, I won't. Do you understand? Go!

Slow-Picture: Here the subject was told that he would

be shown pictures after trials during which he sorted the cards slowly but would not be shown pictures after trials during which he sorted fast.

Fast-Light: The subject was told that a light would be turned on momentarily after he sorted the cards fast but would not be turned on after he sorted the cards slowly.

Slow-Light: In this condition, the subject was told that a light would be turned on momentarily after he sorted the cards slowly but would not be turned on after he sorted the cards fast. After the eigth trial, all subjects were given these directions:

> From now on I'm not going to show you any more pictures (lights). I want you to sort the cards three more times as fast as you can. Do you understand? Go!

Timing was done by a stopwatch held by the Experimenter and recorded to the nearest second. It began when the first card was thrown onto the board and ended when the last card had been correctly sorted. There was an inter-trial interval of thirty seconds during which the Experimenter shuffled the cards and the subject rested. During this interval and depending upon the experimental condition and the subject's performance, five pictures or a light was shown. One picture at a time was given to the subject who was told to simply look at it and hand it back when finished; the light was turned on for about five seconds. In the case of the same sorting time on two consecutive trials,

the subject was shown the pictures or light. The entire procedure was completed in one session. At its conclusion, the subject was thanked, reassured about his performance and escorted back to his ward.

B. Sub-Experiment:

Because the pictures which constituted the first few sets of photos represented some area of frustration, conflict, and/or threat, it was necessary to determine whether subjects were responding to these pictures in particular or to pictures in general. The sub-experiment was designed to provide an answer to this question.

Three types of pictures were obtained; eleven were photos of people judged threatening, eleven were photos of people judged non-threatening, and eleven were photos of inanimate objects which were considered non-threatening. They were combined into one pile of thirty-three pictures.

One month after the main experiment, ten process and ten reactive subjects who performed under the light conditions were selected. Each subject was seated before a table on which was the pile of pictures face-down. The Experimenter sat to the side and gave these instructions:

> I have a pile of pictures that I'd like you to just look at. You can look at any picture for as long as you like. When you're through looking at a picture just put it down and go on to the next one. Do you understand? O! K! Begin.

As soon as the subject turned over the first picture, the Experimenter started two stopwatches. With the first, the time spent looking at each picture was obtained and recorded to the nearest second. If the subject had not completed looking at all the pictures, when the second registered three minutes, he was told to stop. The subject was then asked to arrange the pictures that he had seen into piles of "Like" and "Dislike". He was then thanked and returned to his ward.

SELECTION OF PICTURES AND LIGHT

A. Main Experiment:

Thirty-six pictures, half of which were in color and half of which were in black and white, were selected from a number of popular magazines: Time, Life, Look, Sports Illustrated, and The Saturday Evening Post. All were photographs, with the majority depicting one or more individuals whose faces were clearly visible. These were mounted on $8\frac{1}{2}$ x 12 inch manila paper and then presented to five judges. Three of the judges were clinical psychologists employed on the staff of a Veteran's Administration mental hospital; the remaining two were clinical trainees with a minimum of three year's experience working with psychotic groups. Their instructions were to examine each of the 36 pictures and note which, if any, in their opinion represented an area of frustration, conflict, and/or threat. For each picture so noted they were to indicate what area they considered represented.

All five agreed on 11 photos as representing some area and on 7 as representing none; four judges agreed 9 other pictures represented an area; two judges agreed on 3 pictures; there were four pictures where only one judge felt an area of frustration, conflict, and/or threat was represented. Five pictures were shown after each trial where subjects performed

according to the directions specified in the experiment. The 11 photos agreed upon by all five judges were shown first. They were considered to represent a wide variety of areas: pain, sex, striving for achievement, death, homosexuality, inadequacy. Then followed the 9 pictures agreed upon by four judges. Thus there were four sets of five pictures each of which were considered by at least four of the five judges to represent an area of frustration, conflict, and/or threat. Since there were only seven opportunities for subjects to see the photographs, the four sets were considered sufficient to produce avoidant responses if avoidance were going to be produced. The remaining sets were composed of the remaining 16 pictures with the 7 photos agreed upon by all judges as non-representative of any area comprising the next-to-last and last set.

It was desired that the light to be used in the experiment should be as innocuous as possible to avoid the possibility that the patients might be emotionally affected by it and yet be able to serve the purpose of a signal that could be easily seen. This was accomplished by using a flashlight from which the reflector head was removed so that the bulb was exposed. A no. 14 bulb was used powered by two Eveready no. 950 size D batteries. The bulb was made of transparent, uncolored glass and cast a diffuse light. It should be mentioned that the three process subjects who dropped out of the experiment once it had begun were all

under one of the two light conditions.

B. Sub-Experiment:

Thirty-three pictures were assembled: eleven were photos of people previously judged representative of an area of frustration, conflict, and/or threat; eleven were photos of people which had been judged as not representative of an area; eleven were photos also selected from popular magazines and depicted inanimate objects. Approximately half of the pictures were in color and half were in black and white. The pictures were arranged in groups of three with a threatening, non-threatening, and inanimate photo in each group. They were also arranged so that, in general, a colored picture was followed by one in black and white and vice-versa. All pictures were similarly mounted on manila cardboard and the groups of three were placed in one pile.

SELECTION OF SUBJECTS

Before subjects were selected for the experiment, a reliability check was conducted on the Experimenter's ability to differentiate between process and reactives using 18 of the 24 criteria of Kantor, Wallner, and Winder (29; See Table 1). Those criteria eliminated were concerned with course of hospital treatment and other areas which were difficult or impossible to evaluate.

Fourteen case histories of schizophrenic patients were selected at random from the records of a ward which would furnish subjects for the experiment. On the basis of the case history each of the patients was classified depending on whether the majority of the criteria he satisfied was process or reactive. According to the Experimenter's classifications, there were eight process and six reactives in the sample. These case histories were then presented to three judges who were furnished with copies of the evaluation criteria. Each of the judges was a clinical psychology intern with at least one year's experience working with psychotic groups and each had some familiarity with the process-reactive concept.

The judges sat in different parts of a room with the Experimenter present to answer any questions that might arise and to distribute the case histories. All classifications were made

during one session to insure that inter-judge communication would not affect the categorizations. In addition, no communication between judges was permitted during the session. The Experimenter informed them that though there was an even number of case histories, there need not be an even number of patients in the two categories. He therefore cautioned that they judge each case individually. Analysis of these diagnostic judgments indicated that only one judge disagreed with the Experimenter in his categorization of one out of the fourteen patients. This obviously indicated a sufficient degree of reliability for experimental purposes.

TABLE 1

Criteria For Selection Of Process and Reactives

Process	Reactive
Birth To Fifth Year	
1. Early psychological trauma.	1. Good psychological history.
2. Severe or long physical illness.	2. Good physical health.
3. Odd member of family.	3. Normal member of family.
Fifth Year To Adolescence	
1. Difficulties at school.	1. Well adjusted at school.
2. Introverted behavior trends and interests.	2. Extroverted behavior trends and interests.
3. Pathological siblings.	3. Normal siblings.
4. Overprotective or rejecting mother.	4. Accepting mother.
5. Rejecting father.	5. Accepting father.
Adolescence To Adulthood	
1. Unsatisfactory heterosexual adjustment.	1. Satisfactory heterosexual adjustment.
2. Insidious onset of psychosis.	2. Sudden onset of psychosis.
Adulthood	
1. Clash between culture and environment.	1. Harmony between culture and environment.
2. Little alcohol capacity.	2. Much alcohol capacity.
3. Failures under stress.	3. Successes despite stress.
4. Massive paranoia	4. Minor paranoid trends.
5. Loss of decency.	5. Retention of decency.
6. No manic-depressive component.	6. Manic-depressive component.
7. Somatic delusions.	7. No somatic delusions.
8. Awareness of change in self.	8. No sensation of change.

Selection of Subjects (Continued)

The experimental group consisted of 72 male hospitalized veterans diagnosed as schizophrenic by the psychiatric staff of the hospital. Thirty-six of these patients were considered by the Experimenter as process and thirty-six as reactive schizophrenics. None of the patients was above the age of forty years and in all cases the present hospitalization was less than one year. There were 44 patients with no records of a previous hospitalization for schizophrenia; of these, 21 were considered reactive and 23 were considered process. Those patients whose records indicated previous mental hospitalization were required to have spent at least one year out of the hospital from the date of their last discharge to the date of their present admission. Each patient was required to be of at least dull normal intelligence as estimated by his performance on the Vocabulary Scale of the Wechsler-Bellevue, Form I.

There were 36 "normal" male hospitalized veternas in a group used for comparison purposes. None of these patients was diagnosed as or considered schizophrenic and none had been previously hospitalized for any mental illness. The same requirements with respect to age, IQ estimate, and length of hospitalization were in effect for this group as for the experimental group. In addition, there were several requirements which were peculiar to this sample: none of the patients was bedfast;

none complained of being in physical pain at the time of the experiment; all acknowledged at least superficially, that they understood they were being seen for research purposes. This last point deserves some clarification.

In the selection of the schizophrenic sample an attempt was made to obtain subjects as acutely ill as possible. For this reason, 46 of the 72 mentally ill patients had been in the hospital less than a month and the maximum length of hospitalization was ten months. Many of these patients could not appreciate nor did any of them request the reason for their being seen. Therefore, the Experimenter simply went to the ward, introduced himself to the patient, and stated that he would like to see him for a few minutes. No further explanation was given nor was any needed to obtain cooperation.

With the "normals", the hospital staff felt some explanation should be given to avoid needless anxiety, possible ridicule of subjects by other patients, and to prevent misunderstandings e. g., the patient believing that he had taken some standardized psychological test. Therefore, each normal patient was approached in the following manner:

> Hello, Mr. _____, my name is Mr. _____. I'm a psychologist from the VA Hospital in Battle Creek. I'm doing some research out there with patients who are mentally ill. As part of this research I have to see people who are also veterans and in the hospital and about the same age but who aren't mentally ill. You seem to fit the bill and I wonder if you'd help me out. It will only take half an hour and I'd certainly appreciate it.

Unintentionally, but fortunately, this introduction served as a rather crude screening device. Three "normal" patients replied, in effect, that they were not being fooled and knew the real reason for their being seen by a psychologist; of course none of the three were included in the sample.

Within the "normal" sample, a proportionate number of patients were selected who had been in the hospital less than a month: 23 out of the 36. The maximum length of hospitalization was about 11 months. Thirteen of the patients were hospitalized for pulmonary tuberculosis and were in the final phase of treatment; the remainder had a variety of physical ills ranging from cancer to athlete's feet. Among the 36 reactive schizophrenics, 25 were diagnosed as undifferentiated, 8 as paranoid, 2 as catatonic, and 1 as schizo-affective; among the 36 process schizophrenics, 25 were diagnosed as undifferentiated, 8 as paranoid, 2 as catatonic, and 1 as simple. As can be seen, an effort was made to have the two schizophrenic groups similar in diagnostic composition.

In obtaining the 36 reactive subjects, 41 possible subjects were seen: 3 were too confused to cooperate in the experiment and 2 had IQ estimates which were too low. In obtaining the 36 process subjects, 48 possible subjects were seen: 6 showed no interest in doing the experiment or in attending to instructions, 3 lost interest in the experiment after it had begun

and refused to continue it; 2 were too confused to cooperate, and 1 had an IQ estimate which was too low. In obtaining the 36 "normal" subjects, 43 possible subjects were seen: 3 believed the experiment was a ruse to obtain other information, 2 had IQ estimates which were too low, and 1 complained of severe pain while another refused to continue after the experiment had begun. Therefore a total of 132 patients were seen in order to obtain the required 108.

The process and reactive samples may be further described with reference to some of the Kantor, Wallner, and Winder criteria (29) which were employed in selecting and classifying the subjects. Ten of the process and none of the reactives had pathological siblings ("Pathological" was defined as a period of mental hospitalization.) Nine of the process and none of the reactives had poor early health. Eighteen of the process and nine of the reactives had some traumatic incident during the first five years of their childhoods. None of the process and eighteen of the reactives had some traumatic incident which occurred shortly before their hospitalization: 4 of these were deaths; 4 were divorces or separations; the remainder were a variety e. g., being beaten in a Marine stockade, the announcement by a step-mother that she planned to remarry, the discovery by a patient that the woman he thought was his sister was really his mother and the woman he thought was his mother was really

his grandmother.

There were other indications of the validity of the classifications than the criteria employed in making them. Thirteen of the process patients but none of the reactives had pathological parents. In addition, one month following the completion of the experiment, seven reactives and only two process subjects had been discharged from the hospital. At that time the marital status of the subjects was investigated and it was found that 17 of 29 reactives were married or had been married while this was true for only 3 out of 31 process. Chi square equalled 14.01 which was significant at less than the 1% level. Even when it was assumed that the remainder of the 36 reactives whose marital status could not be determined were not married while the remainder of the process were married, chi square equalled 3.65 which was significant at the 7% level. Such a difference would be expected since it would not be likely that someone who had been withdrawing from childhood would either desire marriage or be considered desirable for marriage. It would appear then, that male hospitalized veterans who are schizophrenic and married could be considered reactive with little chance of being in error and that this might serve as a guide for rapid group selection.

EXPERIMENTAL PREDICTIONS

The predictions specific to the procedures of the experiment were logically derived from the general hypothesis which is restated as follows:

Schizophrenics who are predominantly reactive will avoid while predominantly process schizophrenics will not avoid pictures which are considered to represent areas of frustration, conflict, and/or threat.

This hypothesis was evaluated by the following predictions:

1. If reactive subjects are informed that they will see pictures after each trial during which they sort cards rapidly, they will sort slowly.
2. If reactive subjects are informed that they will see pictures after each trial during which they sort cards slowly, they will sort rapidly.

In other words, reactives will sort the cards so as not to see the pictures and thus will perform differently under the two picture conditions.

3. Reactive subjects who are informed that they will see a light after each trial during which they sort cards rapidly will perform the same as reactive subjects who are informed that they will see a light after each trial during which they sort cards slowly.

4. Process subjects will not sort the cards so as to avoid seeing the pictures. They will either:
   a. Perform the same under the four experimental conditions, i.e., be indifferent to the pictures or
   b. Perform the same under the two light conditions. If informed that they will see pictures after each trial in which they sort cards rapidly, they will sort rapidly. If informed that they will see pictures after each trial in which they sort cards slowly, they will sort slowly, i.e., they will approach seeing the pictures.

If threatening, non-threatening, and inanimate types of pictures are presented to process and reactive subjects:

5. Reactive subjects will look at non-threatening and inanimate pictures longer than at threatening pictures.
6. There will be no significant differences in the times taken by process subjects to look at threatening, non-threatening, and inanimate pictures.

No predictions were made with respect to the normal subjects who were included solely to make the comparisons more meaningful.

RESULTS

I. Main Experiment

Though the four experimental conditions were in effect only on trials 2-8, the data are presented as if these treatments were operative throughout the experiment. This was done to give an idea of the differences which existed between the groups before trial 2 and after trial 8. As was intended, the P (process), R (reactive), and N (normals) who participated under the conditions FP (Fast-Picture), SP (Slow-Picture), FL (Fast-Light), and SL (Slow-Light) did not differ significantly with respect to age, IQ estimates, and length of hospitalization (See Table 2). In addition, the groups did not differ significantly with respect to mean sorting times or variances on trial 1 (See Appendix, Table 14). Thus the experiment began with 12 groups about the same in age, intelligence, period of hospitalization, and speed of sorting cards.

A. Prediction 1

This prediction states that reactives under FP will sort the cards slowly. As can be seen in Figure 1, the reactives sorted slower under FP than under any other condition. While this was as expected, it was necessary to determine whether or not it was statistically significant.

As a first step in this determination, the mean sorting times for each subject were computed for trials 2-8.

TABLE 2

Controlled Variables For The Twelve Groups

	FP (N = 10)		SP (N = 10)		FL (N = 8)		SL (N = 8)	
	Mean	Range	Mean	Range	Mean	Range	Mean	Range
Age								
P	30	22-37	29	21-39	30	23-36	27	22-34
R	30	19-38	28	18-40	30	20-37	30	21-36
N	28	20-36	30	19-37	28	19-37	28	20-37
IQ								
P	104	79-139	114	87-132	108	80-125	104	92-119
R	108	92-117	106	86-120	105	87-120	106	80-132
N	106	76-127	102	76-127	105	92-129	102	80-124
Mos. Hosp.								
P	3	1-10	2	1-6	2	1-7	3	1-8
R	2	1-6	2	1-8	2	1-4	2	1-4
N	4	1-11	3	1-10	4	1-11	2	1-10

An analysis of variance of this data was not permissable because there was heterogeniety of variance (Fmax. = 12.42, $P < .05$; See Table 3).

TABLE 3

Mean Sorting Time Per Trial During Trials 2 Through 8

	FP (N = 10)		SP (N = 10)		FL (N = 8)		SL (N = 8)	
	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
R	114	48.4	101	41.8	91	20.9	89	21.7
P	96	37.6	138	52.6	143	73.6	124	67.2
N	76	44.0	83	25.8	90	39.0	82	25.2

Therefore, a square root transformation of the data (15) was performed. The analysis of variance of the transformed data resulted in a significant Between Groups F ($F = 8.00$, $P < .01$), a non-significant Between Conditions F, and, of much importance, a non-significant Groups X Conditions Interaction (See Appendix, Tables 17 and 18). Thus, although the reactives under FP sorted slowly, their mean sorting time under this condition was not significantly greater than the reactive means under the other three conditions. However, as subsequent analyses will show, this prediction will be well supported.

B. Prediction 2

It was predicted that reactives under SP would sort

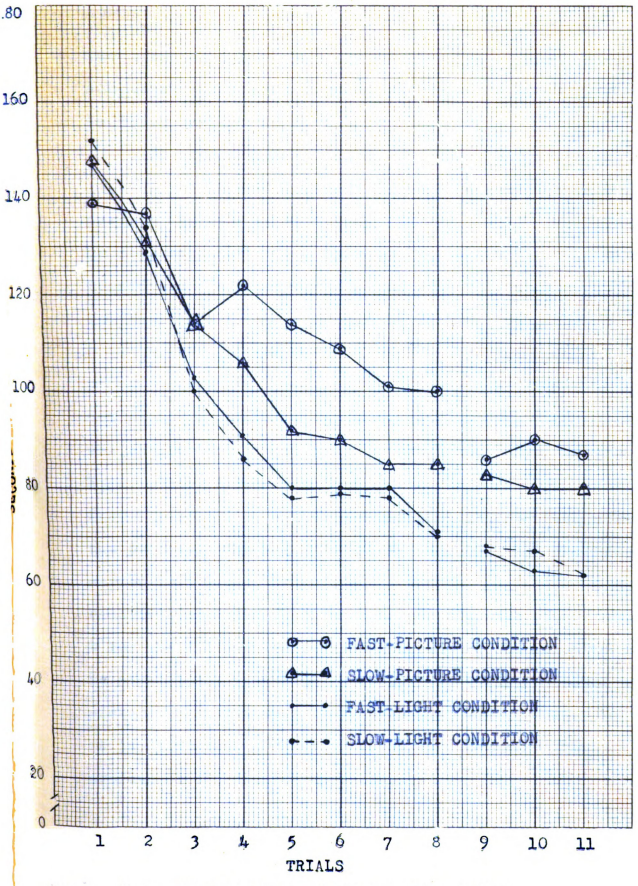

Fig.1 Mean sorting times of the reactive group.

the cards rapidly. They did (See Fig. 1). Note that these subjects consistently reduced their sorting times from trial to trial until trial 8.

C. Prediction 3

It was predicted that reactives under FL would perform the same as reactives under SL. In Figure 1 it can be seen that the curves for these two groups are virtually identical. Thus, as was expected, the reactives were indifferent to the light.

D. Prediction 4

It was predicted that the process subjects would not avoid the pictures. A measure of avoidance or approach was obtained by simply counting the number of times that the Experimenter showed pictures to the subjects. It was expected that the reactives would be shown the pictures less often than the process. The mean number of times that the process subjects sorted in a manner which enabled them to see pictures was 3.65; reactives saw them 2.7 times and normals, 3.4 times. Only the t for the differences between the process and reactive means is significant ($t = 2.50$, $P < .05$). Thus the reactives saw pictures significantly less often than the process. However, it is difficult to determine whether this meant that the reactives avoided or the process approached.

This ambiguity seemed resolved by comparing the number of times each group was shown the pictures with the number of times they were shown the light. As was mentioned, the reactives were indifferent to the light. It appears that the same was true of the process subjects since they sorted slowly under both FL and SL (See Fig. 2). Now if subjects were indifferent to the pictures as well as to the light, it would be expected that they would perform in such a manner as to be shown pictures no more or no less often than the light (See Table 4).

TABLE 4

Mean Number of Times Groups Saw Pictures or Light

	FP	SP	FL	SL
P	4.7	2.6	4.0	3.2
R	3.5	1.9	5.2	1.8
N	4.9	1.9	4.8	1.4

Neither the process nor the normals show any significant differences when their frequencies under FP (or SP) are compared with their frequencies under FL (or SL). The process, then, by this measure do not seem to evidence avoidance or approach. Reactives under the SP condition saw pictures no more often than reactives under the SL condition saw lights. This was to be expected, for the following reasons: there is a physiological

limit to the speed of sorting, avoidance under SP was to be reflected in sorting rapidly, the reactives under both light conditions tended to sort fast. However, under the FP conditions, where avoidance was to be reflected in sorting slowly, the reactives saw significantly fewer pictures than they did lights under FL ($t=7.38$, $P<.01$). Thus the reactives saw pictures less often than would have been expected from their manner of sorting under the light condition which gives clear indication of avoidance, as would follow from Prediction 1.

Two alternative predictions were made with respect to the performance of the process subjects: either they would be indifferent to (Prediction 4a) or approach (Prediction 4b) the pictures. Although the differences between the mean sorting times are not significant, the results are more in accord with the interpretation that they approached than that they were indifferent. In Figure 2, it can be seen that the process subjects sorted rapidly under FP, slowly under SP, and slowly under FL and SL which is in keeping with Prediction 4b. It should also be noted that under the FP condition, the process subjects sorted faster than the reactives (See Fig. 3). Again, subsequent analyses will tend to support the approach interpretation.

E. Other Results Relevant to the Hypothesis

Additional evidence that the pictures influenced the performance of the reactives comes when the heterogeniety of variance on trials 2-8 is analyzed. It was found that neither the process nor the normals were significantly more

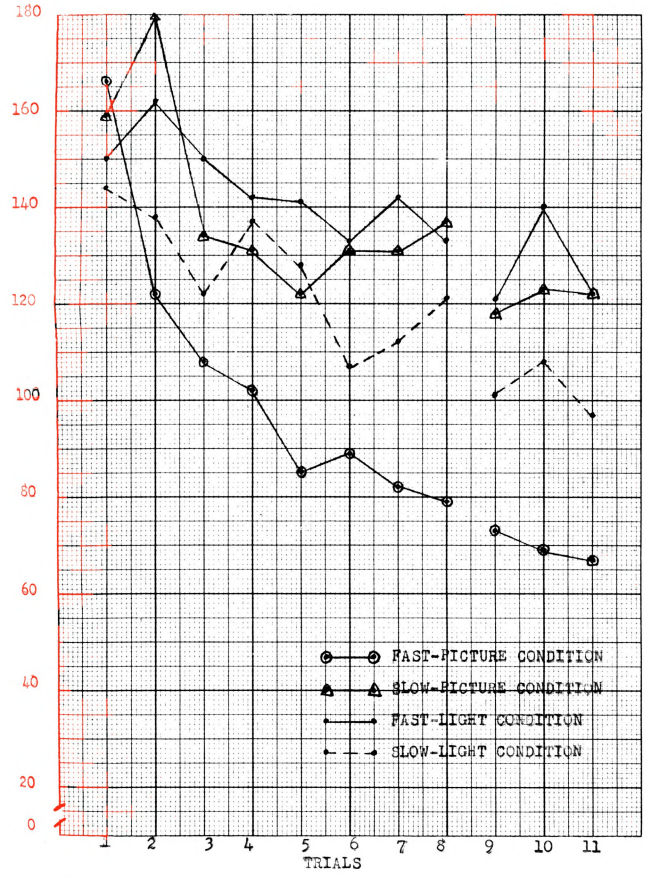

Fig. 2. Mean sorting times of the process group.

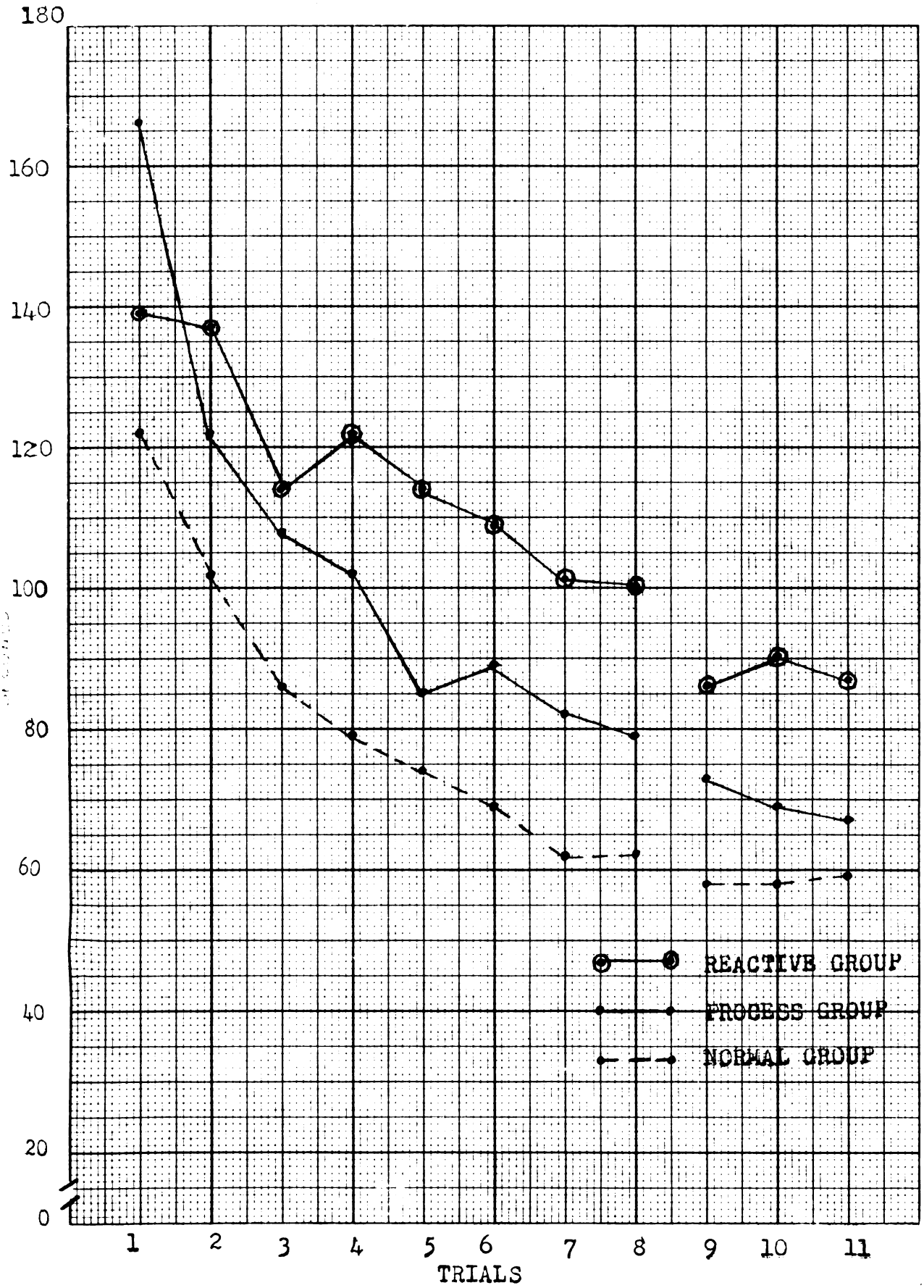

Fig. 3. Mean sorting times under the Fast-Picture condition.

variable than reactives under either FL or SL (F's=5.38 and 4.98, respectively, P<.05). Reactives under SP also tended to be significantly more variable than reactives under either FL or SL (F's= 4.01 and 3.71, respectively, P<.10). Although no prediction was made with regard to variability, the fact that reactives show increased variability, i.e., a performance effect, under the picture conditions is in accord with Predictions 1 and 2. Conversely, the process were less variable under FP than under the light conditions at the 10% level of significance (F's= 3.82 and 3.12).

Let us look at another analysis relevant to Prediction 1. Although there were no significant differences between the mean sorting times on trials 2-8 for the twelve groups, the performance of the reactives under FP had a marked influence on the results. . After the Groups X Conditions Interaction was found not to be significant, the mean sorting times and standard deviations on trials 2-8 for each group were pooled, (21, See Table 5).

TABLE 5

Pooled Mean Sorting Time Per Trial During Trials 2 Through 8

	Reactives (N = 36)	Process (N = 36)	Normals (N = 36)
Mean	100	124	82
S.D.	37.9	61.0	35.0

Several tests were then conducted to determine which differ-

ences between the means were responsible for the significant Between Groups F ratio.

Since there is heterogeniety of variance in the non-transformed data and an equal number of subjects in each group, the table of t was entered with half the number of degrees of freedom that would ordinarily have been available (15). The t ratio between process and normals was 3.719 ($P<.01$); that between reactives and normals was 2.065 ($P<.05$); that between process and reactives was 1.978 ($P>.05<.10$). These results indicate that the normals sorted the cards significantly faster than either the reactives or the process but that the two schizophrenic groups barely approached significance between their mean sorting times.

However, since it was predicted that the reactives under FP would sort slowly (Prediction 1), their times were removed to see what effect this would have upon the interpretation of the data. The reactive mean and standard deviation were now 94 and 31.8, respectively. Again t tests were conducted using the formula recommended by Edwards (15) when there is heterogeniety of variance. The t ratio between normals and reactives becomes 1.362 and is not significant ($P>.10$). However, the t between process and reactives now becomes 2.260 which is clearly significant ($P<.05$).

To summarize, when all four reactive conditions were pooled, the results indicate that the reactives sorted about as slowly as the process subjects and significantly slower than the normals. When the times of the reactives under FP

were removed from the pooled data, the results indicate that the reactives sorted about as fast as the normals and significantly faster than the process. In view of the importance of the reactive FP condition, it was wondered why the Groups X Conditions Interaction was not significant.

There are two reasons which may explain why this Interaction was not significant: the relatively small number of subjects in each group and the hign variabilities. To test the validity of this explanation, it was decided to compare the mean sorting times of subjects on trials 9-11. Variability was less on these trials because there was no longer any significant amount of learning taking place (Between Trials 2-8 $F = 56.29$, $P < .01$; Between Trials 9-11 $F = 1.63$, $P > .05$) and because everyone was supposedly sorting fast. Reactive subjects who had formerly sorted under FP were compared with reactive subjects who had formerly sorted under the two light conditions. A similar comparison was made with the process subjects (See Table 6). The significant differences which were found within each of the two

TABLE 6

Mean Sorting Time Per Trial During Trials 9-11

	"FP" (N =10)	"FL" & "SL" (N = 16)	t
R	88	65	2.19; $P < .05$
P	70	115	2.30; $P < .05$

schizophrenic groups between "FP" and "FL" and "SL" indicate

that the lack of a significant Groups X Conditions Interaction was due more to the variability and small N's of the groups and less to the absence of any effect of the conditions. Assuming that the effects established on trials 2-8 may be in part permanent or learned, here again is evidence in support of Prediction 1.

F. Incidental Results

Of particular interest is that the normals sort rapidly under all four conditions (See Fig. 4). This indicates not only that they were indifferent to the pictures and light but also that they were motivated to do well despite the fact that they were free to sort slowly. Contrast this with the curves of the reactives who sort slowly under FP and rapidly under the other three conditions (See Fig. 1) or with the process subjects who sort rapidly under FP and slowly under the other three conditions (See Fig. 2). Both the reactives and process seemed indifferent to the light, i.e., reactive subjects performed the same under both light conditions and so did the process subjects. Yet the reactives sorted rapidly while the process did not which would indicate that the reactives, unlike their process brethren, came equipped with their own motivation when none was explicit in the experimental procedure.

Another indication that the process and reactives were drawn from different population was evidenced in the heterogeniety of variance found on trials 2-8. Since no

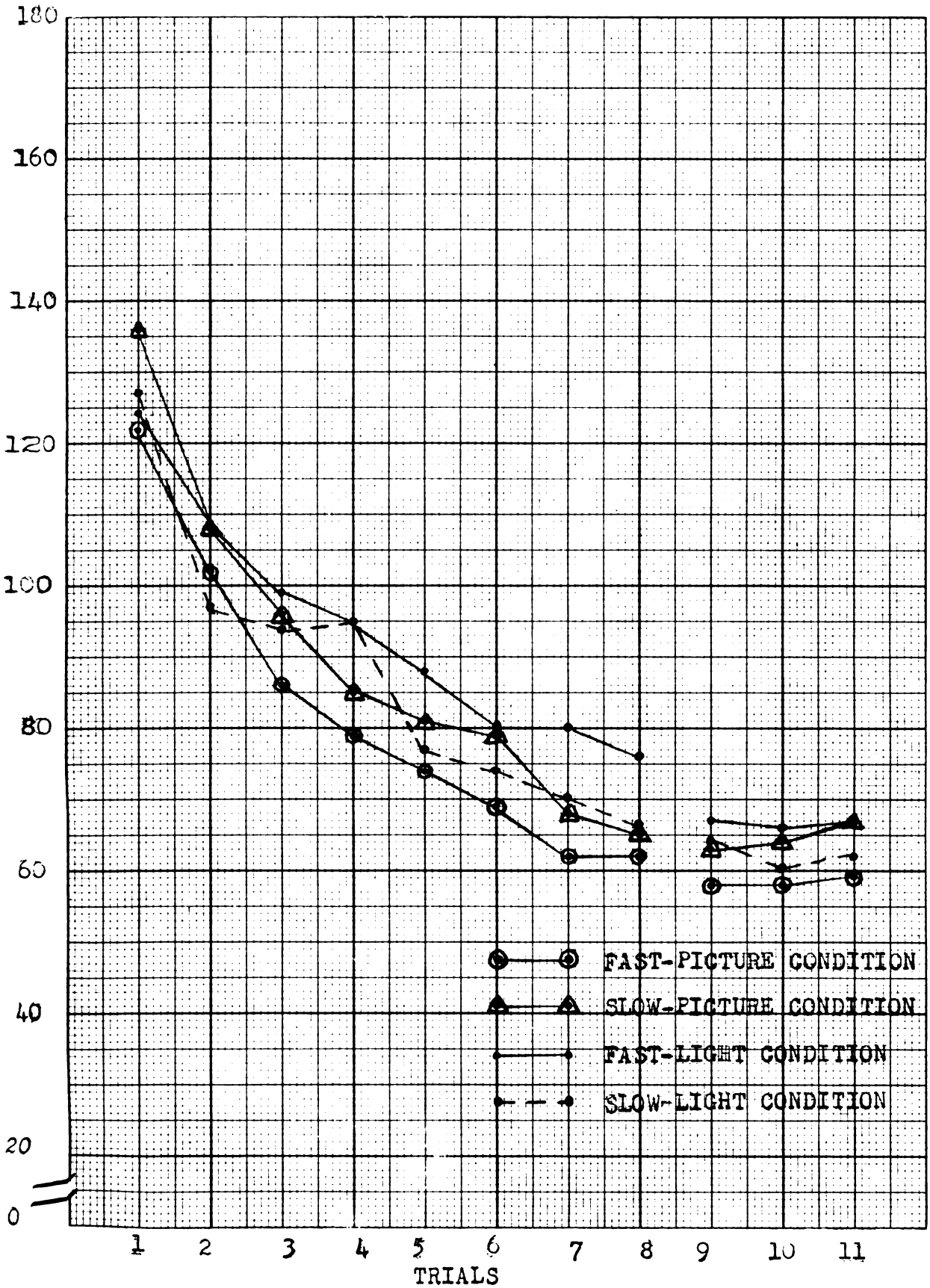

Fig. 4. Mean sorting times of the normal group.

predictions had been made about variability, two-tailed tests were used and the tabled probability levels of F doubled. There was no significant difference between the variability of the normals and reactives (F = 1.16). However, process subjects were significantly more variable than either reactives (F = 2.59, $P < .02$) or normals (F = 3.03, $P < .02$).

On trials 9-11, the process group was significantly more variable than the reactives (F = 2.095, $P < .05$) and the normals (F = 9.647, $P < .01$). In addition, the reactives were significantly more variable than the normals (F = 3.266, $P < .01$). The mean sorting times on trials 9-11, which are presented in Table 7, also differed significantly (Reactives vs. Process, t = 2.830; Reactives vs. Normals, t = 2.137; Process vs. Normals, t = 4.328).

Table 7

Pooled Mean Sorting Time Per Trial During Trials 9-11

	Reactives (N = 36)	Process (N = 36)	Normals (N = 36)
Mean	76	104	63
S. D.	31.8	54.7	17.6

To summarize the results on these last three trials, the normals as a group sorted the cards significantly faster and were significantly less variable than the schizophrenic sample but within the schizophrenic sample, the subjects considered reactive sorted the cards significantly faster and

were significantly less variable than the subjects considered process.

II. Sub-Experiment

The purpose of the sub-experiment was to determine whether reactives were responding to the pictures which represented an area of frustration, conflict, and/or threat in particular or to pictures in general. Those subjects employed do not differ significantly with respect to age, IQ estimate, and length of hospitalization (See Table 8).

TABLE 8

Controlled Variables in the Sub-Experiment

	Mean Age	Mean IQ	Mean Mos. Hospitalized	No. Schiz. Undif.
P (N = 10)	29	106	5	7
R (N = 10)	30	105	5	6

In describing the results, the following designations will be used: T stands for pictures of people considered to represent areas of frustration, conflict, and/or threat; NT for pictures of people not so considered; I for pictures of inanimate objects.

A. Prediction 5

It was predicted that reactives would look at NT and I pictures longer than at T pictures. The mean time that each subject looked at each type of picture was computed. Sign tests were then employed. With an N of ten, 1.25 or

fewer minus signs among the ten differences were needed for significance at the 2½% level using a one-tailed test. Nine of the reactives looked at NT pictures longer than at T. All ten reactives looked at I pictures longer than at T. Both of these positive effects were significant and in the expected direction. On the other hand, only six of the ten reactives looked longer at I pictures than at NT (not significant). These results do not necessarily indicate that reactives avoid only T pictures (since, as seen below, the process spend longer time with all photos)but that reactives avoid T more than NT and I pictures, i.e., the avoidance of the reactives is not wholly generalized.

B. Prediction 6

It was predicted that the process subjects would look at the three types of pictures for about the same length of time. Among the ten process subjects, five looked at T pictures longer than at NT, six looked at I pictures longer than at T, and five looked at I longer than at NT. In short, for the process subjects, as was predicted, there are no significant differences between the times looked at threatening, non-threatening, and inanimate pictures. These results indicate that the process subjects would have probably performed about the same in the Main Experiment regardless of the type of picture that was used.

C. Other Results Relevant To the Hypothesis

While the results seem to point clearly to the conclusion that the reactives avoid while the process do not,

it is more difficult to determine whether the process were indifferent to (Prediction 4a) or approached the pictures (Prediction 4b).

Some help in evaluating this issue is afforded by these final results. The mean time the process group looked at the pictures was significantly longer than the mean time of the reactives ($t = 3.25$; $P < .01$; See Table 9). Run tests were then used to determine if the differences between the groups with respect to the times they looked at any one type of picture were significant. The statistic derived by this non-parametric technique is C, which in this case would have to equal -1.645 for significance at the 5% level using a two-tailed test. With T pictures, $C = -3.21$; with NT pictures, $C = -1.83$; with I pictures, $C = -1.83$. Thus the process group looked at the pictures significantly longer than the reactives and differed significantly from the reactives in the times they looked at each of the three types of pictures.

It might be argued that the above differences are a reflection of generally slow performance by process subjects. This is a point which cannot be lightly dismissed. However, evidence that the process subjects may have approached the pictures includes: (1) their learning curves; (2) the fact that the subjects who sorted under FP were significantly faster on trials 9-11 than the subjects who sorted under the light conditions; and (3) observations that these subjects did seem motivated under the picture

conditions.

TABLE 9

Seconds Spent Looking At The Three Types of Pictures

	T Mean	NT Mean	I Mean	TOTAL Mean
P.	6.8	7.8	6.7	7.1
R.	3.2	4.2	4.4	3.9

D. Incidental Results

As an afterthought, subjects were required to sort the pictures they had seen into "Like" and "Dislike" categories. This was to determine if there was any relationship between the time a subject looked at a picture and whether or not he expressed a preference for it. Since the categories do not represent genuine dichotomies, point biserial correlations were computed (21). For the reactive group, $r_{pbi} = +.275$ which is not significant. For the process group, $r_{pbi} = +.331$ which is not significant. The difference between these two correlations is also not significant. However, it should be noted that these correlations are in the same direction and about the same size. It is probable that with larger samples, these correlations would be significant. If so, it would indicate some positive relationship between the length of time process and reactives looked at pictures and whether they expressed a "liking" for them.

Discussion

A. Discussion of Results

This experiment began with the hypothesis that reactive subjects would avoid and that process subjects would not avoid stimuli which might be considered to represent areas of frustration, conflict, and/or threat. In the present study, the stimuli were pictures judged as representative of such areas by clinical psychologists while avoidance was manifested by either sorting slowly or rapidly, whichever would cause these pictures not to be shown. The results supported the hypothesis. (See Figs. 1 and 2).

That the reactives did avoid the pictures was indicated not only by their learning curves under the four conditions but by other statistical evidence. They sorted slowly under FP and saw significantly fewer pictures than would have been expected from their performance under the light conditions. In addition, it was found in the Sub-Experiment that this avoidance was not wholly generalized to all pictures since they looked at non-threatening and inanimate photos longer than at threatening ones.

It seems reasonable to assume that the experiment would have been more sensitive in eliciting avoidance if there had been threatening pictures selected specifically for each subject rather than a variety of pictures covering a variety of problem areas. However, such a procedure would have detracted from the generality of the conclusions which

might be drawn. Of concern was not whether the reactive with a mother problem avoids pictures of elderly females but whether the reactive with a mother problem avoids pictures of virtually everyone. The psychotic nature of withdrawal lies in its excess. Thus the pictures were composed mainly of people, both men and women, and were judged to represent a diversity of possible areas of frustration, conflict, and/or threat. That the reactives avoided such pictures was in accord with the clinical conception of schizophrenic withdrawal as being an over-generalized response.

There seemed little doubt from the results that process subjects did not avoid the pictures. Instead the question became whether they were indifferent to or approached them. Though the evidence was somewhat equivocal, it favors the interpretation that they were motivated to see them. During the experiment, it was noted that these subjects took interest in the photographs and a few of them even expressed displeasure when, after trial 8, they were informed that no more pictures would be shown. In contrast, several reactives requested that they be permitted to sort the cards without seeing the pictures.

Normals sorted rapidly under all four conditions which meant that they were relatively indifferent to the photos and light. The schizophrenics were also indifferent to the light. Yet reactives under the light conditions sorted rapidly and were similar to normals in their performance. They showed interest in their sorting time from trial

to trial, verbalized goals as to the time they wished to attain, and inquired as to how their performance compared with that of others. On the other hand, process subjects under the light conditions sorted slowly. They appeared bored or indifferent. Some of them whistled or hummed tunes as they sorted the cards, there were inquiries as to how many trials were left, and, as was mentioned earlier, a few had to be excused from the experiment because they simply refused to continue it.

However, under the FP condition, the process subjects sorted the cards about as fast as any other group. Therefore, the significant difference between the mean sorting times of the process and the reactives and the process and normals is not interpreted as a deficit in psychomotor performance but as a deficit in motivation. It would seem reasonable that such a deficit must be considered in the evaluation of virtually all psychological experiments with schizophrenic groups. Otherwise, experimental differences found between process and reactives and normals which are a reflection of differences in motivation may erroneously be ascribed to differences in the variable being measured. In other words, care must be taken to insure that in experiments, for example, on reaction time or critical flicker fusion, all subjects are about equal in motivation. Though experimental directions may be sufficient to insure the cooperation of normals and reactives, additional incentives

may be required for process subjects. In view of the present results, it seems that an effective incentive is the showing of pictures.

As stated in the Introduction, the experimental hypothesis was based on the assumption that as schizophrenic symptoms persist over long periods of time, changes occur in their motivational basis. Although withdrawal may originally have been in response to a noxious environment, it later may become habitual or motivated by secondary gain. Therefore, the difference in prognosis ascribed to process and reactive schizophrenics need not be explained in terms of organic factors. A psychological explanation is possible in which the duration of the symptoms is a crucial variable.

Another explanation for the present results is based on the assumption that reactives are more prone to experience anxiety than process schizophrenics. Thus when reactives see pictures of the T type, they experience anxiety and avoid whereas process subjects do not become anxious and so do not avoid. However, rather than being contradictory to the interpretation offered above, the two seem compatible. The reactives are more prone to experience anxiety than the process because their withdrawal is still in response to an environment which they perceive as noxious.

Still another explanation may be derived from Selye's views on stress (43). This would probably state that the reactive, who was recently subjected to sudden stress, had

his homeostasis upset whereas the process, who has had longer to adjust, is more stable homeostatically. Though this may be a partial explanation, there are several points which should be considered in its evaluation; the imbalance of homeostasis must be viewed relatively since no living organism ever achieves a state of perfect balance; it is not possible to predict from this whether reactives would approach or avoid noxious stimuli, since in achieving equilibrium, homeostatic mechanisms usually operate in an oscillatory fashion (22); a relatively stable homeostasis would seem to have difficulty in explaining the progressive changes observed in schizophrenics by Arieti (1).

B. Suggestions for Future Research

Since reactive schizophrenics, unlike process, appear to be avoiding a noxious environment, it would be expected that these two groups should respond differently to various psychiatric treatment procedures. Because shock is noxious, it should be less effective than tranquilizers in the treatment of reactives. On the other hand, the very punitive nature of shock may elicit from process patients responses other than their symptoms while it is difficult to see any therapeutic value that might be gained by using tranquilizers. Therefore, it would be expected that shock would be more effective than tranquilizers in the treatment of process schizophrenics. To be tested, recently hospitalized patients would have to be used as subjects.

It would be predicted from the first explanation

offered that reactive schizophrenics who exhibit their symptoms over a long period of time should have a change in motivation similar to process patients. These reactives should not avoid stimuli considered to represent areas of frustration, conflict, and/or threat. This could be tested by using schizophrenics hospitalized for, let us say, at least two years and classified by their case histories into process and reactive. These patients could perform in an experiment similar to the one described here and it would be expected that reactives would sort more or less like the process.

SUMMARY AND CONCLUSIONS

The essential difference between process and reactive schizophrenics is that the former manifests schizoid symtoms from childhood while the latter appears to suddenly become psychotic when an adult. Assuming that changes in motivation occur as behavior persists over long periods of time, such changes would be more likely in process than in reactives. Therefore, while the withdrawal of the reactives may be in response to a noxious environment, the withdrawal of the process may be habitual or motivated by secondary gain. Thus it was hypothesized that reactive subjects would avoid stimuli considered to represent areas of frustration, conflict, and/or threat while process subjects would not.

The stimuli were magazine photographs judged by five clinicians as to whether they represented an area of frustration, conflict, and/or threat. A small flashlight bulb was used as a neutral stimulus for control groups. The experimental task was to sort an ordinary deck of playing cards onto a board divided into quadrants for eleven trials. On trials 1 and 9-11, all subjects were requested to sort rapidly. From trials 2-8, subjects were free to sort fast or slow under one of four conditions: FP subjects were told they would see pictures if they sorted fast; SP subjects were to see pictures if they sorted slowly; FL subjects were to see a light if they sorted fast; SL subjects were to see a light if they sorted slow. Fast and slow were defined in relation to the subject's speed on the preceeding trial. The light

or five pictures were presented after each trial during which the subject had sorted according to directions. The question was whether subjects would sort so as to see or so as not to see the pictures.

Thirty-six male hospitalized veterans diagnosed as schizophrenic were classified as process and thirty-six as reactive. A comparison group consisted of thirty-six male hospitalized veterans not considered psychotic. The three groups were controlled for age, IQ estimates, and length of hospitalization. It was predicted that reactives would sort slowly under FP, rapidly under SP, and perform about the same under the two light conditions (avoidance). For the process group, it was predicted that either they would perform about the same under all four conditions (indifference) or that process subjects would sort rapidly under FP, slowly under SP, and perform about the same under FL and SL (approach). No predictions were made for the normals who were used only to make comparisons more meaningful. The results indicated that the reactives did avoid while the process did not. While it was not conclusively demonstrated whether the process subjects were indifferent to or approached the pictures, the evidence favored the interpretation that the process approached.

Because reactives had only seen pictures considered to represent areas of frustration, conflict, and/or threat, a Sub-Experiment was conducted to determine whether they were

avoiding these pictures in particular or pictures in general. Ten of the reactives and ten of the process who performed under the light conditions were used as subjects. A pile of thirty-three pictures was presented to each subject who was told to simply look at them for as long as he liked. Eleven of these pictures were judged to represent an area of frustration, conflict, and/or threat; eleven were judged not to represent these areas; eleven were photos of inanimate objects. It was predicted that the process subjects would look at the three types of pictures for about the same length of time but that the reactives would look at the threatening pictures less than the other two types. The results of the Sub-Experiment were in accord with these predictions.

Other results indicated that reactives and normals are motivated to perform effectively under conditions where process schizophrenics perform with indifference. Thus the significant differences between the mean sorting times of the three groups were interpreted in terms of differences in motivation rather than as any deficit in psychomotor ability on the part of process or reactives.

The major conclusions with respect to the population employed are:

1. Schizophrenics may be fruitfully divided into process and reactives.
2. Reactive schizophrenics avoid pictures considered to represent areas of frustration,

conflict, and/or threat.

3. Process schizophrenics do not avoid pictures considered to represent areas of frustration, conflict, and/or threat.
4. Duration of symptoms is a crucial variable in the investigation and understanding of schizophrenia.

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APPENDIX

TABLE 10

Description of Experimental Pictures

1. The faces of a middle-aged woman with eyes wide and a younger woman in the background.. (2)

2. An attractive young woman wearing a sweater. (5)*

3. Miners in a pit from an above perspective. (8)

4. A young man holding a bowling ball apparently looking tensely down the alley; another young man and an attractive woman are in the background looking in the same direction. (11)*

5. A man with mouth agape and blood on his head apparently trying to rise from his bed with a nurse in the background restraining him. (14)

6. An attractive young woman posed in an evening gown against a leopard skin; the head of a man facing her is to the left. (20)

7. A negro runner at a track meet grimacing; other runners and a filled stadium are in the background. (17)*

8. A group of four men standing around a blueprint; one of the men is pointing at something in the distnace. (24)

9. Interior of a paper pulp factory; two workers are visible. (33)*

10. A man about to submerge another man in an icy pit of water. (26)

11. A man seems to be talking seriously to a young boy on his lap.

12. Group of weather-beaten tomb stones.*

13. An infant with only the hand and arm of the woman holding the baby visible.

14. Scene of a crowd at a night baseball game. *

15. A semi-clothed young woman on a tiger skin. (28)

16. A collection of adolescents in a teen-canteen.

17. A smiling young man and woman in swim suits running on a beach. *

TABLE 10 (cont.)

18. A group of semi-formally attired men and women at a cocktail party.

19. Ferris wheel and another amusement ride at a carnival. *

20. Group of smiling foreign soldiers gathered about an officer.

21. Interior of a church whose walls are painted with pictures of saints and Christ.*

22. A young man and woman asleep in bed.

23. A waterfront scene with factories and a ship visible.*

24. A baby in a high chair sticking its hand into the mouth of a man. (16)

25. A hunter and his dog walking through snow.*

26. A child about a year old with his hand around a dog.

27. Group of young men and women seated at a barn dance. (25)*

28. Group of adolescents laughing and singing. (10)

29. Group of men and women in a sailboat being splashed with spray. (31)*

30. Family group of four holding puppies. (4)

31. Young woman fishing at a stream in the woods. (7)*

32. Golfers walking down the green. (19)*

33. Men and women around a campfire at night. (23)*

34. Groups of young men and women seated on grass in the Fall. (29)*

35. A country scene; mountains and horses are visible. (1)*

36. Two people fishing from a boat on a placid lake. (13)*

Inanimate Pictures

Squares of pastel colors. (3)*

Expressway intersection with cars. (6)

TABLE 10 (cont.)

Canoes on a beach; palm trees are prominent. (9)*

Scene of a wooded hillside. (12)

Camera on a fishing basket. (15)*

Rooftops in a city. (18)

Pillars with plants on them. (21)*

A guided missile on its launching pad. (22)

An expanse of sky with four jetstreams from a plane. (27)*

A house of colonial type architecture. (30)

Concrete-domed airport terminal. (32).

Note-Numbers in parentheses indicate order of picture in sub-experiment. Asterisk indicates colored photographs. Pictures are numbered in order of their presentation.

TABLE 11

Analysis of Variance: Age

Source	Sum of Squares	d.f.	Mean Square	F
Methods	11.62	3	3.87	.11
Groups	15.50	2	7.75	.22
Interaction	71.00	6	11.83	.33
Within	3433.55	96	35.77	
Total	3531.67	107		

TABLE 12

Analysis of Variance: IQ Estimates

Source	Sum of Squares	d.f.	Mean Square	F
Methods	1147.55	3	382.52	.93
Groups	553.86	2	276.93	.67
Interaction	2428.77	6	404.80	.98
Within	39434.90	96	410.78	
Total	43565.08	107		

TABLE 13

Analysis of Variance: Length of Hospitalization

Source	Sum of Square	d.f.	Mean Square	F
Methods	6.03	3	2.01	.25
Groups	42.06	2	21.03	2.59
Interaction	26.75	6	4.46	.55
Within	780.08	96	8.12	
Total	854.92	107		

TABLE 14

Analysis of Variance Trial 1

Source	Sum of Squares	d.f.	Mean Square	F
Conditions	943.83	3	314.61	.09
Groups	15194.13	2	7597.06	2.09
Interaction	3721.16	6	620.19	.17
Within	348897.65	96	3634.35	
Total	368756.77	107		

TABLE 15

Analysis of Variance of Differences Between Time on Trial 1 & 2

Source	Sum of Squares	d.f.	Mean Square	F
Groups	6587.39	2	3293.69	2.38
Conditions	4117.09	3	1372.36	1.00
Interaction	22723.26	6	3787.21	2.74*
Within	132381.18	96	1378.97	
Total	165808.92	107		

* Significant at less than the 5% level.

TABLE 16

Analysis of Variance Repeated Measures Trials 2 Through 8

Source	Sum of Squares	d.f.	Mean Square	F
Conditions	23412.60	3	7804.20	.57
Groups	222245.63	2	111122.82	8.17**
Interaction	97045.98	6	16174.33	1.19
Between subjs. in same group % condition	1304981.03	96	13593.55	
T Total between subjects	1647685.25	107		
Trials:2-8	131591.96	6	21931.99	56.29**
Interaction: trials X conditions	4036.66	18	224.26	.58
Interaction: trials X groups	6720.42	12	560.04	1.44
Interaction: pooled subjects X trials	238459.53	612	389.64	
Total within subjects	380808.57	648		
Total	2028493.82	755		

** Significant at less than the 1% level.

TABLE 17

Analysis of Variance Mean Sorting Time Per Trial On Trials 2-8

Source	Sum of Squares	d.f.	Mean Square	F
Groups	31813.47	2	15906.74	8.20**
Conditions	3375.39	3	1125.13	.58
Interaction	13871.00	6	2311.83	1.19
Within	186,213.22	96	1939.72	
Total	235273.08	107		

F max. = 12.42; P is less than .05.

TABLE 18

Analysis Of Variance Square-Root Transformation of Mean Sorting Time Per Trial On Trials 2-8

Source	Sum of Squares	d.f.	Mean Square	F
Groups	66.09	2	33.04	8.00**
Conditions	7.92	3	2.64	.64
Interaction	25.22	6	4.20	1.02
Within	396.60	96	4.13	
Total	495.83	107		

F max. = 8.67; P is greater than .05.

** Significant at less than the 1% level.

TABLE 19

Analysis of Variance Repeated Measures Trials 9 Through 11

Source	Sum of Squares	d.f.	Mean Square	F
Groups	95666.98	2	47833.49	11.12**
Between Subjs. in same group	451607.54	105	4301.02	
Total between subjects	547274.52	107		
Trials	393.94	2	196.97	1.63
Interaction: trials X groups	1943.85	4	485.96	4.01**
Interaction: pooled subjects X trials	25434.21	210	121.12	
Total within subjects	27772.00	216		
Total	575046.52	323		

** Significant at less than the 1% level.