Neuropsychologia, Vol. 16, pp. 683 to 695.
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0028-3932/78/1201-0683$02.00/0

THE RECOGNITION AND ENCODING OF FACES BY ALCOHOLIC KORSAKOFF AND RIGHT HEMISPHERE PATIENTS

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(*Received* 29 *May* 1978)

Abstract—Alcoholic Korsakoffs, patients with right-hemisphere lesions, long-term alcoholics and normal control subjects were examined on three tests of facial memory and encoding. The Korsakoffs and patients with right-hemisphere lesions were impaired in their memory and simultaneous matching of unfamiliar faces. Their performance on a facial processing task indicated that they matched faces on the basis of superficial features such as paraphernalia and expression rather than the deeper configurational characteristics of faces. It is suggested that such superficial encoding may be partially responsible for these patients' visuoperceptual and memory problems.

INTRODUCTION

IT HAS been proposed that the verbal memory deficits of alcoholic Korsakoff patients are related to an impairment in their information processing. CERMAK and BUTTERS [1] have attributed the Korsakoffs' inability to acquire verbal materials to a deficiency in the depth of their verbal encoding. The Korsakoffs encode or analyze the superficial characteristics (e.g. phonemic or associative atrributes) of verbal stimuli but fail to consistently categorize information according to its deep semantic features. While other investigators have stressed the Korsakoffs' deficits in contextual encoding [2, 3], their interpretations do not conflict with the notion that these patients restrict their encoding to the more superficial rather than to the deeper levels of analysis. GLOSSER, BUTTERS and SAMUELS' [4] demonstration that alcoholic Korsakoffs have a general limitation in the amount of information they can abstract from a verbal stimulus is also consistent with the depth of encoding hypothesis.

The main focus of the present investigation is to determine whether deficiencies in depth of encoding are also responsible for some of the Korsakoffs' nonverbal visuoperceptive deficits. In addition to their problems with verbal memory, alcoholic Korsakoffs are significantly impaired on a number of visuoperceptive tasks such as retention of random geometric forms [5], digit-symbol substitution tasks [6–8], hidden figure tests [6–8], and on visual card sorting tasks [9, 10]. OSCAR-BERMAN and SAMUELS [10] provided some evidence that the Korsakoffs' perceptual problems may reflect an incomplete analysis (i.e. encoding) of all of the attributes of visual stimuli. Korsakoffs were trained to discriminate between

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complex visual stimuli differing on a number of relevant dimensions (e.g. color, form, size and position) and then were administered transfer tasks to determine which of the relevant stimulus dimensions had been noted. While the intact controls showed transfer to all of the relevant stimulus dimensions, the Korsakoffs' discriminations were based upon only one or two of the relevant features of the stimuli.

To further assess the possibility that the alcoholic Korsakoffs' visuoperceptive problems are attributable to a deficiency in the depth of their nonverbal encoding, we employed a series of facial recognition and matching tasks. These facial tests were chosen because recognition of unfamiliar faces appears to be a nonverbal task depending upon the integrity of the right hemisphere [11–13] and because methods have recently been developed for assessing the attributes an individual uses in recognizing and matching unfamiliar faces [14, 15]. One test developed by CAREY and DIAMOND [14, 15] compares the use of paraphernalia, expression, and configurational facial cues. Six and 8 yr old children rely heavily upon superficial paraphernalia to determine identity of unfamiliar faces while older children (10 yr) shift to the adult strategy of analyzing the complex configurational relationships (e.g. the spatial relationships between the nose, mouth, and eyes). The young child, but not the adult, will judge two photographs of faces to be identical because both models are wearing the same hat or have the same hair style. If alcoholic Korsakoffs tend to analyze only the superficial characteristics of patterned visual stimuli, their performance on the Diamond–Carey facial recognition task should be qualitatively similar to that of children.

Three sets of facial recognition and matching tests are administered to alcoholic Korsakoffs, patients with right-hemisphere damage, long-term alcoholics, and normal controls. Two tests examine whether the patients can recognize and match photographs of unfamiliar faces, and the third test is DIAMOND and CAREY's [14, 15] facial processing task.

Right hemisphere patients have been included because they have a wide array of severe visuoperceptive deficits (e.g. [16, 17]) including the recognition of unfamiliar faces [11–13]. DIAMOND and CAREY [14, 15] have suggested that some of the visuoperceptive deficits of right hemisphere patients are related to piecemeal analyses of visual stimuli and that these patients should perform like young children on their facial recognition task. Since the emphasis of this paper is upon the processes underlying known recognition deficits in Korsakoff and right hemisphere patients, other populations, such as left hemisphere patients, have not been included. The results and interpretations of this investigation are limited then to the two patient populations under study and do not bear directly on the issue of hemispheric lateralization.

EXPERIMENT 1

Methods

Subjects. Four groups of male subjects were employed in the present study: 13 alcoholic Korsakoffs, 13 long-term (at least 10 yr of alcohol abuse) alcoholics, 8 patients with right-hemisphere damage and 14 intact nonalcoholic controls.

All of the Korsakoff patients have been used in previous experiments from this laboratory and have been described extensively [18]. They have severe anterograde and retrograde amnesias but have full-scale I.Q.'s (based on the WAIS) that are within normal limts ($\bar{X} = 101$). The mean age of this group was 53 yr.

All of the long-term alcoholics had at least 10 yr histories of alcohol abuse, but had been detoxified for a minimum of 30 days prior to the administration of our tests. None of the alcoholics showed signs of severe memory problems during a clinical examination. Alcoholics with a history of severe head trauma were excluded from this study. The mean I.Q. of the alcoholics was 110 and their mean age was 53 yr.

Of the eight right hemisphere patients, five had cerebrovascular accidents, two had had neoplasms removed, and one had endured a traumatic injury to the right side of his brain. All of the right hemisphere patients had been right handed prior to their brain injuries. Seven of the eight patients had some paralysis and sensory loss on the left side of their bodies. Three patients had visual field defects, and three evidenced some visual neglect of the left half of space. When the patients with visual field defects or neglect were tested, the examiner positioned the test stimuli somewhat to the right of the midline of the patient's body and and continually reminded the patient of the stimuli falling within or near his left visual field. Although I.Q. scores were not available for these patients, all were judged on the basis of their educational backgrounds to have been within normal limits premorbidly. The mean age of this group was 58 yr.

The normal controls were matched with the Korsakoff and alcoholic groups for socioeconomic and educational background. The mean full-scale I.Q. of this control group was 112, and their mean age was 53 yr. All of the controls were non-hospitalized volunteers recruited from newspaper advertisements.

Materials and procedures. Materials and procedures similar to those described by MILNER [12] were used. For the delayed identification (i.e. memory) task, the subjects were presented with two sets of photographed faces of college students. These photographs were obtained from a 1968 college yearbook. Set I was a 4 × 3 array of 12 photographs (6 male, 6 female), each measuring $1\frac{1}{8} \times 1\frac{1}{4}$ in. Set II was a 5 × 5 array of 25 faces (12 male, 13 female) that included the 12 faces of Set I randomly interspersed with the 13 new faces. Each photograph of Set II measured $1\frac{1}{8} \times 1\frac{1}{4}$ in.

The subject was told that he would be shown some faces and that he should study them carefully so that he would be able to recognize them when they were presented a second time together with faces he had not previously seen. He was then allowed to inspect Set I for 45 sec, after which the photographs were removed. To insure that the patients with right-hemisphere damage did not neglect the faces on the left side of the matrix, the examiner continually reminded these patients to examine the faces on the left side of the inspection card. The subject was then told to sit quietly for 90 sec and at the end of that time was shown Set II in which each photograph was numbered. He was told to call out the numbers corresponding to the 12 faces that he had already seen. If he selected fewer than 12 faces, he was encouraged to continue "guessing" until he had made a total of 12 choices. Again to counter any tendency to neglect the left half of the choice card, the right hemisphere patients were reminded to inspect the faces on the left side of the matrix. The score attained is the number of incorrect responses, with 6 errors essentialy a chance performance.

For the immediate identification (i.e. matching) task the test materials consisted of two sets of photographed faces of college students. Set I was a series of 12 individual faces ($1\frac{1}{8} \times 1\frac{1}{4}$ in.) on separate cards, each measuring 5 × 5 in. Set II was a 5 × 5 array of 25 faces (13 males, 12 females) that included the 12 faces of Set I randomly interspersed with the 13 new ones. This array was enclosed in a hinged cover which could be opened to display the group of faces or closed to cover them. Each photogaph in the array measured $1\frac{1}{8} \times 1\frac{1}{4}$ in.

The subject was told that he would be shown an individual face on a separate card and that he should try to find the same face in the larger group of faces. He was then presented with the closed array within which had been placed one of the individual cards. He was instructed to open the larger card as soon as he was ready, to find the matching face as quickly as possible, and then to call out the number on that photograph. If the subject selected an incorrect face, he was told to continue looking until he found the correct match. Any further incorrect matches were recorded until the correct match was made or until 2 min had elapsed. This procedure was repeated for all 12 individual cards. As with the delayed identification task, special procedures (i.e. reminding the patient to inspect the left half of the choice card) were followed with patients with right-hemisphere damage to reduce any effect of sensory neglect.

RESULTS

Delayed identification

A one-way analysis of variance design in which group (Korsakoff, right hemisphere, alcoholic and normal control) effects could be assessed was performed on the error scores. To evaluate individual group comparisons (e.g. Korsakoffs vs normals) the Duncan procedure for multiple comparisons was used.

Figure 1 shows the mean number of errors compiled by the four groups on the delayed identification task. The group effect was significant ($F = 6.66$, $df = 3{,}44$, $P < 0.01$). The Duncan procedure revealed that the differences between the Korsakoff and normal control ($q = 4.06$, $df = 44$, $P < 0.01$) and between the right hemisphere and normal control groups ($q = 3.11$, $df = 44$, $P < 0.05$) were statistically significant. None of the other group comparisons reached or approached significance.

There was no evidence that the poor performance of the right hemisphere patients was due to neglect of the left half of space. Like the Korsakoff group, the errors and correct

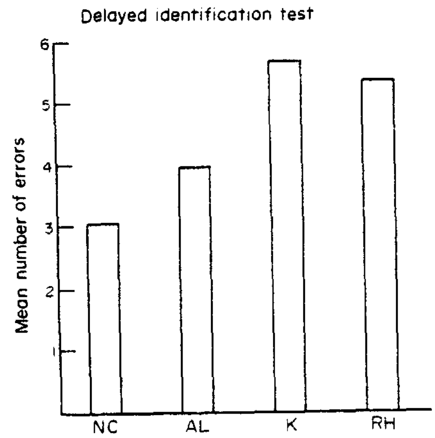

FIG. 1. The mean number of errors by the Korsakoffs (K), right hemisphere patients (RH), alcoholics (AL) and normal controls (NC) on delayed identification of faces.

responses of the right hemisphere patients were equally distributed over the left and right halves of the choice card.

Immediate identification

Most of the *S*s failed to make errors on this matching task: only 4 of the 14 normal controls, 1 of the 13 alcoholics, 9 of the 13 Korsakoffs and 5 of the 8 patients with right-hemisphere damage made any errors. Due to the heterogeneity of variance produced by these zero error scores, the results were analyzed with a nonparametric statistical test (Fisher's Exact Probability test). Table 1 shows the number of *S*s in each group with errors on three or more of the 12 trials. Since none of the normal control and alcoholic subjects made errors on three or more trials, these two groups were combined and compared with the Korsakoff and right hemisphere groups. The differences between the Korsakoff group and the combined control group ($P = 0.0008$) and between the right hemisphere group and the combined control group ($P = 0.018$) were significant. Again an examination of the right hemisphere patients' impaired performance could not be attributed to neglect of the left half of the choice card.

Table 1. Number of *S*s making errors on three or more of the 12 immediate identification trials

	Errors on 0, 1, or 2 trials	Errors on 3 or more trials
Normal controls	14	0
Alcoholics	13	0
Korsakoffs	7	6
Right hemisphere patients	5	3

DISCUSSION

It is evident that both the Korsakoff and right hemisphere patients are impaired in their memory and matching of unfamiliar faces. This deficit cannot be attributed simply to a memory problem because both patient groups encountered some difficulty with the immediate identification (simultaneous matching from sample) task. It appears then that these patients have some deficit in the way they perceptually encode or analyze the features

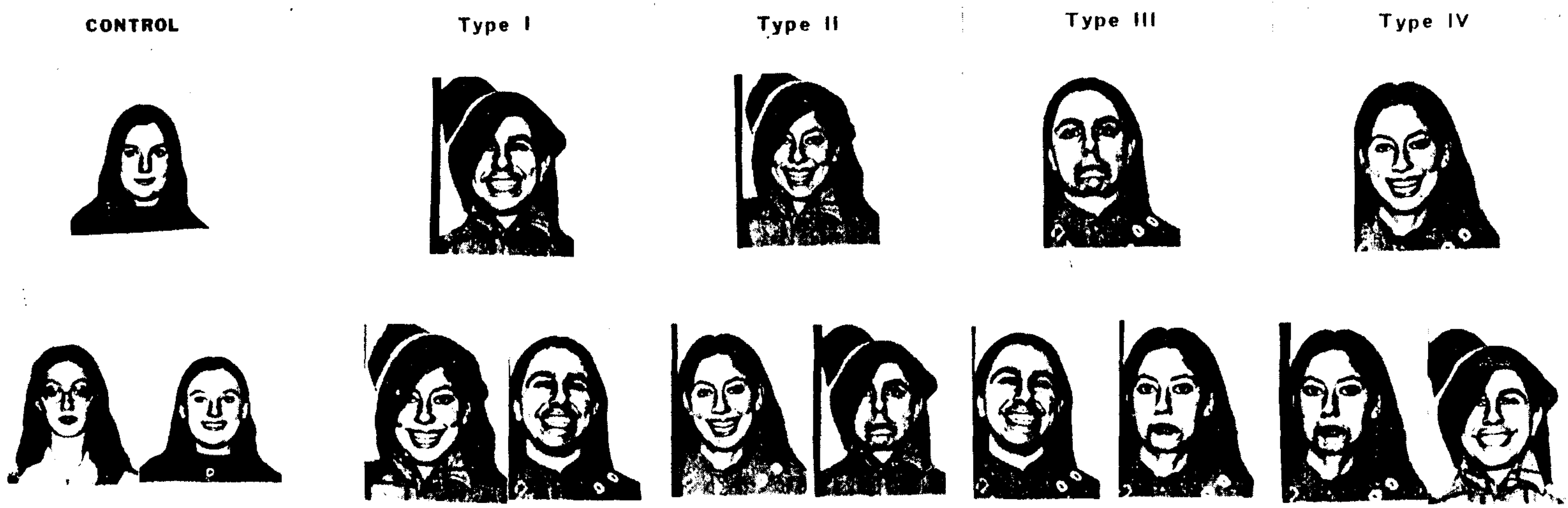

FIG. 2. Examples of the five (control, Type I, II, III and IV) face matching problems from the Carey–Diamond test.

of unfamiliar faces. DIAMOND and CAREY [14, 15] have suggested that such problems in face perception may be due to a reliance on the superficial aspects of faces. Thus, the Korsakoffs and right hemisphere patients may have declared two dissimilar faces to be identical because of similar hair styles, clothing or expressions. The patients may have started to search the 25 comparison faces for the standard presented on each trial but may have reached a premature (i.e. erroneous) match because a particular comparison photograph shared some superficial feature with the standard. To systematically assess this possibility, we administered Diamond and Carey's matching task in the second experiment of this investigation.

EXPERIMENT 2

Methods

Subjects. The same subjects that participated in the first experiment were used in the second experiment.

Materials and procedures. The materials and procedures were the same as those used by DIAMOND and CAREY [14, 15], and the description of the test that follows is abstracted from their reports. Since the first experiment had shown that our patients' perceptual problems appeared even with a simultaneous matching procedure, only Diamond and Carey's simultaneous matching condition was employed in this second experiment.

Twelve pairs of young women were chosen as models. The two members of each pair were similar in general coloring and their hair was alike in length and texture. An attempt was made to pair persons who did not resemble each other facially. For each model pair, four types of recognition problems were constructed (Fig. 2), in which expression and paraphernalia (hats, shirts, scarves, necklaces, eyeglasses and wigs) were manipulated. On each trial the subject was shown a card with three photographs of faces, one at the top (i.e. the target face) and two at the bottom (i.e. the comparison faces). The subject was asked to indicate which of the two comparison faces (at the bottom of the card) was the same face as the one at the top of the card. In Type I problems (paraphernalia-to-fool; expression equal), if the patient bases his judgment of identity on paraphernalia, he has made an incorrect choice. Since all three photographs show the same expression, no judgment can be based on expression. In Type II problems (paraphernalia-to-fool; expression-to-help) a judgment based on paraphernalia will be wrong, while a judgment based on expression would be correct. In Type III problems (paraphernalia equal; expression-to-fool) no judgment can be based upon paraphernalia, while a judgment based upon expression would be incorrect. And in Type IV problems

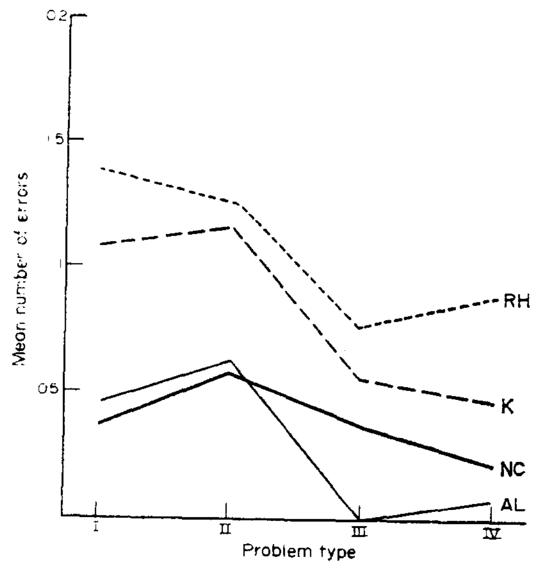

FIG. 3. The mean number of errors by the four subject groups on Carey and Diamond's Type I, II, III, and IV face matching problems. K = Korsakoffs; RH = right hemisphere patients; AL = alcoholics; NC = normal control subjects.

(paraphernalia-to-help; expression-to-fool) a judgment based on paraphernalia would be correct, whereas a judgment based on expression would be incorrect. Thus, there were two paraphernalia-to-fool items (Types I and II), and two expression-to-fool problems (Types III and IV).

Four alternate sets of problems were constructed. In each set, one problem was contributed by each of the 12 model pairs, and there were three examples of each problem type. Thus, over all four sets, each problem type was equally represented for each pair of models. The sequence of items in each set was independently randomized with the constraint that no two successive items be of the same problem type. In addition, four identical control stimuli were added in series positions 1, 2, 4 and 8 (Fig. 2). On these items the person shown twice was photographed in different costumes or with different expressions, but the distractor's photograph did not match the target in any obvious way. That is, there was no attempt to fool the subject with confounding paraphernalia or confounding expressions. The control stimuli were included as a check that the subject understood the task. Each subject saw only one set of photographs, with each set consisting of 4 control cards and 12 test cards (3 of each problem type). The presentation of sets was ordered within each group of subjects so that each set was seen by at least two subjects in each group.

The subjects were tested individually, and given the following instructions: "I'm going to show you a picture of a woman and then ask you to tell me which of two other pictures shows the same woman. Sometimes the clothing will be changed, or the eyeglasses, or even the hair might be different, because some of these women are wearing wigs. And the person might have a different expression than she has, too. Don't let me fool you. Just try to say which of the two pictures is the same person in the photograph at the top of the card." The subject was then permitted to take as much time as he wished to make a choice. Choices were recorded by hand by the experimenter.

The scores obtained were the total number of errors for each distractor (I, II, III, and IV) and control problem.

RESULTS

The error scores from the Diamond–Carey faces matching task were analyzed by Kruskal–Wallis analyses of variance. Between group comparisons were analyzed with the Mann–Whitney U test (two-tailed); comparisons between conditions (e.g. Problems I and II vs Problems III and IV) were analyzed by the Wilcoxon sign ranks test.

Analysis of the control problems yielded no significant differences ($H = 6.11$, $df = 3$, $P > 0.05$) among the four groups. The mean error scores for the four groups were as follows: normal controls = 0.00, Korsakoffs = 0.39, right hemisphere patients = 0.50, alcoholics = 0.08. Thus, it appeared that when all distracting cues were removed, the subjects were able to make correct facial matches.

Figure 3 shows the results for the four problem types. The error scores for the two paraphernalia-to-fool conditions (Problems I and II) were combined for analysis. The resulting Kruskal–Wallis analysis yielded a significant group effect ($H = 10.75$, $df = 3$, $P < 0.02$). Comparisons among the various groups showed that the Korsakoff group made significantly more errors than did the normal control ($U = 40$, $P < 0.025$) and the alcoholic ($U = 44.5$, $P < 0.05$) groups. The patients with right-hemisphere lesions also made more Type I and II errors than did the normal control ($U = 22$, $P = 0.025$) and alcoholic ($U = 26$, $P < 0.10$) groups.

The error scores for Type III and IV problems (i.e. expression-to-fool) were also combined for analysis. The result of the Kruskal–Wallis analysis of variance was significant ($H = 12.32$, $df = 3$, $P < 0.01$). The Korsakoff ($U = 43.5$, $P < 0.05$) and right hemisphere ($U = 15.0$, $P < 0.025$) groups both made significantly more errors than did the alcoholic controls. The difference between the right hemisphere and the normal control groups approached significance ($U = 29.5$, $P < 0.10$).

To determine whether the various groups encountered more difficulty with paraphernalia-to-fool or with expression-to-fool problems, performance on Type I and Type II problems was compared with error scores on Type III and IV problems. Except for the alcoholic group ($t = 0$, $P < 0.005$), none of these comparisons proved significant.

Although the groups did not differ on the control problems, some errors were made by a few of the right hemisphere and Korsakoff patients. Since any errors on this control task might indicate a lack of understanding concerning the task or an unwillingness to perform the test, all analyses were repeated with subjects who made no errors (i.e. all four matches correct) on the control problem. For these analyses the Korsakoff group was reduced to 9 patients, the right hemisphere group to 6 patients, and the alcoholic group to 12 patients.

The shapes of the curves for this corrected population are essentially identical to those reported for all *S*s. For Type I and II problems a significant group effect was found ($H = 12.98$, $df = 3$, $P < 0.01$). The Korsakoff ($U = 24.5$, $P < 0.025$) and right hemisphere ($U = 16.0$, $P < 0.05$) groups made significantly more errors than did the normal control group.

The Kruskal–Wallis analysis of variance performed on Type III and IV problems was significant ($H = 14.49$, $df = 3$, $P < 0.01$). Both the Korsakoff ($U = 20.5$, $P < 0.025$) and the right hemisphere ($U = 14.0$, $P < 0.05$) groups made significantly more errors than did the alcoholic group.

Comparisons on the paraphernalia-to-fool and expression-to-fool problems yielded non-significant results for the Korsakoff, right hemisphere, and normal control groups. Only the alcoholic group made significantly ($t = 0$, $P < 0.005$) fewer errors on the expression-to-fool (Type III and IV) than on the paraphernalia-to-fool (Type I and II) problems.

DISCUSSION

The results from the Diamond–Carey facial recognition task indicate that the Korsakoffs' deficits in perceptual encoding may be analogous to their reported problems in verbal processing. Just as the Korsakoff patient is restricted in the depth of his verbal processing (i.e. he relies upon phonemic rather than semantic or contextual encoding strategies), he seems to limit his analysis of unfamiliar faces to superficial features such as paraphernalia and expression and ignores the deeper configurational aspects of the face. The Korsakoff patients often judge two faces to be identical because they wear the same hat or have the same expression. Since many of the faces used in the first experiment had similar hair coloring and styles, the recognition deficits noted in the first study may have been due to the distraction or interference produced by the similar paraphernalia. It has been shown that incomplete verbal encoding can lead to deficits in the retrieval of verbal materials [1, 18], and the present findings suggest that failures to analyze all of the features of faces may result in poor facial recognition. Verbal and nonverbal engrams based upon a superficial stimulus analysis may decay more rapidly or be more difficult to retrieve than those involving a deep and complete encoding.

It is evident that the patients' performance on the Diamond–Carey task is not due to a lack of understanding of the task. When distractors are removed during the control condition, the groups no longer differ in their matching capacity. Furthermore, if analyses of the four problem types are restricted to subjects who perform perfectly (no errors) on the control problems, the same results are again found for the Korsakoff and right hemisphere patients.

The performance of the patients with right hemisphere damage is also of some importance. While it has been known for some time that lesions of the right hemisphere impair recognition of unfamiliar faces [11–13], the role of perceptual encoding in such deficits has been analyzed in only one other study [19]. Like the alcoholic Korsakoffs, the performance of the right hemisphere patients indicates that they are deficient in the depth of their perceptual encoding; they are fooled both by paraphernalia and by expression on the Diamond–Carey task. Based on the similarities between children and right hemisphere patients on a series of perceptual reversal tasks [20, 21], CAREY and DIAMOND [15] predicted that right hemisphere patients would perform like children on their facial recognition task. The young (6 yr old) child is often fooled by paraphernalia but rarely by expression. In fact, Diamond and Carey failed to find any age level when children made more errors on Type III and IV than on Type I and II problems. While our right hemisphere patients were impaired on paraphernalia-to-fool problems, they were also impaired on expression-to-fool problems and significant differences were not found between the two problem types. This latter finding serves to attenuate any conclusions concerning analogous processing in children and brain-damaged patients.

The results showed that the Korsakoff and right hemisphere patients were more impaired on the delayed identification (Experiment 1) than on the Diamond–Carey Matching Task. The two patient groups performed at essentially chance levels on the delayed identification task, but their performance on the Carey–Diamond test, although impaired, was better than chance. Since it appears that the Korsakoff and right hemisphere patients did utilize configurational cues on some trials, why was their performance on the delayed identification test so poor? One possible explanation of this discrepancy involves the differential complexity of the two tests. The Carey–Diamond test requires the subject to process only three faces on each trial while the Milner task involves the analysis of 12 faces in 45 sec. Perhaps the tendency to use superficial piecemeal cues becomes more evident when the demands of the task become greater. The fact that the patients had less difficulty with the immediate than the delayed identification task is consistent with this complexity hypothesis. Alternatively, the identification deficit noted in Experiment 1 may be only partially related to inadequate encoding. In addition to the detrimental effects of their incomplete stimulus analyses, the Korsakoff and right hemisphere patients may have other storage or processing problems that contribute to their overall recognition deficits.

What is the neurological basis for the similarites in the behavioral deficits of the Korsakoffs and right hemisphere patients? At least two explanations seem equally plausible. One, deficits in perceptual encoding may follow either cortical (right hemisphere patients) or subcortical (Korsakoff patients) lesions. For the alcoholic Korsakoffs this deficit in perceptual encoding is only a single exemplar of a general deficiency in the depth of the patients' verbal and nonverbal information processing while for the right hemisphere patients the encoding problem may be limited to the visual modality. JARHO's [22] report that traumatic injury to diencephalic structures results in both amnesic and visuoperceptive problems is consistent with this explanation. Two, the Korsakoffs' impairment in perceptual encoding may reflect some general cortical atrophy in addition to their well-known subcortical diencephalic lesions [23]. The numerous neurological studies [24–27] linking atrophy of the frontal and parietal lobes to long-term alcoholism supports this interpretation. In either case, the results of the present study leave little doubt that alcoholic Korsakoff patients are impaired in their processing of nonverbal as well as verbal information and that the depth of encoding hypothesis [1] remains a viable explanation for these patients' cognitive problems.

Finally, some mention should also be made of the unimpaired performance of the long-term alcoholics. A number of studies [7, 8, 28–30] have reported that chronic alcoholics manifest visuoperceptive deficits similar to those of Korsakoff and right hemisphere patients, and one might have anticipated some mild impairments on the Milner or Carey–Diamond recognition tasks. While the alcoholics were the only group to make significantly more errors on Type I and II than on Type III and IV problems, this finding may reflect the extensive within-group variability of the other three groups rather than a special characteristic of the alcoholic group. This apparent discrepancy in the continuity between long-term alcoholics and the two brain-damaged groups may be rooted in the alcoholics' degree of brain damage and the complexity of the various testing instruments. Since the alcoholics' cortical and subcortical atrophy is probably less extensive than the brain damage of Korsakoff and right hemisphere patients, their behavioral deficits may be apparent only on the most complex visuoperceptive tasks. The perceptual tasks used in the present investigation may have been too easy to tap the alcoholics' minimal organicity.

Acknowledgements—This study was supported in part by funds from the Medical Research Service of the Veterans Administration and by NIAAA grant AA-00187 and NIH grant NB-06209 to the Boston University School of Medicine. The authors wish to thank Drs. A. POMFRET of the New England Rehabilitation Center and A. ADINOLFI of the V.A. Outpatient Clinic for their help in locating suitable patients, and LAIRD CERMAK for his helpful review of this manuscript. The administrative assistance of Ms. KATHLEEN MONTGOMERY is also greatly appreciated.

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Résumé :

On a examiné avec 3 tests de mémoire et d'encodage de photographies des visages des malades alcooliques Korsakoviens, des malades avec lésions hémisphériques droites, des alcooliques chroniques et des sujets de contrôle. Il existait chez les Korsakoviens et chez les malades avec lésions hémisphériques droites un déficit de la mémoire et de l'appariement simultané des visages non familiers. Leurs performances sur une tâche de traitement du matériel de visages indiquaient qu'ils appariaient les visages en se fondant sur les traits superficiels tels que les accessoires et les expressions plutôt que sur les caractéristiques plus profondes de configuration du visage. On suggère qu'un tel encodage superficiel peut être partiellement responsable des problèmes mnésiques et visuoperceptifs de ces malades.

Deutschsprachige Zusammenfassung:

Alkoholische Korsakowkranke, Patienten mit rechtshemisphärischen Läsionen, chronische Alkoholiker und normale Kontrollpersonen wurden mit 3 Tests auf Behalten und Einprägen von Physiognomien geprüft. Korsakowkranke und solche mit rechtshemisphärischen Läsionen waren beim Behalten und Zuordnen von unvertrauten Gesichtern beeinträchtigt. Ihre Leistungen bei einer Aufgabe, die dem Vergleich von Gesichtern diente, zeigten, daß sie Gesichter mehr nach oberflächlichen Kriterien wie äußeres Zubehör und Ausdruck als aufgrund wesentlicher physiognomischer Eigenheiten verglichen. Es ist naheliegend anzunehmen, daß diese oberflächliche Einprägungsart teilweise für die optisch-perceptiellen und mnestischen Probleme dieser Patienten verantwortlich ist.