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The influence of age and depression on intellectual and memory performances*

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ABSTRACT

Since we know that both aging and depression impair intellectual functionning, a question arises about specificity of impairement in each condition.

Intellectual and memory performances (WAIS, visual and verbal tests, attention task) were correlated on the one hand with a mood score (BfS) and one the other with age in a group of 101 men (age : 49 to 86; $\bar{x} = 59$).

We found that : 1° some intellectual tasks are more impaired by depression than by aging; 2° the digit symbol substitution test (WAIS) and the V.R.T. scores (Benton) are correlated with both mood and age ; 3° a weakened mental control appears among the older patients [Acta psychiat. belg., 84, *127-134 (1984)*].

Key words : *memory tests, mood scale, WAIS, human males.*

It is commonly accepted that age has an impact on certain intellectual functions, but debate still goes on regarding the effect of depression. For example, Kendrick and Post (1967) have detected no difference in intelligence, memory and graphomotricity tests between control groups and depressed people. On the contrary, Cronholm and Ottosson (1961), Rey (1966), Henry *et al.* (1973) and Stromgren (1977) have noted that depressed people perform, at least in certain tasks, significantly more poorly than healthy subjects. But opinions diverge as to the exact effect : for some (Cronholm and Ottosson), deficits would be due to learning rather

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than to memory, for others (Henry *et al.*) such disturbances would affect the transfer from short-term to long-term memory. For Stromgren, mental control would be slightly more affected by depression than verbal learning or visual memory would be. Stromgren also thinks that the contradictions which appear in the literature are due to methodological biases and particularly to the fact that certain variables, such as age and the degree of depression, have been consistently neglected. It is therefore interesting to investigate the respective influence of these two variables on intellectual and memory tests.

Aims and methods

Our purpose is to 1° measure the influence of age and depression on mental efficiency ; 2° measure the possible specific influence of either of these variables.

To this end, we have calculated the correlations between, on the one hand, age and the other variables observed and, on the other, the degree of depression and the same variables.

The degree of depression has been measured with von Zerssen's Befindlichkeit Skala (BfS) (french version by Bobon and Bobon-Schrod, 1974).

Efficiency has been measured with the following tests :

1. Wechsler Adult Intelligence Scale (WAIS).
2. Benton's Visual Retention Test (VRT).
3. Rey's « test d'une figure complexe » ; this complex drawing test consists *a)* in the copy of a geometric complex figure ; *b)* in the memory reproduction of this figure after a gap of two minutes. Drawing time, quality and accuracy are scored.
4. Rey's « profil de rendement mnésique » (PRM) : the memory performance profile is an eight scores pattern. The first score is the number of things that the patient indentifies correctly in a line of twenty drawings (tree, cat, table and so on). In the subtests 2, 3, 4 and 5, the patient has to identify the same things but from simplified drawings. Immediate recall and delayed recall (delay of 20 minutes) are the subtests 6 and 7. Double and wrong recalls are recorded. The last subtest is a subtest of recognition.
5. Rey's Auditory Verbal Learning Test (AVLT) : a fifteen words list is read aloud by the psychologist and learned by the patient who must recall as many words as he can. The same list is given out five times. Like in the PRM, double and wrong recalls are recorded.

Hundred and one men aged 49 to 86 years (M = 59 ± 6 years) were examined.

The starting point of this investigation was the study of former prisoners of war with no manifest psychopathological disturbances (Donnay *et al.*, 1977). We then investigated a group of severely depressed men (Mormont *et al.*, 1979) along with a control group. Because of the context in which our investigation was carried out, a number of control subjects were quite old, a fact which will have to be taken into account when analysing correlations.

Results

1. **Psychometric variables correlated with age and mood** (table I).

The number of signs reproduced in the WAIS digit symbol substitution test and of correct drawings in the VRT decreases with age and the severity of the depression, while the number of errors on the VRT increases in parallel with those variables.

TABLE I

Psychometric variables correlated with age and mood

	Age	*BfS*
WAIS : digit symbol substitution test	— 0.21*	— 0.25**
VRT-score	— 0.29**	— 0.28**
-score of errors	+ 0.40***	+ 0.30***

* = $p < 0.05$ ** = $p < 0.01$ *** = $p < 0.001$.

Performance in these two visuo-motor tests thus decreases in proportion to age and depression. This points to the presence of a negative factor in these two variables and shows that these two tests are good indicators of a decrease in performance.

2. **Psychometric variables correlated with age only** (table II).

Perceptivity and attention seem to decrease with age (WAIS-digit span ; figure complexe : copy score ; PRM : subtest 1).

This could provide a partial explanation for the nature of errors (substitution, size appreciation) in the VRT. On the other hand, there is a negative correlation between age and memory performance time in the complex drawing (figure complexe). In other words, the oldest people perform fastest. But this cannot be explained through a proportional worsening of memory (there is no negative correlation between age and

the memory score). It seems, however, that this may be due to the sampling : the oldest subjects were chosen as controls because of their good mental health whereas the depressed subjects were younger. This distortion in the sampling shows that it is depression rather than age that causes a decrease in psychomotor performance.

TABLE II

Psychometric variables correlated with age only

WAIS : Digit Span	— 0.23*
VRT — substitution	+ 0.28**
— errors in size appreciation	+ 0.32***
Figure complexe — copy score	— 0.26**
— memory performance time	— 0.24*
PRM — subtest 1	— 0.23*
— doubles on immediate recall	— 0.21*
— doubles on delayed recall	— 0.20*
AVLT — subtest 2	— 0.21*
— subtest 3	— 0.26**
— subtest 4	— 0.23*

* = $p < 0.05$ ** = $p < 0.01$ *** = $p < 0.001$.

In opposition, the learning of a list of words occurs significantly more slowly as age increases (AVLT : subtests 2, 3 and 4). The final result of learning (subtest 5) is not abnormally low, which indicates that aged subjects still manage to store a satisfactory quantity of recollections, but that such storing occurs more slowly.

Control of recall activity (PRM : immediate and delayed recall of doubles) does not change with age. On the contrary, subjects produce fewer double answers as they grow older, but this is not due to a general decrease in production (no significant decrease in recall scores).

3. **Correlations between the psychometric variables and the BfS score only** (table III).

It appears that the higher the scoring on BfS — i.e. the more the mood worsen —, the more the mental tonus collapses.

Efficiency in most of the tasks in the WAIS performance scale decreases, which results in a decrease in IQ. In addition, it is noteworthy that there is a significant and positive connection between the deterioration coefficient and the degree of depression, which would tend to show — provided one follows Wechsler's point of view — that depression influences intelligence with the same selectivity as « normal » physiological deterioration.

TABLE III

Psychometric variables correlated with the BfS score only

WAIS	— picture completion	— 0.28**
	— block design	— 0.26**
	— picture arrangement	— 0.22*
	— object assembly	— 0.33***
	— performance IQ	— 0.40***
	— full scale IQ	— 0.31***
	— deterioration coefficient	+ 0.20*
VRT	— omissions	+ 0.36***
Figure complexe : memory score		— 0.22*
PRM	— subtest 2	— 0.21*
	— subtest 3	— 0.29**
	— subtest 4	— 0.26**
AVLT	— subtest 5	— 0.24*

* = $p < 0.05$ ** = $p < 0.01$ *** = $p < 0.001$.

There is a clear indication that memory is impaired since learning in PRM decreased (subtests 2, 3 and 4) and recollection became more difficult (VRT : omissions ; figure complexe : memory score).

One very interesting last point concerns the drop observed in AVLT subtest 5 : such a drop gives the impression that the more depressed the subject is, the more tired he gets and loses interest, and his performances collapse systematically in the last subtest. This cannot be due to a memory deficit since learning is not impaired in the preceding subtests.

4. **Comparison of correlation.**

We have established that age and depression influenced a few visuo-motor tests (WAIS — digit symbol substitution test and VRT scores).

Two rather different patterns develop on such a common base of non specific worsening :

a) although the perceptivity and the learning rhythm of verbal data worsen with age, no general worsening of mental efficiency has been observed ;

b) depression results in a proportional weakening of the mental tonus, which limits immediate efficiency as well as memorization, with a stronger influence on visual than on verbal data.

AVLT provides particulary interesting results in that it illustrates the difference between depressed and aged subjects. The degree of depression has no systematic influence on learning in depressed subjects, whereas age causes a slowing down of learning. On the other hand, aged subjects

maintain their activity throughout whereas the performance of depressed subjects is all the weaker in the last subtest as their mood grows worse.

Noteworthy is also the negative correlation between :

a) the learning of visual data and depression ;
b) the learning of verbal data and age.

A possible explanation might be found in the difference in energy or tonus. The decoding and analysis of the visual material in PRM may require more energy than does listening in the AVLT. Hence, the depressed person, whose memory is not really impaired (he will recover it when he is cured), may store data more easily if all he has to do is record passively whereas he may balk at the effort necessitated by PRM. Conversely, the old but energetic subject will mobilize his energy in PRM and manages to memorize correctly whereas passive listening will betray the real worsening of his memory.

Conclusion

This study of 101 male subjects aged 49 to 84 whose thymic state ranges from good mood to severe depression shows that age and depression have negative effects on mental efficiency. But the effects of age and depression are different.

The older the subjects (provided they are still in relatively good mental health), the lower their perceptive and motor performances. Their learning is slower but reveals no deficit. Intellectual performance remains good.

Conversely, intellectual disturbances increase with the degree of depression. Mental tonus collapses. All the tasks that require an effort are poorly executed.

We can therefore conclude that depression has a quantitatively and qualitatively more important (but reversible) effect on intellectual functions than age.

There is no need to stress how useful it is, when we examine our patients, to be able to distinguish what can be attributed respectively to age and to depression, especially when we deal with patients who suffer from thymic disturbances so frequent in senescence.

RESUME

Influences spécifiques de l'âge et de la dépression sur les performances intellectuelles et mnésiques.

Bien que nous sachions que l'âge et la dépression altèrent le fonctionnement intellectuel, la question de leurs effets spécifiques se pose.

Des performances intellectuelles et mnésiques (WAIS, tests visuels, verbaux, d'attention) ont été corrélées d'une part à une échelle d'humeur (BfS), d'autre part à l'âge, dans un groupe de 101 hommes (âge : de 49 à 86 ans, $\bar{x} = 59$).

Il est apparu que : 1° certaines tâches intellectuelles sont plus altérées par la dépression que par l'âge ; 2° le sous-test de code (WAIS) et les notes au Test de Rétention Visuelle (BENTON) sont liés à la fois à l'humeur et à l'âge ; 3° un affaiblissement du contrôle mental apparaît chez les sujets plus âgés.

SAMENVATTING

De invloed van de ouderdom en de depressie op de verstands en geheugen prestaties.

Hoewel wij weten dat de ouderdom en de depressie de voorstands en geheugen prestaties vervalsen, blijft het probleem gesteld van de specificiteit.

De gevonden prestaties, in een groep van 101 mannen (49 à 86 jaar oud, X = 59) bij verstands en geheugenproeven (WAIS, visuele, mondeling en aandachtproeven) worden in verband gebracht met de gegevens van een stemmingsschaal (BFS) en met de ouderdom.

Wij vonden : 1° dat zekere verstandsproeven meer vervalst worden door de depressie dan door de ouderdom; 2° de code subtest (WAIS) en de test van het visuele bijhouden (BENTON) worden even vervalst door de stemming als door de ouderdom; 3° oudere personen hebben een vermindering van de verstandskontrole.

RESUMEN

Influencia especifica de la edad y de la depresión sobre los resultados intelectuales y mnesicos.

Aunque sabemos que la edad y la depresión alteran el funcionamiento intelectual, la cuestión de sus efectos especificos se plantea.

Las marcas intelectuales y mnesicas (tests visuales, verbales, de atención, WAI) se han puesto en relación por una parte con una escala de humor (Bfs), por otra parte con la edad, en un grupo de 101 hombres (edad : de 49 a 86 anos, X = 59).

Aparece que : 1° algunas tareas intelectuales estan mas alteradas por la depresión que por la edad; 2° el infra-test de código (WAI) y las notas al test de retención visual (BENTON) estas relacionados a la vez con el humor y con la edad; 3° una debilitación del control mental aparece en los sujetos más mayores.

BIBLIOGRAPHY

BOBON D.P., BOBON-SCHROD H. Les listes d'adjectifs BS/BS' de Zerssen et la ligne Scott : deux auto-évaluations de l'humeur. *Feuill. psychiat. Liège,* 7, 492-508 (1974).

CRONHOLM B., OTTOSSON J.O. Memory functions in endogenous depression. *Arch. gen. Psychiat.,* 75, 193-199 (1961).

DONNAY J.M., MORMONT C., BAUTHIER-STALON M. Profil psychologique de 42 prisonniers de guerre hospitalisés. In : Fédération des Anciens prisonniers de Guerre (Ed.). *Symposium sur la pathologie de la captivité*. Bruxelles, FNAPG, 1977.

HENRY G.M., WEINGARTNER H., MURPHY D.L. Influence of affective states and psychoactive drugs on verbal learning and memory. *Amer. J. Psychiat., 130,* 966-971 (1973).

KENDRICK D.C., POST F. Differences in cognitive status between healthy, psychiatrically ill and diffusely brain damaged eldery subjects. *Brit. J. Psychiat., 113,* 75-81 (1967).

MORMONT C., GILOT P., DONNAY J.M. Influence d'un traitement antidépressif par clomipramine sur les performances à des tests d'efficience. *Bull. Soc. belg. Psychol., 13,* 23-25 (1979).

REY A. *Les troubles de la mémoire et leur examen psychométrique*. Bruxelles, Dessart, 1966.

STROMGREN L. The influence of depression on memory. *Acta psychiat. scand., 56,* 109-128 (1977).

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