Controlled Study on Time Reproduction of Depressive Patients

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\textbf{Abstract.} 23 depressive inpatients and the same number of matched nonpsychiatric controls were examined three times: following admission, and 14 and 28 days thereafter. Hamilton's Rating Scale for Depression and the Time Reproduction Test were administered. Time reproduction was found not to be different between patients and normal controls and within patients. Nor was a significant correlation found with any clinical symptoms.

Time reproduction [4], one of the aspects of time perception, is an ability to imitate a given rhythm. Usually, a regular beating sound, as of a metronome, is given to the subject for a short time, then after it is discontinued the subject is required to imitate the rhythm by tapping as exactly as possible. This may, therefore, reflect personal tempo.

When one suffers from depressive illness, not only psychological but also physiological functions are depressed. The latter appear as constipation, insomnia, reduced salivation and sexual dysfunction. Psychomotor tasks, for example number counting [5], are also inhibited, particularly when subjects are retarded.

Since time reproduction is a psychomotor task, it can be anticipated that time reproduction in depressive subjects will be slowed down, as has been shown by two previous investigations [3, 4].

Nevertheless, these two investigations had certain methodological drawbacks; Mezey and Cohen [4] did not employ control groups and Lehman's [3] samples were not followed up. Neither of them applied explicit diagnostic criteria for depressive illness. Furthermore, correlations between time reproduction and each depressive symptom were not scrutinized.

We therefore compared patients who had been selected using the Catego [6] as diagnos-
tic criteria with matched controls. These sub-
jects were examined over a 4-week treatment
period by adopting Hamilton’s [1] rating
scale for depression as well as the Time Re-
production Test (TRT).

Material and Methods

The full details of the methods used have been dis-
cussed elsewhere [2]. Briefly, the methods were as fol-
loows:
23 depressive patients newly admitted to All
Saints Hospital, Birmingham, UK (13 males and 10
females, aged between 20 and 66; mean 42.2) were
examined on three occasions: on admission, and 14
and 28 days thereafter. They were diagnosed by the
Present State Examination (PSE) and its subsequent
Catego computer system [6] and divided into three
diagnostic groups, namely endogenous depression (n =
14; Catego main classes D+, D7, R+, and R7), depressive
or anxiety neurosis (n = 5; A+, A?, N+, and N?) and
schizophrenia or paranoid state with depressive
symptoms (n = 4; S+, S7, P+, P7, O+, and O7). No
significant differences in the mean ages were found
between the three groups.

The medication for the patients was started before
the experiment. However, within one individual the
treatment regimen was rarely changed.

On each interview, Hamilton’s Rating Scale for
Depression (HRS) [1] was completed and the TRT
administered.

In the TRT [4], a regular metronome beat, approx-
imately 40 beats per minute, was presented for a short
time and the subject was requested, when the beat was
stopped, to try his best to imitate the exact rhythm by
tapping the table in front of him. The length of time
spent for 10 taps was measured by the author with a
stopwatch and the tapping rate was calculated by the
following formula: \( r = \frac{pq}{600} \), where \( p \) is the actual
rhythm of the metronome beat (beats per minute) and
\( q \) is the time (in seconds) spent by the subject for 10
taps. Although the metronome beat was around
40/min, it occasionally showed slight deviation. The
exact beat frequency of the metronome was measured
on every occasion and was applied in the calculation
of \( r \). The formula was designed to indicate the relative
tempo of the subject’s tapping with the value of 1.0
when the tapping was exactly the same as that of the
metronome. A high \( r \) value means slow tapping
whereas a low \( r \) means rapid tapping. The beat fre-
quency of the original design of Mezey and Cohen [4]
was 20/min. This was halved in the present study
since our preliminary trial indicated that beats at slow
as 20/min might be too boring.

The same number of nonpsychiatric volunteers
matched for age, sex and race were examined in the
same way. They were found to have never been men-
tally ill by applying the PSE and investigating their
past history.

| Table I. Mean TRT scores (± SD) of the patients and the controls on the three occasions |
|-----------------|-----------------|-----------------|
| Interview       | Patients         | Controls        | P    |
| 1st             | 0.96 ± 0.22 (0.54 – 1.38) | 0.91 ± 0.16 (0.69 – 1.23) | NS   |
| 2nd             | 1.05 ± 0.26 (0.69 – 1.61) | 0.95 ± 0.12 (0.77 – 1.30) | NS   |
| 3rd             | 1.03 ± 0.24 (0.73 – 1.69) | 0.94 ± 0.19 (0.69 – 1.53) | NS   |

Figures in parentheses indicate range of TRT values. P value of two tailed Wilcoxon matched pairs signed-
rank test. NS = Not significant.
Written informed consent was obtained from every subject prior to the examination. The Local Ethical Committee approved this study.

Results

As is shown in the table 1, no significant difference emerged within and between the patients as a whole and the normal controls. Subcategorization of the patients into males and females, and into the three diagnostic groups failed to reveal a significant difference (Mann-Whitney U test). The TRT was not correlated with the patient's age.

Neither the total score nor any single symptom (including 'psychomotor retardation') of the HRS was correlated with the TRT.

17 of 23 patients showed more than 50% reduction of the total HRS score over the 4-week period whereas the remaining 6 patients did not. No significant difference of TRT emerged between the two groups.

Discussion

The findings of the present study, despite our expectation, did not show any difference between or within the patients, or between the patients and the normal controls. This negative finding may well be due to too short an examination time (about 10 s) to uncover a subtle abnormality if it exists.

The examination time was about 30 s in Mezey and Cohen's [4] study, whereas it was about 15 s in Lehman's [3]. The range of the TRT values was between 0.54 and 1.69 for the patients and between 0.69 and 1.53 for the controls (table 1). Therefore, the negative nature of the present results cannot be attributed only to the short examination time. Although it would have been desirable to prolong the examination time, for example, to 3 min, most of the subjects found the tapping so tiring that it had to be restricted to a relatively short time.

Another expectation was that the TRT score would be increased (slowing down of the tapping) when the subject was retarded. This was because retarded patients were reported to take longer to do a psychomotor task like number counting [5].

The TRT of the 'retarded' cases in the present study was not significantly different from that of the other patients. However, since subjects who did not manage to complete a PSE interview were excluded, patients selected in this study cannot have been 'severely' retarded.

Possible effects of medication on TRT cannot be ruled out by the present findings since the medication was started before the study. Nevertheless, the possibility seems low because the TRT did not manifest any significant changes within the 4-week period, whereas more than 70% of the patients were improved by the same medication for each of them. This assumption remains to be verified by comparing drug-free patients and those on drug.

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