

MEMORY FOR REMOTE EVENTS IN ANTEROGRADE AMNESIA: RECOGNITION OF PUBLIC FIGURES FROM NEWSPHOTOGRAPHS

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Abstract—Patients with anterograde amnesia, including the case H.M. and a group of alcoholic Korsakov cases, were tested for their prompted and unprompted recognition of public figures who had become famous at various points in time from the 1920's to the 1960's. The comparisons between prompted and unprompted recognition for figures from before and after the onsets of the patients' amnesic syndromes were discussed in relation to competing theories of anterograde amnesia. The results were interpreted as not favoring the strong versions of either a faulty-storage or a faulty-retrieval theory.

INTRODUCTION

IN DISCUSSION of human memory and its possible mechanisms, cases of abnormal forgetfulness (anterograde amnesia) after brain injury or disease have played a special role. Yet, as these discussions progressed, there has been increasing controversy about the proper description of these conditions. Traditionally, anterograde amnesia has been defined as an impairment in committing ongoing events to memory, in the face of considerable preservation of memories for earlier (premorbid) events [1], and in the absence of general intellectual deficiency. More recently, this description has been further specified by insisting on essentially normal registration, and by emphasizing, either, a subsequent failure of normal consolidation [e.g. 2, 3], inefficient encoding [e.g. 4, 5] or instead, an impairment in the retrieval of apparently normally stored material [6], possibly because of abnormal interference between relevant and irrelevant traces.

The possibility remains that these descriptions are not clear-cut alternatives being applicable in various combinations to different kinds of amnesic conditions. Nevertheless, the different views lead to somewhat different predictions about the relative sparing of premorbid (as opposed to postmorbid) memories, and about the ways in which seemingly forgotten material can be evoked with the aid of prompts. On a strong version of a faulty retrieval theory, memory for premorbid events should be as defective, under conditions of free recall or recognition, as memory for postmorbid events. Conversely, on this hypothesis, appropriate prompting—by reducing the effects of interference—should improve the performance for memories from any epoch in a patient's life. On the strong version of the view that anterograde amnesia is typically a failure to store ongoing events, one would expect good recall for premorbid material, in sharp contrast to the failure to recall events

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that came after the onset of the illness; moreover, in so far as postmorbidity events are in fact not stored, the patient should derive no help from any kind of prompt. On a view stressing primarily faulty encoding after the onset of an anterograde amnesia, there should again be a contrast between early memories (well-preserved) and memory for postmorbidity events (defective), but, as on the faulty-retrieval notion, there should be the possibility of demonstrating at least partial storage by recourse to particular kinds of prompts.

Anterograde amnesias arising from different causes may not be equally suitable for testing these various predictions, and it will therefore be necessary, in the long run, to investigate etiologically diverse forms of amnesia, in order to test the generality of the various descriptions [e.g. 7]. In particular, one would like to include some instances of persistent anterograde memory disorders following damage to medial temporal lobe structures [2, 8], as well as the often studied amnesia associated with long-standing alcoholism.

Cases such as the justly famous patient H.M. of SCOVILLE and MILNER [9] afford the advantage that the onset of the condition is sharply demarcated in time; his anterograde amnesia began immediately after one-stage, bilateral resection of amygdala and large portions of hippocampus and hippocampal gyrus, performed in 1953 in an attempt to provide relief from non-focal epilepsy. Aside from a period of apparent retrograde amnesia for one to two years immediately preceding the operation, memories for the period before and after that date can be readily compared.

This comparison is more difficult, though not impossible, in the memory disorders associated with severe alcoholism or similar toxic or metabolic damage to the brain. These disturbances often have an insidious onset, and even in cases of Korsakov's syndrome, where the beginning of the illness is marked by a florid confusional state, the effects of the preceding alcoholism make it difficult to identify the exact date at which these memory defects might have begun. Nonetheless, it is usually possible to define an earlier period in such a patient's life when he was presumably recording ongoing events in essentially normal fashion.

Accordingly, in the present experiments, we have examined the performance of H.M. and of a group of twelve patients with Korsakov's syndrome, together with three different control groups, on a test involving recognition of news photographs of public figures, who had become famous at different times from the 1920's to the late 1960's, thereby enabling us to compare the amnesic patients' recognition of public figures famous from before and after the onset of the patient's illness. The task differed from one used by SANDERS and WARRINGTON [10], which appeared while this study was in progress, in a number of ways which will be discussed later.

In order to probe, if only in preliminary fashion, for kinds and degrees of memory loss, we introduced two types of prompts, letter prompts and circumstantial prompts, essentially following the method first described by LOTMAR [11, 12], who examined word-finding difficulties in aphasic patients by giving them either letter prompts (N, Na, Nap, . . . , for Napoleon), or circumstantial prompts ("the man who lost the battle of Waterloo"). This approach is similar, though not identical, with the one advocated recently by BUTTERS and CERMAK [4, 5], who have suggested that amnesics of the Korsakov variety fail to encode the semantic aspects of material, relying instead on acoustic features with consequently less efficient long-term storage.

The control groups for H.M. comprised 34 head-injured veterans of the Korean campaign whose ages and time of injury matched H.M.'s age and time of operation, as well as

15 non-injured veterans of that campaign of similar age and background. Since the possible role of alcoholism as such, previous to the onset of the overt Korsakov syndrome, required consideration, the control group for the Korsakov cases was composed of 12 patients with histories of severe alcohol abuse but without history or symptoms of a Korsakov syndrome.

METHOD

Although the subjects of the study were briefly characterized in the introduction, a few additional details will be necessary.

1. *H.M.*

This case has been described in a number of publications since 1957 [e.g., 3, 9]. He had undergone a bilateral mesial temporal-lobe removal including amygdala, hippocampus (back to about 8 cm) and hippocampal gyrus, in 1953 when he was 27 yr old. The patient had then and continues to have above average general intelligence, and a low-normal digit span (six digits forward); he impresses an interviewer as essentially intact, but shows extraordinary forgetfulness for everyday events and necessities, as described, e.g. in 1968 [3]. For the present study he was tested twice, eight months apart, in December, 1972 and July, 1973, the first time without prompts, and the second time after the prompting procedure had been introduced.

The control group for H.M. consisted of 34 head-injured but non-amnesic patients whose injuries were sustained, as already mentioned, in action during the Korean War (1950–1953). The mean age of this group at the time of testing was 42.5 yr and thus not too far below H.M.'s ages of 46–47 at the time of the two tests for recognition of famous faces. An additional control group of 15 combat veterans without head injuries was later added since the first control group had been tested before the introduction of our prompting procedures. The average age of that group was 40.2 yr and their background closely resembled that of the head-injured men.

2. *Korsakov cases*

The second experimental group consisted of 12 male alcoholic patients bearing a diagnosis of Korsakov's disease, with amnesic syndromes ranging from 11 months to nearly 10 yr in duration (with a mean duration of 4 yr and seven months). These onsets of their memory disorders were dated from the first hospital admission in which a diagnosis of Wernicke-Korsakoff syndrome was made. Thus all subjects were well past the initial florid state typical of the onset of the syndrome and as their IQ scores (mean 103) indicate they showed no signs of dementia at the time of testing (July and August, 1973). According to their medical histories, all of these patients had initially exhibited the combination of signs on which the diagnosis of Korsakov's syndrome, in this particular group, was based: They had been deemed addictively alcoholic for a number of years ranging from 15 to 34, prior to the onset of their amnesic syndrome. They all were said to have presented, at one time, the signs of acute Wernicke-Korsakov encephalopathy, i.e. either oculomotor disturbances, or ataxia, or both, combined with peripheral neuropathies. At the time of testing, however, their oculomotor status was essentially normal, though some showed mild cerebellar signs, or residual peripheral neuropathies. The mean age of this group of twelve patients, at the time of testing, was 54.7 yr, with a range of 45–64 yr.

As additional control subjects for this group with Korsakov's syndrome, a group of 12 alcoholics from the Alcoholism Unit at the Brockton VA Hospital was also tested. They were matched with the Korsakov cases for age, (mean 53.1 yr) and, as far as possible, for IQ (mean 106).

The purpose in testing this group, apart from controlling for age at time of testing, was to control for the possible effects of alcoholism *per se* on memory for recent public figures. Even if an alcoholic's memory is not affected, his memory for recent events may be impaired because his alcohol intake might have interfered with his original registration of such events. We needed to be able to distinguish such effects from those produced by an anterograde amnesia.

STIMULUS MATERIALS

The materials for the test consisted of 65 8 × 10 in. black and white photographs portraying 85 famous individuals. Eighteen of these were film stars or other entertainers, 17 were politicians and public servants, 15 were foreign leaders, 11 were sports figures, 9 were Presidents of the U.S., 5 were religious leaders, 3 were scientists or inventors, and 7 fell into other categories. The public figures were assigned to that decade in which they first became nationally famous. Twelve were assigned to the 1920's, 17 to the 1930's, 17 to the 1940's, 19 to the 1950's, and 20 to the 1960's.

We did not attempt to select individuals who were famous only for a restricted period of time and then faded into obscurity. To answer the questions we were asking, it was only necessary to establish the date *before* which the subject could not have known about the person being shown to him.

EXPERIMENTAL PROCEDURE

The photographs were presented in a pseudo-random order, with the faces from each decade spread over the whole series. The same order of presentation was used for all subjects. The subjects were tested individually. They were first informed that they were going to see a series of photographs of people who had been famous for one reason or another at some point during the last 50 years. They were told that they would be asked to answer up to 3 questions for each famous face: (1) whether the face was familiar or unfamiliar; (2) if the face was familiar, whether they knew the name; (3) why and when the named person was famous. It was stressed to the subjects that (1) and (2) were different questions, and that a face might well seem familiar even if they could not place it. The subjects were given as much time as they needed to respond to each photograph.

After the entire series of faces had been presented, the subjects were told that they had done very well but that there were a few faces they had missed, either by misidentification or by failure to identify some faces altogether. This had in fact happened in every case including the most proficient control subject. They were further told that the faces they had missed would be shown again, and that, if necessary, they were to receive help in their identification.

If on this second presentation the subjects could not identify the face correctly they were then given either a circumstantial or a letter prompt. An example of a circumstantial prompt (for Alfred Landon) is as follows: "He was the Republican presidential nominee in 1936; he ran against Roosevelt and lost. He was also governor of Kansas." The letter prompts were graded systematically. The subject was first given the initials, then the first syllable of the first name, then all of the first name, the first syllable of the last name, and as far beyond that as possible letter by letter, without giving the full word. Thus for Alfred Landon the letter prompt sequence was as follows: A.L.; Alf. L.; Alfred L.; Alfred Lan . . . ; Alfred Land. . . . If the prompts had not elicited the full name by this time, the subject was given the rest of the last name and asked if he had ever heard of the person in question.

We alternated between circumstantial and letter prompts throughout the series of faces which had not been correctly named during the initial, unprompted presentation of the series. The letter prompts for a given face were not followed by circumstantial prompts, but an unsuccessful circumstantial prompt was always followed by a series of letter prompts for that face. No attempt was made to use misleading prompts, nor were subjects left unaware of whether their performance after prompting was correct or not. In H.M.'s case, the first session (December, 1972) was done without prompting; the second (July, 1973), with the full prompting sequence, as described. His sessions were tape-recorded, those with the other patients and control subjects were recorded in writing during the tests. The full testing procedure lasted from 1-1.5 hr, depending on the amount of prompting required.

RESULTS AND DATA ANALYSIS

1. *H.M. unprompted*

Table 1a lists the unprompted mean scores for H.M. and for the two control groups, head injured and normal veterans of the Korean campaign. The scores are given as per cent correct per decade in Fig. 1. Since H.M.'s performance on the two test sessions (done 8 months apart) is so stable, we took the mean of these two scores as his unprompted score.

H.M.'s recognition rate was above average for the 1920's and the 1930's, fell off slightly for the 1940's and dropped dramatically for the 1950's and the 1960's. He managed to recognize some faces, for example, John Glenn, Elvis Presley, and Krushchev, which he could only have encountered after 1953. Yet in general, his performance indicated a severe deterioration of unprompted memory for faces from the last two decades. The slight and non-significant fall-off for the 1940's may reflect a mild retrograde amnesia; he was quite confused when questioned about events in the mid- and late 1940's.

The normal control subjects did better than the head-injured control subjects throughout, but the response pattern for the two groups across decades was qualitatively similar. All the control subjects individually did better on the more recent faces. The peak in the curves for the 1940's may be due to an idiosyncrasy of this particular series of faces, or to the greater salience of war-time figures.

2. *H.M. prompted*

The prompting procedures were very effective for both the normal control subjects and

Tables 1a and 1b. Unprompted correct identification

	Number correct by decade					
	<u>20's</u>	<u>30's</u>	<u>40's</u>	<u>50's</u>	<u>60's</u>	<u>Total</u>
Maximum Possible:	12	17	17	19	20	85
<u>1a</u>						
H.M. Test I	6	12	11	4	2	35
Test II	6	12	12	3	1	34
Mean:	6	12	11.5	3.5	1.5	34.5
Head-injured Controls:	3.0	7.5	10.1	9.1	11.3	41.0
(n=34) Range:	0-8	1-13	2-17	2-16	3-17	14-65
Normal Controls:	4.6	9.7	14.3	13.1	14.9	56.6
(n=15) Range:	1-9	3-14	8-16	9-18	11-17	34-70
<u>1b</u>						
Alcoholic Controls:	5.7	9.8	11.8	8.5	9.8	45.7
(n=12) Range:	3-10	5-13	6-35	3-14	4-13	21-62
Korsakovs:	5.4	8.1	9.3	6.1	4.4	33.4
(n=12) Range:	1-11	4-13	2-14	0-11	1-9	9-51
Mean Difference:	0.3	1.7	2.5	2.4	5.4	12.3

for H.M. (see Table 2a and Fig. 2). The prompted scores of the controls were throughout above 90 per cent of the total possible, and reached 99 per cent in the 1940's and 1960's. H.M.'s performance was indistinguishable from the controls for all decades, except for the 1960's where his prompted total of 16 (out of 20) was somewhat below the average of 19.8 reached by the controls.

3. Korsakov cases unprompted

The unprompted scores for the Korsakov cases and their alcoholic controls are given in Table 1b and (as percentages) in Fig. 3.

The Korsakov cases did worse than the alcoholics for all decades, but the pattern of their results across decades was very similar until the 1960's, when their recognition rate fell off sharply. The difference between the two groups, Korsakov cases vs alcoholic controls, is negligible for the 1920's ($t = 0.428$, $df = 22$, non-significant), and increases to a constant, marginally significant level for the 1930's, the 1940's, and the 1950's. The difference for the 1960's is twice as large and highly significant ($t = 5.002$, $df = 22$, $P < 0.001$).

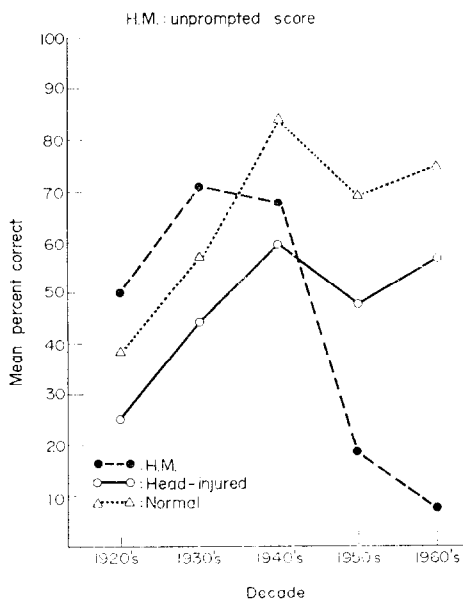


FIG. 1. Per cent correct identifications of faces (unprompted) in each decade, for H.M., head-injured controls, and normal controls.

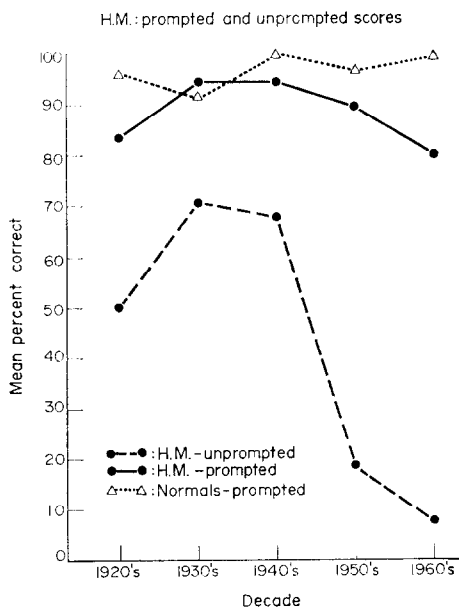


FIG. 2. Per cent correct identifications of faces (prompted and unprompted) in each decade for H. M. and (prompted scores only) for normal controls.

Tables 2a and 2b. Prompted correct identification

	Number correct by decade					Total
	20's	30's	40's	50's	60's	
Maximum Possible:	12	17	17	19	20	85
<u>2a</u>						
H.M.:	10	16	16	17	16	75
Normal Controls:	11.5	15.5	16.9	18.3	19.8	82.0
(n=15) Range:	10-12	13-17	16-17	17-19	19-20	77-85
<u>2b</u>						
Alcoholic Controls:	11.4	15.7	16.7	17.4	17.5	78.7
(n=12) Range:	10-12	14-17	16-17	14-19	14-20	74-85
Korsakovs:	11.2	15.4	16.3	17.2	16.4	76.5
(n=11) Range:	9-12	13-17	13-17	15-19	10-20	66-82
Mean Difference:	0.2	0.3	0.4	0.2	1.1	2.3

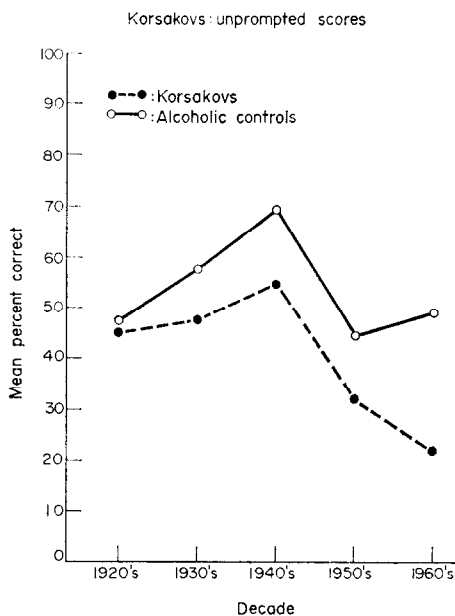


FIG. 3. Per cent correct identification of faces (unprompted) in each decade, for Korsakov cases and alcoholic controls.

4. Korsakov cases prompted

One of the Korsakov subjects was excluded from the prompted groups because a severe hearing loss made it difficult for him to hear the prompts.

As Table 2b and Fig. 4 demonstrate, the effect of prompting is to make the scores of the Korsakov cases and their alcoholic controls indistinguishable from each other for all decades. The largest difference for the 1960's, does not approach significance ($t = 0.948$, $df = 21$, non-significant), and cannot account for the 5.4 points difference in their unprompted scores.

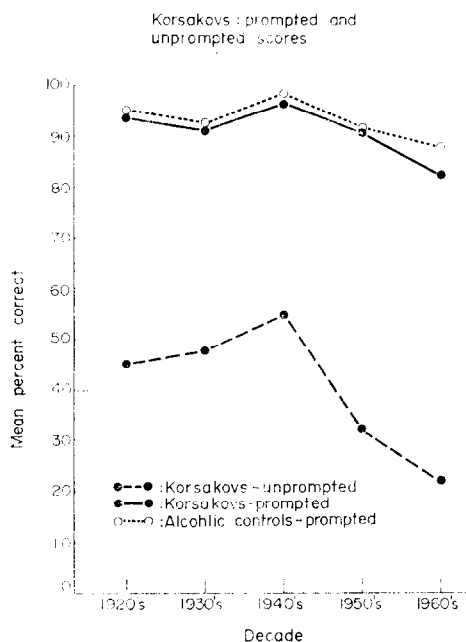


FIG. 4. Per cent correct identifications of faces (prompted and unprompted) in each decade for Korsakov cases and (prompted scores only) for alcoholic controls.

5. Analysis of prompts

Number of prompts required for correct identification of a given face was, as expected, greater for H.M. than for normal subjects, but this was not differential for pre- and post-morbid material. The same was true for the Korsakov cases: although they tended to be less efficient than the alcoholic controls in using prompts, this effect was not specific to the most recent material and in fact diminished over the last two decades. Even on using a more refined measure of utilization of prompts, essentially the same picture was obtained. (This measure was based on the per cent increase produced by prompting, divided by the mean number of prompts required.)

Furthermore, we looked into the possibility that the two types of prompts, i.e. circumstantial and letter prompts, might have had differential effects. Table 3 shows the results of such an analysis. Evidently there were no differences between Korsakov cases and alcoholics, and no systematic decrease across decades. Although the levels of the two groups dropped for the 1950's, the proportion of successful circumstantial prompts for the 1960's was as high as for the 1920's and 1930's, and higher than the normal scores for the 1960's. Overall, the Korsakov cases and the alcoholics had a slightly higher percentage of successful circumstantial prompts than the normals. Generally, the Korsakov cases did not show a specific impairment on the more "semantic" prompts for either pre- or post-onset material.

H.M., nevertheless, did show a differential trend in the direction suggested by BUTTERS and CERMAK [4, 5], in that he seemed unable to use circumstantial prompts for the post-morbid material. It should be noted, however, that the number of observations involved (ten) was small.

Table 3. Percentage of successful circumstantial prompts

	Number correct by decade					Total
	20's	30's	40's	50's	60's	
Normal Controls:	55.8*	48.5	63.2	55.6	42.3	53.0
Alcoholic Controls:	65.7	58.6	52.2	37.9	65.2	56.1
Korsakovs:	61.9	65.5	59.1	35.7	66.7	56.8

*The figures represent the percentage of the successful initial letter and circumstantial prompts added together that were circumstantial prompts.

6. Incidence of misidentifications

Neither H.M. or the patients with Korsakov syndrome differed from the various control groups with respect to the selective incidence of "false positive" responses, i.e., misidentifications as compared with their statement that a given face could not be identified.

DISCUSSION

The outcome of this study is not compatible with the strong versions of either a faulty-storage or a generalized poor-retrieval hypothesis about anterograde amnesia. The patient H.M. as well as the 12 patients with Korsakov's syndrome patently did better, in the unprompted condition, for faces to which they had been exposed for some years before the onset of their amnesia, and performed quite badly when asked to identify public figures who had more recently become famous. This was particularly striking in the case of H.M., where the date of the operation that provoked the amnesic syndrome is exactly known. A non-differential difficulty with retrieval should have affected performance for pre- and post-onset material alike.

At the same time, any strong claims for a failure to store events after the onset of an amnesic syndrome has to be tempered by the remarkable effectiveness of prompting in eliciting successful identification of faces to which the patients could only have been exposed after the onset of their memory disorder. That some recent material is getting stored, and occasionally retrieved, either spontaneously or under the influence of appropriate hints, has of course been noted by a number of observers, irrespective of their theoretical views about the nature of amnesic states. Nevertheless, the findings of our present study may serve to underscore the extent to which, even in an amnesia as severe as H.M.'s, such an uncovering of seemingly lost memory traces is possible.

On the other hand, it would be unwise not to stress that the number of prompts required in H.M.'s case, for the recognition of public figures whose fame began only after 1953 (the date of H.M.'s operation) was 50 per cent above the normal mean, indicating that

even under conditions of extensive cueing, his memories are not as readily brought out as in normal subjects.

The patterns of prompted and unprompted scores, for the cases of Korsakov's syndrome, was essentially as BUTTERS and CERMAK might have predicted, except that we did not find the expected advantage of letter prompts over circumstantial prompts (i.e., prompts that BUTTERS and CERMAK would have called "semantic"). Our prompting procedure, however, was far from a direct test of their hypothesis, since it is not clear whether our two classes of prompts really correspond to theirs.

Nor is it possible to compare our findings, in the unprompted condition, with the strikingly different results of SANDERS and WARRINGTON [10], whose amnesic patients did equally badly on both pre- and postmorbidity material. Aside from probable differences in the kinds of patients tested in their study and in ours, there are major differences in the test materials. As we pointed out, we did not attempt to find public figures whose fame might have faded after a particular period; our concern was to identify the approximate date when their fame began. By contrast, SANDERS and WARRINGTON took pains to concentrate their choices of test photographs on those public figures whose fame had come and gone. They were explicitly concerned with what they called the "fate of old memories" which we could not, strictly speaking, evaluate with our procedures.

Nonetheless, the fact remains that, without prompting, there is a clear difference between the success of our Korsakov patients with faces from the 1920's to the 1950's, and their relative failure with those from the 1960's (except in H.M.'s case where a precipitous decline sets in already for the 1950's, in line with the abrupt onset of his disorder in 1953). Such a result would, of course, have been expected on the traditional view of anterograde amnesia, which has always assumed a relative sparing of older memories, aside from the puzzling facts of retrograde loss for a period immediately preceding the onset of the trouble.

A similar conclusion has recently been reached by SELTZER and BENSON [13] on the basis of a questionnaire probing memory for public events across different decades. There, too, events falling into a premorbid period (for essentially the same group of Korsakov cases) were better recalled than more recent postmorbidity events, just as traditional assumptions would have predicted. Similarly, a very extended series of biographical interviews with H.M. [14] yielded rich recollections for the first two decades-and-a-half of his life, in contrast to a virtual absence of such recollections for the two decades since his operation. This near-total failure of free recall for his postmorbidity autobiography must be weighed against the fact that he has produced, at times, evidence of unprompted recognition or recall of figures or events to which he can only have been exposed post-operatively, ranging from his recognition of President Kennedy on a half dollar [3] to some of his more intriguing misrecognitions on our test for famous faces: for example, on being shown a picture of Einstein, he called him Pompidou, adding that he meant a French statesman. This was doubly surprising, since Pompidou was not a particularly well-known figure in the U.S., and must have been unknown to H.M. until sometime in the 1960's.

H.M.'s behavior thus underscores the perplexing quality of severe amnesia: it is not all or none, even in such a grave case as H.M.'s, and it does not readily lend itself to those interpretations of amnesia which speak of generalized failure either of storage or retrieval. A good deal more postmorbidity material is stored than can be retrieved without considerable prompting, but if a general failure of retrieval were the basis of the trouble, it should have extended to the early premorbid material as well. The fact that it did not, under our conditions of testing, brings us back to the classical view that there is something amiss in the

way in which ongoing events, after the onset of the amnesic syndrome, are stored. Unfortunately, there is little in our data that could shed further light on the nature of this disturbance of storage.

A promising tack one might take is to look further into the question of whether items that do get into long-term storage, despite severe anterograde amnesia, are indeed stored in an abnormal fashion, and hence are rendered less accessible for retrieval. Our present observations are not incompatible with those recent approaches that invoke some inefficiency of encoding as one major factor. Other work [15] suggests, in addition, that H.M. performs abnormally on verbal learning tasks involving an extended-span paradigm [16]. H.M., when asked to repeat an unrelated word string exceeding his normal span, will produce large numbers of "recombination" errors; for example, he will substitute the response "waste" for the list words "wake" and "taste". Similar responses were noted for the cases of Korsakov's syndrome. Although we do not wish to imply that other tasks might not demonstrate some differences between H.M. and the Korsakov cases, this abnormality in immediate recall may be indicative of a more long-lasting disturbance of storage shared by both groups.

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Résumé

On a examiné chez des malades avec amnésie antérograde, comprenant le cas H.M. et un groupe de malades atteints de Korsakoff d'origine alcoolique, la reconnaissance, avec ou sans aide, de visages de personnalités devenues célèbres à des époques variant entre 1920 et 1960. On discute les comparaisons faites entre les reconnaissances avec ou sans aide, des visages selon que leur célébrité date d'avant ou d'après le début des syndromes amnésiques, en tenant compte des théories qui sont en compétition sur l'amnésie antérograde. L'interprétation de ces résultats n'est pas en faveur des aspects "forts" aussi bien de la théorie d'un déficit de l'emmagasinement que d'un déficit du rappel.

Zusammenfassung

Patienten mit anterograde Amnesie, darunter auch der Fall H. M. und eine Gruppe von alkoholischen Korsakowkranken wurden auf ihr sofortiges oder verzögertes Erkennen von bekannten Persönlichkeiten getestet, die in verschiedener Hinsicht in der Zeit zwischen den zwanziger und den sechziger Jahren berühmt geworden waren. Die Vergleiche zwischen sofortigem und verzögertem Erkennen von Persönlichkeiten aus der Zeit von vor und nach dem Auftreten der amnestischen Syndrome der Patienten wurden hinsichtlich konkurrierender Theorien über die anterograde Amnesie diskutiert. Die Resultate wurden dahingehend interpretiert, daß sie keine der einseitigen Versionen favorisieren, weder die Theorie fehlerhafter Speicherung noch diejenige eines fehlerhaften Abrufes.