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Abnormal Subjective Time Experience in Depression

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Abnormality of subjective time experience is well recognised in psychiatric illness. Earlier authors suggested that slowed time experience in depression is an aspect of psychomotor retardation, while more recently it has been argued that this disturbance is non-specifically linked to the global severity of the depressive syndrome. This study offers evidence that both views can be justified: slowed time awareness is a common symptom of depression, related particularly to retardation, and to the severity of the mood disturbance. Some of the experimental difficulties in this kind of research are illustrated.

Disturbed time perception is well recognised in mental disorder, and varies in normal emotional states. It is said that time drags when one is bored or sad. This study examines that aspect of time perception known as time awareness and its relationship to depressive illness.

In early literature, experience of time in psychopathology is divided into outer 'world time' and inner 'ego time' (Straus, 1928). Jaspers (1959) divided the knowledge of time, i.e. judgement about objective time, from the experience of time. Experience of time involves an awareness of the constancy and continuity, as well as of the direction, of time. Lehmann (1967) called this 'time awareness', the term used here, from which he further distinguished 'time perspective', meaning the subject's attitudes towards past, present, and future.

Historically, time awareness has been most amenable to phenomenological examination, and its inaccessibility to objective measurement has made comparative studies difficult. The early theories of Janet and of the phenomenologists who followed developed the idea of the 'central now' in normal experience. The normal subject is firmly rooted in a concrete present drawing on the past (memories) and the future (anticipation) to act. In melancholia the present loses its clarity, the future is diminished as change seems less and less possible, and the past looms into the present in the form of guilt and regret (Minkowski, 1988; Straus, 1947; Fouks *et al*, 1988).

There is a considerable amount of experimental knowledge about objective time judgement in depression. Some studies have found time judgement to be preserved (Mezey & Cohen, 1961; Melges & Fourgerousse, 1966; Lehmann, 1967; Bech, 1975; Kitamura & Kumar, 1983). This agrees with early impressions (Lewis, 1932). Others have found time judgement to be disturbed, although differences in method and terminology make their studies difficult to compare (Dilling & Rabin, 1967; Wyrick & Wyrick, 1977; Tysk, 1984; Kuhs *et al*, 1989).

Unlike time judgement, there is agreement from early work onwards that time awareness is altered in depressive illness, and that it characteristically feels slower (Lewis, 1932; Mezey & Cohen, 1961; Lehmann, 1967; Bech, 1975; Wyrick & Wyrick, 1977; Kitamura & Kumar, 1982). There is disagreement as to its specificity to subgroups of depressed patients: no definite experimental evidence has linked it with retardation, as suggested by earlier authors (Lewis, 1932; Mezey & Cohen, 1961). Kitamura & Kumar (1982) found evidence that it might be more prominent in association with endogenous symptoms irrespective of depth of depression, but this did not reach significance. Bech (1975) stated that there was no relationship between slowed time awareness and subsyndromes, including psychomotor retardation.

These findings leave the status of slowed time awareness uncertain. It seems important to re-examine the relationship between time awareness, retardation, and the global depressive syndrome. It may be that earlier reviews were correct, but this has been obscured by limitations in the methods used to test the hypothesis. These have always relied on questionnaires to quantify the degree of change from normal.

In this study, an alternative technique, the visual analogue (VA) scale, of time awareness, as well as a time questionnaire, was used to compare patients' subjective time experience.

Depressive symptoms were quantified by the HARD scale (Rufin & Ferreri, 1984; Ferreri *et al*, 1986), an acronym for the French terms *h*umeur, *a*nxiété, *r*alentissement, and *d*anger ('mood', 'anxiety', 'slowing', and 'danger'), the headings given to its four subscales. HARD is an observer-rated scale which can be used with a routine clinical interview and is well adapted to the limited time available to the examiner. It was developed at St Antoine

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Hospital in Paris, both for clinical use and for drug trials. It has the merit of measuring components of the depressive syndrome such that the relationship between time awareness and the disorders of dysphoria and retardation, as well as global severity of depression, can be analysed separately. The component subscales are described in more detail below.

The VA scale, consisting of a vertical line representing time awareness from as slowly to as quickly as possible, is a non-verbal, dimensional means of expressing subjective time experience. Its use has not been explored in this specific context to date. The same principle has, for example, been applied to studying mood (Luria, 1975) and in a three-case study of 'time experience' (Richter & Benzenhofer, 1985). It has the advantages of being easily understood and easy to score finely, and it is perhaps more accurate in representing subjective time awareness. It was felt that it could be phenomenologically more informative than the questionnaire, making subjective experience accessible to quantitative measurement.

Method

Over a 5-month period all patients admitted to the department of psychiatry in a central Paris general hospital were considered for inclusion in the study. Patients were seen within 2 days of admission, between midday and 5 p.m. Whenever possible, assessments took place at 1 p.m. All patients were asked for their consent after the procedure had been explained. Inclusion was on the basis that the main complaint was of depressed mood, or could be understood as such. DSM-III-R criteria (American Psychiatric Association, 1987) were used. There were 17 patients with an axis-I diagnosis of major depression, and 11 with dysthymia (or depressive neurosis). One patient was considered to have a personality disorder with depressive symptoms not sufficient for an axis-I diagnosis. Only one of the depressed patients, presenting with melancholia, had a definite bipolar illness.

Of 52 patients, 23 (44%) were excluded for a variety of reasons as follows: six because they were over 65, four for administrative reasons, four because they were manic, two because they were diagnosed as schizophrenic, two because they were too heavily sedated to cooperate, two because they were in stuporose states, one because of recent brain trauma, one because of alcohol withdrawal syndrome, and one for opiate abuse. One patient with probable disseminated sclerosis and one with HIV seropositivity were included, as they presented otherwise typical depressive syndromes. None of the patients included were treated with electroconvulsive therapy.

The remaining 29 participating patients, age range 16–64, 6 males (mean 34 years) and 23 females (mean 39 years), were assessed and rated on the HARD scale. This scale has four subscales, allowing more detailed analysis of correlation with the VA scores. Its subscales are as follows: H, depressed mood, which scores for the presence of subjective and objective unhappiness, loss of interest, withdrawal, and loss of appetite; A, anxiety, which scores for psychic and somatic anxiety and some aspects of insomnia; R, psychomotor retardation, which scores for lassitude, poor concentration, and aspects of expression and posture; and D, danger, which indicates self-depreciation, suicidal thoughts, and overvalued or delusional ideas of guilt, incurability, or persecution. The D scale represents the danger of suicide. Each subscale scores a maximum of 18. The total score was divided as follows: 0–17 (mild), 18–34 (moderate), greater than 34 (severe). Because of the structure of the HARD scale, it is not possible to analyse further the frequency of specific symptoms within these four subscales.

Patients were then asked to reply to five forced-choice questions requiring yes/no answers, with the option of not responding. They were asked whether time seemed to pass at different rates since the onset of the illness, i.e. was slowed, accelerated, or fluctuating from hour to hour in relation to normal experience. They were also asked whether time seemed static.

Patients were finally asked to mark the 10 cm, vertical VA scale, annotated for time passing, 'at present', as fast as possible, normally, and as slowly as possible, at the top end, mid-point, and bottom end, scoring 10, 5 and 0, respectively. The scores, rounded to the nearest whole numbers, were not collated until all the diagnoses had been assigned.

The rating interview, questionnaire, and VA were repeated for patients at the latest time practicable to allow a reasonable proportion of repeat assessments before discharge. In practice, this was between 10 and 14 days for all cases. The second assessment was intended to allow comparison after the mental state had significantly improved, and introduced some control for the effects of drugs and hospital admission.

All but one of the patients were receiving antidepressants at the time of both interviews, and eight were receiving low to moderate doses of neuroleptics (generally up to 150 mg thioridazine per day). Doses were varied according to clinical need, and analysis in relation to drug use was not possible because of differences of doses, times of taking drugs, and changes of medication between the two assessments. At the first assessment, drug levels were likely to be lower. Of the moderate to severe group, 15 were taking antidepressants, including seven on tricyclics; six were taking neuroleptics; four were taking lithium; and eight were taking minor tranquillisers. Of the mild group, 11 were taking antidepressants, including eight on tricyclics; one was taking lithium; and six were taking minor tranquillisers.

Statistical analysis was as follows: χ^2 tests using Yates' correction were applied to the frequency of positive responses to the questionnaire. Comparison of VA by the HARD group (mild = HARD < 18, $n = 13$; moderate/severe = HARD $\geqslant 18$, $n = 16$) was made by the Mann–Whitney U/Wilcoxon rank sum test. The same patient groups were retested at the second assessment. Changes in both the HARD scores and the VA scores between the two assessments were examined by the same test.

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Table 1
Results according to time awareness (TA) questionnaire and visual analogue (VA) by broad HARD category

Assessment	1		2	
Initial category (HARD)	A (mild)	B (mod/severe)	A	B
Number of patients	13	16	6	16
Mean score (HARD)			6.0	10.8
Range (HARD)	7-17	18-42	0-16	2-30
TA 'changed since illness began'	8	12		
TA 'slowed'	4	10	2	7
TA 'accelerated'	3	2	2	4
TA 'fluctuating' from hour to hour	12	11	3	11
TA 'static'	2	9	2	5
VA mean	5.8	1.5	5.0	3.4

Parametric tests to compare VA scores between three diagnostic groups were employed (major depression with melancholia, $n=7$; major depression without melancholia, $n=10$; dysthymic disorder, $n=11$).

Finally, correlations by Spearman's product-moment correlation test were examined for the components of the HARD, against VA.

Results

Analysis of the questionnaire results by HARD (Table 1) showed non-significant trends consistent with the hypothesis that time awareness is slowed in depression. Changed, slowed, and static time awareness were all commoner in the moderate/severe group. It was notable that two-thirds of patients complained that time awareness had changed since becoming ill, and that fluctuating time awareness was common in all groups, remaining so even when the illness improved. No question achieved a statistically significant difference (by χ^2 test with the Yates' modification).

Both HARD and VA scores tended to normalise between the two assessments. This change was highly significant in the case of HARD (2-sample Mann-Whitney U/Wilcoxon rank sum test; $P<0.0001$) but non-significant in the case of all VA (same test; $P=0.847$) or VA, moderate/severe HARD group (same test; $P=0.077$).

Table 2
Correlations (r) between symptom severity as defined by HARD and abnormal time awareness on the visual analogue (VA)

Assessment	1	2
Number (VA <5)	24	18
HARD:VA, r	-0.77***	-0.61*
H:VA, r	-0.58**	-0.54*
A:VA, r	-0.39 NS	-0.41 NS
R:VA, r	-0.67***	-0.65**
D:VA, r	-0.50*	-0.15 NS

***$P<0.001$, **$P<0.01$, *$P<0.05$, NS $P>0.05$.

Comparison between the VA scores for time awareness, for moderate/severe HARD and mild HARD groups, showed a highly significant difference between them (2-sample Mann-Whitney U/Wilcoxon rank sum test; $P<0.001$).

The correlation coefficient between HARD and VA was calculated, excluding patients who showed acceleration. This seemed important, as accelerated time awareness may not have the same determinants as slowed time awareness. Correlation for overall HARD was strong (Table 2). Of the subscales, R showed the strongest correlation. Only A showed no relationship at all. This pattern persisted to the second assessment.

Reanalysis of results according to diagnostic category (Table 3) confirms the trend for slowed time awareness measured on VA to relate to increasingly severe forms of depression. The melancholic group differed significantly from the dysthymic group at the first assessment ($t=3.04$, d.f. $=16$, $P<0.01$). The differences between all major depressions (with or without melancholia) and dysthymia reached probable significance ($t=2.34$, d.f. $=27$, $P<0.05$). The trends persisted to the second assessment, but no differences reached the 0.05 level.

In order to evaluate the significance of the presence of melancholia, a comparison between the subgroup of patients in the melancholic and non-melancholic major

Table 3
Results according to diagnostic category, showing mean HARD scores and their standard deviations (s.d.); analysis of a subgroup of similarly depressed patients is shown

	Assessment 1			Assessment 2		
	Melancholia	Non-melancholic major depression	Dysthymic disorder	Melancholia	Non-melancholic major depression	Dysthymic disorder
Number of patients	7	10	11	7	8	7
HARD mean score	31.4	21.8	13.1	11.3	9.8	7.3
HARD s.d. of mean	9.2	6.4	5.6	2.0	7.1	4.6
VA mean score	1.9	4.0	5.3	3.4	3.7	4.7
VA s.d. of mean	1.2	2.0	0.7	1.2	1.7	2.3
Number of patients with HARD 19-35 (subgroup)	4	6				
HARD mean (subgroup)	28	27				
VA mean (subgroup)	1.6	2.5				

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depression groups was carried out, including only those whose HARD scores were equivalent and suggested a similar depth of depression. This included all patients scoring 19–35 (HARD). The subcomparison was necessary because of the predictable overall tendency of the melancholic group to score higher on the HARD. This showed a trend towards greater disturbance of time awareness among melancholics, although the number of patients involved was too small to draw firm conclusions (Table 3).

Discussion

The results obtained support the hypothesis that disturbed time awareness tends to normalise as depressive illness resolves. They suggest that it tends to be slowed in depression, and that it is possible to show correlation between the degree of slowing and specific syndromes of abnormal mood and psychomotor retardation.

The finding of the strongest correlation between slowed time awareness and retarded psychomotor activity is in agreement with Lewis's (1932) claim that the two are due to a 'common factor', and are intimately related. The two studies which have examined the issue experimentally, Bech (1975) and Kitamura & Kumar (1982), did not support this finding, perhaps because of the limitations of questionnaires.

The present findings have to be qualified: there are methodological problems in any attempt to measure time awareness, and some of these are highlighted in this study.

Questionnaires are generally flawed by their inability to distinguish different experiences which may be crudely expressed by the same response. Possibly, patients' responses that time is static are an example of this flaw. Such a response may be considered figurative language communicating abnormal mood experience, as suggested by Bech (1975). It may also represent a kind of temporal anaesthesia, as suggested by Jaspers (1959). It may be frankly delusional or have an 'as if' quality about it. Hamilton (1985) described patients with nihilistic delusions who experienced the dramatic cessation of time. Patients within a group differentiated by questionnaire are probably quite heterogenous. This is supported in this study by the inconsistency between the high frequency of static time reported and the absence of patients scoring 0 on the VA. It is notable that the questionnaires used in earlier studies have avoided asking about static time experience.

A striking finding was the high proportion of patients reporting that time fluctuated from hour to hour. Eleven of the 14 patients who reported slowed time experience at the first assessment were in this category, as were six of the 11 who reported static time. The significance of this is unclear. Fluctuating time was almost equally common in the mild and moderate/severe groups; therefore it was not specifically associated with the diurnal variation of well-being which occurred in seven patients, all of whom were in the latter group.

It would be important to identify patients who describe significantly abnormal slowed time awareness, and who do not have high H or R scores. Such patients would weaken a direct causal explanation. In this study there were no such cases.

Only one patient with a VA in the accelerated range, 6, occurred in the moderate/severe depressed group. This patient scored 18 (H = 4, A = 10, R = 0, D = 4), suggesting the possible role of anxiety in at least some cases. Patients who scored over 5 on the VA could not be separately analysed because of their small number. It may be that anxiety or mania could produce this effect. Mixed affective states might produce particularly odd results.

There is very limited information on the possible effect of therapeutic drugs on time awareness. This study has not been able to deal with the question in a properly controlled manner, but one of the difficulties in interpreting these results is the possible contaminating effect of psychotropic drugs. Initial comparison of medicated and non-medicated subjects was not possible, as patients' drugs were not always under the author's control. The parallel improvement in overall depressive state and abnormal time awareness in the continuing presence of drugs, measured by both the questionnaire and the VA, suggests that drugs were not a simple causal factor. It is not possible to be sure that there was not a baseline disturbance in time experience because of prior and current drug exposure.

Neuroleptics might be implicated because of their tendency to produce Parkinsonism. This possible source of error was minimised by excluding patients on higher doses. It remains true that there was more exposure to neuroleptics in the moderate/severe groups, although the difference was not marked.

A further difficulty concerns the time of the assessments. Diurnal variation of well-being might be mirrored in time awareness, suggesting that assessment should be repeated at different times or that patients with prominent diurnal variation should be considered separately. Richter & Benzenhofer (1985) found no diurnal variation in time experience in their three-case study. Kuhs *et al* (1989) studied time estimations, which they found not to vary with a measure of diurnal variation of well-being. They speculated that this would apply to time awareness. Of seven patients in this study describing clear diurnal

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rhythm changes, mean HARD was 32, and mean VA was 2. In addition, six said they had slower time, and four said they had static time experience. It can be concluded that patients with rhythmic changes did not differ in their time experience from those with severer depression who did not have these changes.

An attempt in this study to compare melancholic and non-melancholic patients with an equivalent level of depression on the HARD was limited to only ten cases (Table 3). Although there was a trend on the VA results for time experience to be more abnormal in the presence of melancholia, the validity of the comparison is limited by the sample size, and a further study would be needed to clarify this point.

It is impossible to be certain that the test itself does not alter the subject's experience of time. It could be that the patient's act of response to the test brings out the experience of psychomotor slowing and determines the results. This hypothesis could be examined by observing patients' efforts to complete the test and comparing the findings with the VA.

Understanding of the causes of abnormal time experience is very poor. Although phenomenological analysis has delineated its components, this analysis remains, by definition, descriptive and not explanatory. There are, however, some clues. Abnormal time experience does occur in other mental illnesses, including organic brain disease (Lehmann, 1967) and epilepsy (Lishman, 1987). The variety of organic states implicated suggests that its causes are multiple and variable. An interesting idea emerged from Melges *et al*'s (1970) study of cannabis and time experience. They suggested that the flow of consciousness is analogous to a series of stills in a film. These 'moments' in consciousness can be speeded up or slowed down by toxic events, and this may create an impression of timelessness. Conceivably, a similar effect could arise in some primary mood disorders. Unfortunately, it is difficult to test such hypotheses.

A further cause might be other aspects of the patient's affect. Reference has been made to the possible role of anxiety and manic symptoms in modifying the slowed time experience of depression. It is possible that repetitive, ruminative thought or reduced quantity and wealth of thought might have such an effect in a patient whose attention to the external world would be reduced by mental pathology, either functional or organic.

This study suggests that retardation is a related factor. It is clear that depression changes the experience of 'being' with respect to both self and environment. Time experience is the medium in which this occurs and is also the medium in which some memory functions and anticipation occur. Perhaps slowing and diminution of the essential cognitive functions involved in these processes is responsible for changed time experience, while the patient remains capable of insightfully comparing abnormal and normal time experience. The biological and psychological determinants of the phenomenon of psychomotor retardation are beyond the scope of this paper, but they may hold the key to the problem.

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