Reaction Time Measurement of Monaural Temporal Interactions
in Psychiatric Patients and Non-patients

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(Enclosure # 3)
Much theory and research in psychopathology has of late been concerned with the temporal processing of sensory or perceptual information by schizophrenics. Zubin and Kietzman (1965) have discussed the value of studying temporal factors, such as temporal integration and temporal resolution, in psychopathology. They suggest that reliable and precisely determined differences between psychiatric patients and non-patients on these measures may reflect differences in central nervous system functioning. Some studies have actually demonstrated differences between schizophrenic patients and non-patients on a reaction time (RT) measure of visual temporal integration (Collins, 1972), and on two-flash and two-click measures of temporal resolution (Venables, 1964, 1966, 1967). Such findings lend support to theories suggesting that schizophrenia involves a deficit in temporal processing of information (e.g., Broen, 1968; Yates, 1966; Zubin & Kietzman, 1965).

There is also reason to believe that the sensory modality in which schizophrenics show the greatest deficit is audition. Venables (1963, 1964) has proposed that psychiatric patients may show abnormal two-flash and two-click thresholds because of an altered state of cortical excitability. Moreover, Venables (1964, 1967) suggested that the sensory modality most affected in this regard may be the auditory modality. For example, Venables (1966) compared two-flash and two-click thresholds in psychiatric patients and normals and found that in normals two-click thresholds were briefer than two-flash thresholds. However, among the chronic schizophrenics there was a smaller difference between the two thresholds and among very deteriorated patients there was a reversal of the findings, i.e., two-click thresholds were longer than two-flash thresholds. Venables concluded, "The results
show that schizophrenic pathology appears to involve a relative deficiency
in performance involving the auditory modality (p. 372). Further evidence
of an auditory deficit in schizophrenics comes from recent findings of higher
thresholds of audibility and lower signal detectability to pure tones in
schizophrenics compared to normal controls (Emmerich & Levine, 1970; Levine &

We have obtained measures of both auditory signal detectability and
monaural temporal interactions from the same psychiatric patients and non-
patients. In a previous report (Bruder, Sutton, Gurland, & Yozawitz,
Enclosure #1), we presented data showing that thresholds to click stimuli,
measured using a forced-choice signal detection procedure, were higher for
patients than for non-patients. When these patients and non-patients were
classified into sub-groups based on their scores on a structured mental
state interview (Gurland, Fleiss, Cooper, Sharpe, Kendell, & Roberts, 1970),
only one sub-group, i.e., Moody-Disorganized patients, had significantly
higher thresholds than non-patients. These are patients who showed high
scores both on symptoms of mood (depression and retarded speech), and on
symptoms of conceptual and perceptual disorganization (e.g., paranoid delu-
sions, auditory hallucinations, flat affect). In the present report, we
present additional data obtained on some of these same patients and non-
patients using a RT measure of monaural temporal interactions.

Our purpose in measuring monaural temporal interactions in psychiatric
patients and non-patients was to further study the temporal processing of
auditory information in these groups. We used RTs to measure monaural
temporal interactions because the RT task is very simple and can be per-
formed successfully by most patients. In a prior report (Bruder, Sutton,
& Babkoff, Enclosure #2), we introduced a design for measuring monaural temporal interactions using RTs and we presented data obtained for non-patients using this design. The stimulus manipulations used in this design stem from those used in psychophysical studies of the masking of transients or clicks (Babkoff & Sutton, 1968, 1971). Masking experiments involve a more intense "masking" stimulus, and a less intense "masked" stimulus, and a temporal interval (Δt) separating the two stimuli. Masking may be either forward (more intense stimulus precedes the less intense stimulus) or backward (more intense stimulus follows the less intense stimulus). In the present study, we measured the RTs of psychiatric patients and non-patients to unequal intensity click pairs in both the forward masking mode (high-low) and the backward masking mode (low-high), varying the interval between clicks (Δt).

Patients and non-patients were also interviewed using a structured mental state interview that was standardized in an extensive cross-national study (Cooper, Kendell, Gurland, Sartorius, & Farkas, 1969). Ratings from this schedule yielded detailed symptom profiles that were used in classifying patients and non-patients into sub-groups (Gurland et al., 1970).

Method

Subjects

The 26 patients were selected from the new admissions at Brooklyn State Hospital and were tested within two weeks after admission. Selection was restricted to include only cooperative, male patients between the ages of 18-30 years, who were not known to be mentally retarded, brain-damaged, or addicted to drugs or alcohol. The mean age of the patients was 23.6 years.
The 33 non-patients were male college students and referrals from New York State Employment Service, who were between the ages of 18-31 years. The mean age of the non-patients was 21.1 years.

Apparatus

The apparatus permitted control of the intensity of each member of a click pair, the time interval between the clicks (Δt), and the length of intertrial intervals. The details of the apparatus are described elsewhere (Babkoff & Sutton, 1968). The clicks were generated by a negative-going electrical pulse with an exponential return to base. The time constant of the exponential return to base (1/e x peak amplitude) was 0.1 msec. The clicks were presented by the right phone of Sharpe MK II circumaural earphones. Oscilloscope tracings of the input voltage to the phones and the acoustic output (click) are given in Babkoff, Sutton and Bruder (Enclosure #4). RTs were measured with an electronic counter that read in 10ths of milliseconds with an accuracy of .012 ± 1 count. Thresholds and RTs were measured in a sound-attenuating booth. There was a low, constant ambient noise produced by a fan in the booth. The circumaural earphones attenuated this ambient noise to a point that was barely audible.

Procedure

Forced-choice threshold. Each S’s threshold for a single click was measured using a Block Up and Down, Three-Interval, Forced-choice procedure (see Bruder et al., Enclosure #1 for details). The estimate of the intensity needed for 67% correct performance was used as the reference for specifying each S’s sensation levels.
RT measure. RTs were measured to click pairs in the forward masking mode (high-low) and the backward masking mode (low-high) at each of three Δ ts (2, 7, & 15 msec.), and also to the low and high intensity clicks presented alone. These 8 stimulus conditions were randomized within blocks of 80 trials along with 10% blank trials. The sensation levels of the low and high intensity clicks were 10 dB and 25 dB.

Each RT trial consisted of the following sequence of events. The S was signaled by a red light that a trial was ready to begin. When the S was ready he initiated the trial by pressing his finger down on a telegraph key, which produced another red flash signaling him that the trial had begun. In 90% of the trials, a stimulus was presented after a 2.4 sec. fixed foreperiod. No stimulus was presented in the 10% blank trials. The S's task was to lift his finger from the telegraph key as fast as possible upon hearing the stimulus. If he did not hear the stimulus, he was to retain his finger on the key until instructed to lift his finger 2 sec. after stimulus onset. Each S was also told that a blue "feedback" light would be presented if he lifted his finger faster than his previous response to the same stimulus. Each S was also told that he would earn one cent reward each time the blue light went on. Patients also received additional bonuses for completing each testing session. Non-patients received a bonus for completing the experiment in addition to their hourly wages.

Each block of 80 trials of RT testing lasted about 20-30 min. depending on the S's own pacing. Ss were given a brief rest in the testing booth midway during each block, and a longer rest outside the booth between blocks.
Additional rests were given upon the request of the S. After one block of RT practice, each S was tested for a total of 11 blocks, which were distributed over about 2-5 days of testing. Each S thereby received a total of 99 trials per stimulus condition.

**Interview.** After threshold measurement (usually on the same or following day) each S was interviewed using a structured mental state interview schedule that was adapted from the Present State Examination (Wing, Birley, Cooper, Graham, & Isaacs, 1967) and from the Psychiatric Status Schedule (Spitzer, Fleiss, Burdock, & Hardesty, 1964). The origin of this schedule is described by Cooper et al. (1969). Ratings from the interview provided the information for obtaining scores on 20 factors of psychopathology that were derived in a prior factor analysis of the ratings of 500 patients from Brooklyn and London (Fleiss, Gurland, & Cooper, 1971). A profile showing the standard score ($\bar{x} = 50$, $Sd = 10$) on each factor of psychopathology was thereby obtained for each patient and non-patient.\(^2\) Patients and non-patients were divided into sub-groups based on their profile scores using a classification scheme previously utilized in a study by Gurland et al. (1970). The classification scheme can be illustrated with reference to Figure 1, which shows the average profiles for sub-groups that contained a minimum of 5 Ss. Patients and non-patients were assigned into sub-groups based on their profile scores in three major areas of psychopathology: (1) Mood disturbance, which consists of factors usually associated with a diagnosis of depression; (2) Hypomania, which is associated with diagnosis of schizophrenia and manic-depressive, manic; (3) Conceptual or perceptual disorganization,
Fig. 1. Average symptom profiles for patient and non-patient sub-groups.
which consists of factors most often associated with a diagnosis of schizophrenia. A standard score higher than 60 (i.e., higher than 1 Sd above the mean) on any one factor in one of these areas of psychopathology was sufficient for classification in that area. Thus, a S in the Disorganized sub-group scored high on at least one of the disorganization factors, but not on factors in other areas. A S in the Moody-Disorganized sub-group scored high on at least one factor in both the mood and disorganization areas. The remaining groups were formed in the same manner.

Results

The median RTs of each patient and non-patient to each stimulus condition were averaged to yield the group means shown in Table 1. The RTs of patients were on the average about twice as long as the RTs of non-patients. The differences between the means of the patients vs. non-patients were highly significant (p < .001). Since we were not interested in differences between these groups in RT level per se, we have plotted in Figure 2 the mean RTs of patients and non-patients to click pairs in the forward and backward modes using their RT to the single high intensity click as a common referent. The patients' functions for both the forward and backward modes were displaced further below the RT level to the high intensity click than the functions for non-patients. A two-way analysis of variance of the difference scores in the forward mode, $RT_{(HL)} - RT_{(H)}$, showed the main effects of Groups ($F = 4.48, d.f. = 1 & 57, p < .05$) and $\Delta t$ ($F = 3.13, d.f. = 2 & 114, p < .05$) to be significant. The Groups $\times$ $\Delta t$
<table>
<thead>
<tr>
<th>Stimulus Condition</th>
<th>Patients</th>
<th>Non-Patients</th>
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</thead>
<tbody>
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<td></td>
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<tr>
<td>Forward Mode</td>
<td></td>
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</tr>
<tr>
<td>2</td>
<td>348 *</td>
<td>172</td>
</tr>
<tr>
<td></td>
<td>(137) **</td>
<td>(25)</td>
</tr>
<tr>
<td>Δt 7</td>
<td>350</td>
<td>170</td>
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<td></td>
<td>(132)</td>
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<tr>
<td>Backward Mode</td>
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<td>(136)</td>
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<td>(25)</td>
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<tr>
<td>Single Clicks</td>
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<tr>
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</tr>
<tr>
<td></td>
<td>(135)</td>
<td>(27)</td>
</tr>
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<td>Low</td>
<td>426</td>
<td>226</td>
</tr>
<tr>
<td></td>
<td>(161)</td>
<td>(48)</td>
</tr>
</tbody>
</table>

* Mean RT in msec.

** Standard deviation in msec.
patterns as a function of the interval separating the clicks in a pair.

Fig. 2. Difference between RTs to click pairs (forward and backward masking) for patients and non-patients in msec.

- $\Delta t$
interaction was also significant ($F = 3.69$, d.f. = 2 & 114, $p < .05$). The difference between the patient and non-patient functions for the forward mode is evident in Figure 2. The function for non-patients shows a small decrease in RT with the increase in $\Delta t$ from 2 msec. to 7 msec., but no further decrease at a $\Delta t$ of 15 msec. The patients, however, showed no decrease in RT with the increase in $\Delta t$ from 2 msec. to 7 msec., but did show a decrease at $\Delta t = 15$ msec.

A two-way analysis of variance of the difference scores in the backward mode, RT(II-RT(I)), showed the main effects of Groups ($F = 5.82$, d.f. = 1 & 57, $p < .05$) and $\Delta t$ ($F = 4.31$, d.f. 2 & 114, $p < .05$) to be significant. The Groups $\times$ $\Delta t$ interaction was not, however, significant ($p > .05$). The functions for patients and non-patients in the backward mode were highly similar, and differed only in level. For both groups, RTs to click pairs in the backward mode remained constant at $\Delta ts$ of 2 and 7 msec., and then increased at a $\Delta t$ of 15 msec.

When patients and non-patients were classified into sub-groups, only the four sub-groups whose average profiles are shown in Figure 1 had sufficiently large numbers of Ss. The other sub-groups had three or less Ss and are not included in further analyses of the data for sub-groups. The mean RTs of the four sub-groups to each stimulus condition are given in Table 2. One-way analyses of variance showed that there were significant differences in RT levels across sub-groups ($p < .001$). However, Scheffe' multiple comparisons ($\alpha = .05$) indicated that only differences between RT levels for patient vs. non-patient sub-groups were significant. The differences in RT level between the two non-patient sub-groups and between the
### Table 2

Mean RTs of Sub-groups to Each Stimulus Condition

<table>
<thead>
<tr>
<th>Stimulus Condition</th>
<th>2</th>
<th>Δt 7</th>
<th>15</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>169 * (19)**</td>
<td>184 (44)</td>
<td>319 (105)</td>
<td>409 (146)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>168 (18)</td>
<td>182 (48)</td>
<td>324 (110)</td>
<td>408 (131)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>168 (18)</td>
<td>184 (51)</td>
<td>319 (107)</td>
<td>394 (133)</td>
<td></td>
</tr>
</tbody>
</table>

### Forward mode

| 2 | 171 (18) | 184 (43) | 324 (113) | 408 (142) |
| Δt 7 | 170 (16) | 187 (48) | 324 (107) | 407 (137) |
| 15 | 178 (18) | 192 (46) | 333 (119) | 406 (138) |

### Backward mode

| High | 172 (18) | 186 (54) | 333 (106) | 412 (142) |
| Low  | 219 (30) | 258 (91) | 412 (165) | 458 (142) |

* Mean RT in msec.

** Standard deviation in msec.
two patient sub-groups were not significant. The mean RTs of these four
sub-groups to click pairs in the forward and backward modes are plotted in
Figure 3, using their RT to the high intensity click as the common referent.
A two-way analysis of variance of the difference scores in the forward
mode revealed only one of the main effects, $\Delta t$, to be significant ($F =
3.90, \text{d.f.} = 2 & 92, p < .05$). The Groups $X \Delta t$ interaction was also
significant ($F = 3.27, \text{d.f.} = 6 & 92, p < .01$). Scheffe' multiple comparisons
($\alpha = .05$) between the sub-groups' forward mode difference scores at each
$\Delta t$ showed no significant differences between sub-groups at $\Delta ts$ of 2 msec.
and 7 msec. At a $\Delta t$ of 15 msec., only the difference between the Moody-
Disorganized patients and the non-patients with low profile scores was
significant. The forward mode functions for the two non-patient sub-groups
were almost identical. The function for Disorganized patients was displaced
further below the RT level to the high click than the functions for non-
patients, but the differences between these sub-groups were not significant.
There was virtually no difference between the forward mode functions for
the Moody-Disorganized patients and non-patients at $\Delta ts$ of 2 msec. and 7 msec.,
but at a $\Delta t$ of 15 msec., the Moody-Disorganized patients showed a sharp
decrease in RT, which was not shown by the non-patients. This difference in
the form of the forward mode functions for the Moody-Disorganized patients
and non-patients was the source of the Groups $X \Delta t$ interaction.

The backward mode function for the Moody-Disorganized patients also was
different in form compared to the function for non-patients, but the Groups $X
\Delta t$ interaction was not significant ($p > .05$). The main effects were also
not significant in the backward mode ($p > .05$).
clicks in a pair (A and B).
patterns and non-patients as a function of the interval separating the patterns and hits to the high intensity single click for each subject of both modes. In Fig. 3, difference between RT to click pattern (forward) and backward masking.

**Fig. 3**: Difference between RT to click pattern (forward) and backward masking.

- Moody - DiseorGANized Patients
- DiseorGANized Patients
- DiseorGANized Non-Patients
- Non-Patients

**RT - RT (H)**

**Backward**

**Forward**
Discussion

Psychiatric patients as a group differed from non-patients in their performance on the RT measure of monaural temporal interactions. When, however, these patients and non-patients were classified into sub-groups, only one sub-group, Moody-Disorganized patients, had significantly different performance on this measure compared to non-patients. Patients and non-patients who scored high on only conceptual or perceptual disorganization factors, which are usually associated with a hospital diagnosis of schizophrenia (Curland et al., 1970), did not have different RT vs. Δt functions compared to non-patients with low profile scores. In contrast, patients with high scores on both disorganization factors and mood factors (i.e., depression and retarded speech) had different RT vs. Δt functions for click pairs in the forward masking mode compared to non-patients with low profile scores. The Moody-Disorganized patients and the non-patients yielded RT vs. Δt functions in the forward mode that showed the same small decrease in RT as the Δt was increased from 2 msec. to 7 msec., but at a Δt of 15 msec., the function for Moody-Disorganized patients showed a further and much larger decrease in RT, while the function for non-patients showed a slight increase in RT. At the Δt of 15 msec., for click pairs in the forward mode (high-low), the Moody-Disorganized patients benefitted more from the presence of the second less intense click, i.e., they showed a greater reduction in RT relative to their RT to the high intensity single click, than did the non-patients. Such "better" performance for patients than for non-patients could hardly result from poorer attention or motivation in patients (Sutton, 1973).
There are a number of possible explanations of this difference in RT vs. \( \Delta t \) functions for the Moody-Disorganized patients and non-patients. We will deal first with some trivial interpretations and then raise some alternative interpretations.

Could the difference between the RT vs. \( \Delta t \) functions for the Moody-Disorganized patients and non-patients be due to the differences in their level of RTs per se? The Moody-Disorganized sub-group had the longest RTs of all the sub-groups (see Table 2), and their RTs were more than twice as long as the RTs of non-patients. We have attempted to eliminate differences in RT level across groups by using differences between RTs to click pairs and RTs to the high intensity click. While such difference scores by no means guarantee that level effects are removed, some arguments may be advanced that the difference between the RT vs. \( \Delta t \) functions for Moody-Disorganized patients and non-patients are not due to level alone. Since the intensity of the high click was specified with reference to the forced-choice thresholds for each patient and non-patient, the sensation level of the high click was equated across groups. The RT of the groups to the high intensity click can, therefore, serve as a common baseline for comparing the RTs of these groups to the click pairs. When the RTs of the Moody-Disorganized patients and the non-patients to click pairs in the forward mode were plotted with reference to their RTs to the high intensity click (Figure 3), the functions for these groups overlapped at \( \Delta t \)s of 2 and 7 msec. To account for the difference between these groups at a \( \Delta t \) of 15 msec. in terms of level of RT, it would then be necessary to postulate that RT level has a much
greater effect at a $\Delta t$ of 15 msec. than at 2 msec. and 7 msec., i.e., an interaction between RT level and $\Delta t$. Note that the Disorganized patients also showed very long RTs that were not significantly different from the RTs for the Moody-Disorganized patients, and yet they did not show the sharp decrease in RT with increasing $\Delta t$ that was found for the Moody-Disorganized patients. The RT of the Disorganized patients at a $\Delta t$ of 15 msec. in the forward mode was equal to their RT at a $\Delta t$ of 2 msec., which is the same as found for the non-patients. Only the Moody-Disorganized patients showed a decreasing trend between these points, and it would, therefore, be different to account for this difference in their RT vs. $\Delta t$ function in terms of RT level per se.

Were the patients merely showing overall greater RT differences as a function of energy? It could be argued that patients may benefit more than non-patients from the presence of the second click in the click pair, i.e., they show a greater reduction in RT relative to the RT to the high intensity click, because the increase in energy per se leads to a greater reduction in their RT than compared to non-patients. An index of the effects of energy on RT is provided by the difference in RT between the low and high intensity clicks. There was no significant difference between the low-high differences for patients vs. non-patients, nor were there any significant differences between the four subgroups ($p > .05$). Note that the Moody-Disorganized patients had almost exactly the same low-high RT difference as the non-patients with low profile scores (see Table 2), which indicates that these groups showed the same RT differences as a function of energy.
Since all patients were receiving medication from about the time of hospital admission, it could be argued that the difference in RT vs. Δt functions for Moody-Disorganized patients and non-patients was due to drug effects. The types and dosages of drugs received by patients in different subgroups were similar, with the exception of two types of phenothiazines -- Thorazine (chlorpromazine) and Stelazine (trifluoperazine HCl). In the Moody-Disorganized sub-group, there were a higher proportion of patients taking Stelazine but a lower proportion taking Thorazine as compared to the Disorganized sub-group. We checked on the possible influence of these drugs on the forward mode difference scores, RT(HL)-RT(H), at a Δt of 15 msec., where we found our difference between sub-groups. Statistical analyses revealed no significant effects of the presence vs. absence of Thorazine or Stelazine on these difference scores (p > .05). Nor were there significant correlations between dosage level of Thorazine or Stelazine and these difference scores (p > .05). It would, therefore, be difficult to account for the greater forward mode difference score at a Δt of 15 msec. for only one of the sub-groups of patients, i.e., Moody-Disorganized patients, based solely on drug effects.

The high profile scores of the Moody-Disorganized patients on the symptoms of depression, retarded speech, delusional, auditory hallucinations, and flat affect appeared to be the factors most responsible for differentiating them from other patients and non-patients. Although the Moody-Disorganized patients' different RT vs Δt function for the forward mode may be related to their high scores on one or more of these symptoms, it can be argued that the
difference in their function is more reflective of the overall severity of their symptomatology. An index of overall severity was, therefore, obtained by computing the average score each patient received on all 20 factors of psychopathology in the symptom profiles. There was a small, but insignificant (p > .05), correlation between the patients' average profile scores and their forward mode difference scores, RT(HL) - RT(H), at a Δt of 15 msec. (r = .32). The patients' average profile scores on only the factors in the area of Disorganization showed the same correlation with these difference scores. A positive correlation in this case means that higher average profile scores were associated with smaller (more positive) forward mode difference scores, RT(HL) - RT(H). This is opposite to what would be expected if the greater (more negative) forward mode difference scores for the Moody-Disorganized patients were related to their high overall symptomatology.

The results reported in this paper and the auditory signal detectability data reported previously (see Bruder et al., Enclosure #1) indicate that a sub-group of psychiatric patients, i.e., Moody-Disorganized patients, have different RT vs. Δt functions to click pairs in the forward masking mode and higher forced-choice thresholds to single clicks compared to non-patients. If the difference in performance of the Moody-Disorganized patients on both our auditory threshold and RT measures is related to the presence of specific symptoms (e.g. depression, retarded speech, auditory hallucinations, flat affect), it should be possible in future research to select patients with high profile scores on these symptoms, and then demonstrate the predicted difference in their performance on our threshold and RT measures. This would be our next step in following an iterative method (Sutton, 1973).
We also plan to use converging operations that will aid in interpreting the findings of this study. One important direction of our research will be to use additional stimulus manipulations not used in this study. For example, we plan to extend our stimulus manipulations to include click pairs of equal intensity. This will test whether or not the presence of the intensity difference between the members of click pairs in the forward masking mode was of importance in determining the difference in RT vs. Δt functions for Moody-Disorganized patients and non-patients, and this will in turn give us information concerning the possible role of forward masking in determining this patient vs. non-patient difference.

Recent studies (Blinkov & Karaseva, 1967; Gersuni, Baru, Karaseva, & Tankonogii, 1971) measuring the temporal processing of auditory stimuli in brain-damaged patients suggest other stimulus manipulations that may aid in evaluating the basis for the patient vs. non-patient differences in this study. These studies measured auditory thresholds and RTs to noise bursts of varying durations. Patients with lesions in auditory cortex showed elevated thresholds and increased RTs to very brief stimuli (e.g., 1 msec.) presented to the ear contralateral to the side of the lesion, but they showed "normal" performance on these measures at longer stimulus durations (e.g., 120 msec.). In our study, the Moody-Disorganized patient sub-group showed both elevated thresholds to our transient (click) stimuli, and different reaction time vs. Δt functions compared to non-patients. The Moody-Disorganized patients had longer reaction times than non-patients for all stimulus conditions, but they did show a decrease in reaction time as the Δt between click pairs in the forward masking mode was increased from
7 msec. to 15 msec., while non-patients showed a slight increase in reaction time. As a result, the difference in the absolute level of reaction time for these patients and non-patients was less at 15 msec. than at 2 msec. or 7 msec. Although there is some parallel between our data for Moody-Disorganized patients and the data found previously for patients with damage to auditory cortex (Blinkov & Karaseva, 1967; Gersuni et al, 1971), it would be premature to draw any firm conclusions because of differences in the stimulus conditions and other aspects of the procedure in these studies. We are planning additional research using noise bursts of variable duration as our stimuli, so as to be better able to compare our findings with those in the previous studies with brain damaged patients. This could provide information concerning a possible central neural deficit in psychiatric patients who show differences compared to non-patients in their performance on auditory threshold and RT measures.
Footnotes

1. Three of the non-patients were tested on two additional $\Delta t$ values and received 108 RT trails per stimulus condition. In the course of testing these 3 non-patients and 8 other non-patients, blocks of RT measurements were alternated with blocks of discrimination measurements (see Experiment II in Bruder et al., Enclosure #2 for further details). The RT data for these 11 non-patients proved to be essentially the same as the data for the remaining 22 non-patients, and their data were therefore pooled for the purposes of this study.

2. The standardization of factor scores was based on the ratings of the 500 patients in Brooklyn and London (see Fleiss et al., 1971). No standardization on non-patients is available at this time.

3. Fourteen of the 27 non-patients with low profile scores (i.e., less than 60) on the factors shown in Figure 1 scored above 60 on one or more factors not utilized in the assignment of Ss into sub-groups (i.e., anxiety, somatic concern, observed belligerence, reported belligerence, obsession, disorientation, and depersonalization). The RT data for these 14 non-patients did not, however, differ significantly ($t$ tests, $p > .05$) from the RT data for the other 13 non-patients who scored low on all factors.

4. The Moody-Disorganized patients whose RT data are reported in this paper needed an average of 7 dB more acoustic energy to obtain the same level of signal detectability as non-patients.
References


