Feature-specific Inhibition in Intensely Ambivalent Subjects

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Intense ambivalence is a feature long associated with schizophrenia (Bleuler, 1911/1950). Bleuler, who coined both the term schizophrenia and the term ambivalence, argued that ambivalence was a fundamental symptom of schizophrenia meaning that ambivalence was characteristic of all schizophrenics.

Schizophrenic ambivalence has been considered important enough that several theorists have sought to explain this particular symptom in their etiological theories of schizophrenia. Among these theories are Freud's (Fenichel, 1945) regression to earlier levels of development theory, Bleuler's (1911/1950) broken associative threads theory, Fromm-Reichman's (1954) defense against hostile impulses theory, Haley's (1959) communication avoidance theory, and Meehl's (1962, 1963) diathesis-stress theory. In spite of this theoretical interest in schizophrenic ambivalence, essentially no research has been reported on this topic. The first scale to measure schizophrenic ambivalence was developed only recently (Raulin, Note 1). This scale was based on the work of Paul Meehl (1962, 1964).

The present study was also stimulated by Meehl's theory of schizophrenia. Meehl (1962) hypothesized that a genetic component is a necessary but not sufficient condition for the development of schizophrenia. This genetic component he labeled schizotaxia. A person who possesses this genetic component is labeled a schizotype (short for schizophrenic genotype), a word coined by Rado (1962). Given unfortunate environmental situations, a schizotype may decompensate to the point of being clinically schizophrenic. The key in this model to understanding both the genetic and environmental influences of schizophrenia is the identification and study of the compensated schizotype. Meehl has argued that the schizotype can be identified by a series of signs which he detailed in a 1964 manual. Intense ambivalence is one of those signs.

The current study uses a strategy suggested by Chapman, Chapman, Raulin, and Edell (1978). Nonpsychotic subjects who possess one or more of the schizotypic signs suggested by Meehl are brought into the laboratory and tested on variables theoretically related to schizophrenia. Their performance is compared with the performance of a sample of control subjects who do not show these schizotypic signs. The subjects used in this paradigm are college students, partly because of the ready availability of such subjects and partly because these subjects are close to the age of risk for schizophrenia. This paradigm has been used to investigate social functioning (Chapman, Edell, & Chapman, 1980), social skills (Haberman, Chapman, Numbers, & McFall, 1979), psychological test performance (Chapman, Chapman, & Miller, 1982; Edell & Chapman, 1979; Raulin & Van Slyck, Note 2), psychotic or psychotic like symptomatology (Chapman, Edell, & Chapman, 1980; Chapman & Chapman, 1980), communication styles (Adamski, Note 3; Raulin & Adamski, Note 4), and attentional or neurological deficits (Raulin & Chapman, Note 5).

In the present study, primary perceptual processing was studied in high ambivalent and normal ambivalent subjects (controls). Specifically, we focused on the phenomenon of feature-specific inhibition (Bjork & Murray, 1977). Bjork and Murray had found that accuracy of report is lower when a briefly presented target letter is flanked by an identical letter than when it is flanked by a different target letter or by a nontarget letter. This finding was verified by Santee and Egeth, (1980, in press). Bjork and Murray explained these data by hypothesizing that information about the features of several stimuli are extracted by parallel, but interactive, input channels that lead to feature detectors. Stimulation of a specific feature detector results in an inhibition of that same feature detector in other channels as well as a more generalized inhibition of all channels. We wanted to see if our ambivalent subjects demonstrated this feature-specific inhibition to the same degree and in the same manner as control subjects.

Method

Subjects

Twenty-one undergraduates (nine ambivalent and 12 control) served as subjects as part of a course requirement. All subjects were selected on the basis of their scores on the Intense Ambivalence Scale. Ambivalent subjects had scores of two standard deviations or more above the mean while control subjects had scores no higher than one half of a standard deviation above the mean. All subjects had normal or corrected to normal vision.

Procedure

The procedure followed closely the one used by Bjork and Murray (1977) and Santee and Egeth (1980, in press).Stimuli were presented tachistoscopically. Subjects viewed a prestimulus pattern (a screen divided into equal quadrants by dotted lines), the stimulus pattern, and the poststimulus pattern. The post-stimulus pattern was the same as the prestimulus pattern except that an arrow cued either the right or left side of the pattern. The following sequence of slides illustrates a typical trial in slow motion.

Insert Slides 1, 2, and 3 here

The stimulus patterns were 3 x 4 matrices with the entire outside perimeter consisting of number signs (#) and the two inside positions containing either letters or number signs depending on the condition. Each character was .3 cm by .2 cm and subtended .22 by .145 degrees of visual angle. A gap of .4 cm (.29 degrees of visual angle) separated each character. This slide shows examples of each of the four conditions. Two target letters (A and E) and two nontarget letters (K and L) were used. The four conditions were (1) a

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a single stimulus target, (2) a noise letter the same as the target letter, (3) a noise letter which is the alternate target letter, and (4) a nontarget noise letter. Note that the examples of each condition shown on this slide use A as the target letter which always appears on the left side. In the actual study, the target letter and target location were balanced so that A and E appeared equally often and each appeared on the right as often as the left.

Prior to each session, the subjects were told what the target letters would be and that the two target letters as well as their positions would occur with equal probability. Subjects were asked to focus on the intersections of the two dotted lines in the prestimulus display. After 2.15 seconds, the stimulus slide appeared and was followed immediately by the poststimulus display. Subjects then responded by calling out which target letter (either A or E) they thought appeared in the cued location of the stimulus pattern. If they were not sure they were asked to guess. All subjects were pretested on 96 trials the day before to adjust the timing of the stimulus so that performance accuracy was between 75 and 80%. Stimulus duration which was different for each subject, varied between 30 and 90 msec. Subjects were then tested on the next day with 12 blocks of 32 trials each.

Results

The following slide shows the mean percent of target letters correctly

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identified for each cell. A 2-way ANOVA (summing over target letters and blocks) showed no main effect for groups (F (1, 19) = .87). There was a significant main effect for conditions (F(3, 57) = 10.14, $p < .001$) and a significant interaction (F(3, 57 = 2.93, $p < .05$). F tests for simple effects showed that while the control subjects demonstrated differential performance under the four conditions (F(3, 57) = 10.14, $p < .001$), the ambivalent subjects showed similar performance in all conditions (F(3, 57) = .925). There was no difference between ambivalent and control subjects on required stimulus exposure times, F(1, 19) = 1.27.

Discussion

These data suggest that ambivalent subjects, unlike control subjects, do not show the feature specific inhibition first described by Bjork and Murray. These results cannot be attributed to overall accuracy differences between the groups because each subject was pretested and stimulus duration time for each subject was set at a level to insure a 75-80% overall accuracy. Nor can these results be attributed to differences in stimulus duration time between groups since the two groups were comparable on this measure. Assuming these data replicate, one could conclude that intensely ambivalent subjects, who according to Meehl's model are likely to be schizotypes, simply do not show the feature-specific inhibition exhibited by most people. In other words, these subjects seem able to effectively parallel process visual input which control subjects have difficulty processing effectively.

At first glance, this finding might seem counterintuitive. One would expect schizotypes, people presumably at risk for schizophrenia, to show deficits in processing; but the data suggest enhancement of processing in what is normally the most difficult situation. These data are striking because they fit so nicely with other findings and theories regarding schizophrenia. McGhie and Chapman (1961) noted that many schizophrenics report that external stimuli seem to come at them from all directions and that they are unable to focus their attention on any one stimulus. A tendency to process information in parallel may be fine in the simplified setting of the laboratory but a definite hinderance when dealing with the complexities of the real world. It is entirely reasonable to hypothesize that the human mind is capable of processing several channels of information simultaneously. After all, the brain monitors a variety of autonomic functions while we carry on our everyday activities. However, the data from our internal organs are probably simpler and more predictable than the data from the external world. Adequate processing of the external world at the level of human thought might very well <u>require</u> the selection and limiting of input. In a model described below, the key component of attention is the inhibition of the processing of extraneous information. The current data suggest that the inhibition process so critical to normal attention may not be as efficient in schizotypes.

It should be noted that the current finding is exactly the sort of deficit one would expect to find in these subjects if one adopts the diathesis-stress model of Paul Meehl (1962). First of all, such a deficit is subtle, not readily apparent to the outside observer, and could easily exist unnoticed for years. Secondly, it is pervasive enough to have potentially profound effects on an individual's development. Finally, such a deficit might explain a variety of psychotic symptoms.

We would like to propose a model of the etiology of schizphrenia. In this model, the primary deficit is one of inhibition of noncentral cognitive processing. The schizophrenic, both before and during the psychotic episode, has difficulty in limiting attention. Adequate attention is possible in the schizotype under low stress conditions but becomes progressively more difficult and unlikely under high stress conditions. Under stress the normal inhibition of noncentral cognitive processing is reduced in the schizotype and more channels of information are simultaneously processed. In the intellectually gifted schizotype this creates a strain on the cognitive system, but not an overload. In the less gifted, a cognitive overload occurs which results in intellectual and emotional confusion.

It is assumed that interpersonal interactions are stressful for most people. In an interpersonal situation, the increased anxiety will make it likely that a schizotype will fail to inhibit noncentral processing and will be focusing almost equal attention on several aspects of the environment. This could result in a cognitive overload leading to confusion and feelings of disorganization that might increase the likelihood of withdrawal as a way of reducing the amount of incoming information. Learning theory predicts that the reduction in anxiety and confusion which should follow withdrawal from the social setting would increase the likelihood of withdrawal in the future. This might well account for the social fear and interpersonal aversiveness so often reported in schizophrenics and preschizophrenics. This trend should accelerate in adolescence when the complexity of peer interaction increases. For the typical schizotype, this should lead to the classic pattern of increasing withdrawal and occasional bizarre behavior evident from adolescence on with no obvious precipitating factors. The occasional bizarre behavior and the eventual thought disorder, loose associations and flight of ideas would be the result of the massive overload of the cognitive system by a near collapse of the inhibition process so necessary for attention. But the majority of schizophrenics (simple schizophrenics) do not always show the blatant thought disorder characteristic of an acute psychosis. Instead, they show a poverty of thought and emotions. This limiting of all cognitive and emotional processing might well be a last defense against the collapse of the cognitive system described above.

The more intellectually gifted schizotype should show a different developmental course. In the face of stress, they would show the same hypothesized breakdown in the inhibition process and the consequent increase in parallel processing of information. But they are much more able to avoid the cognitive overload and the resultant confusion. They do this by using their intellectual abilities to more effectively organize and structure the mass of incoming data thus preventing much of the interference that leads to cognitive confusion in the less gifted. To the outside observer, such a person would appear to be remarkably vigilant and a keen observer of their environment. This is one of the characteristics that define a paranoid style. The paranoid patient usually shows minimal thought disorder, often has a better premorbid history and is usually quite bright--all of which are consistent with the model. But even for the bright schizotype, the massive flood of input which we are hypothesizing would be too much to handle unless some structure were developed to simplify the data. The delusions which are the defining characteristic of paranoid schizophrenia might well be such a structure which allows the paranoid patient to quickly classify input and thus, avoid more active cognitive processing of the input and the threat of cognitive overload.

The above proposal is not intended as a complete description of the etiology of schizophrenia. Its principle purpose is to serve as a model to stimulate further research. Several strong predictions follow from the model. Since we are adopting Meehl's supposition of a schizotaxia, we would predict that this particular perceptual style should run in families. It should even be apparent in children well before the social withdrawal in adolescence that is often found in preschizophrenics. The tendency to not inhibit parallel processing of information should increase in the schizotype in stress situations. Finally, there should be a point at which parallel processing becomes dysfunctional. That point should occur earlier in the less intellectually gifted schizotype. The next step is to focus research on testing these and other predictions.

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Slide 1

Slide 2

# # # #
A E
# # # #

Slide 3

Slide 4

Examples of Stimulus Slides

# # # #
A #
# # # #

Single Target

# # # #
A A
# # # #

Noise same as target

# # # #
A E
# # # #

Noise Alternative Target

# # # #
A K
# # # #

Noise Nontarget

Slide 5a

The means expressed as percent correct over the four stimulus conditions for Ambivalent and Control Subjects

Conditions	Ambivalent	Control
Single Target (A#)	81.7	81.4
Noise Same as Target (AA)	76.8	65.4
Noise Alternative Target (AE)	83.6	79.3
Noise Nontarget (AK)	82.2	87.2
Overall Mean	81.1	79.7

Slide 5b

The Mean Percent Correct over the Four
Stimulus Conditions for Ambivalent and Control Subjects