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Recognition of pictures by alcoholic Korsakoff patients

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Relative to controls, Korsakoff patients were only mildly impaired in recognition memory for abstract pictures. A comparison of the present results with those reported previously in the literature suggests that Korsakoff amnesics' picture-recognition performance is generally highly correlated with that of normals. The results indicate that some important aspects of recognition memory are preserved in Korsakoff amnesia.

There is generally common agreement among investigators of amnesia that a reasonable approach to studying amnesia is to determine how amnesics perform on various tasks (relative to normals), to consider what components of the memory system might be important in the various tasks, and to organize statements about amnesic deficits around these proposed components (see, e.g., chapters in Cermak, 1982, or Squire & Butters, 1984). One problem with this approach is the unfortunately sparse data base that is available. Although it is clear that the major symptom of amnesia is a severe disruption in the ability to voluntarily recall events that have happened after the onset of amnesia, evidence about amnesic performance on other tasks often comes from only one or a few experiment(s). This lack of evidence is especially worrisome because the number of subjects is typically very small in amnesia studies, and there is probably considerable variability among subjects both between (e.g., Squire, 1982) and within (e.g., Kim, 1985) etiological groups. When there are several studies available using a similar task, the data may appear contradictory. For example, amnesics often perform worse than controls in recognition tasks; on the other hand, the recognition memory performance of amnesics can be surprisingly good and close to normal (Biber, Butters, Rosen, Gerstman, & Mattis, 1981; Hirst & Volpe, 1982; Huppert & Piercy, 1976; Johnson, Kim, & Risse, 1985).

In order to resolve the various issues raised by recognition studies, we need several new experiments varying etiology of amnesia (e.g., Korsakoff vs. sudden-onset amnesics), materials (e.g., pictures vs. words) and conditions of testing (e.g., similarity of targets and distractors). The purpose of the present paper is more limited: to suggest that evidence is accumulating that provides a relatively consistent idea about the performance of Korsakoff amnesics on picture-recognition tasks. First, some new data will be reported. Then we will compare the data with previously reported findings that suggest that our result is not atypical.

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METHOD

Nine patients diagnosed as having alcoholic Korsakoff's syndrome participated (mean age = 60.7; mean years of education = 12.1). The controls were 9 nonhospitalized volunteers matched with the patients for age (mean = 65.7) and education (mean = 13.0). The subjects are described in more detail in Johnson et al. (1985). All subjects were paid for their participation.

Forty-eight abstract paintings (3 × 5 in.) were prepared. Any particular picture included three colors, and five colors were used across all paintings. Half of the paintings served as acquisition items and half as distractors; acquisition items and distractors were counterbalanced across subjects. Four lists were constructed, one for each of four sessions. At the beginning of each session, subjects were told that we were interested in determining what makes paintings seem to be of one style or another, and were asked to decide whether each painting appeared to be painted by a child or an adult. Subjects were told that there was no right answer and were allowed to say "neither" if they could not decide. They also were told that some paintings would be repeated but that the same answer need not be given each time because opinions might change as subjects saw more paintings. Subjects then received 32 rating trials. Two paintings were shown 1 time, two were shown 5 times and two were shown 10 times. Repetitions were never consecutive, and paintings from each condition (1, 5, or 10) were distributed over the acquisition sequence. The multiple-color copies of each painting were created by photocopying the original, and were mounted on cards.

A 5-min retention interval was filled with conversation, and then subjects received a test list consisting of six forced-choice items composed of one old painting and one new painting. The two items of a test pair included similar shapes and were the same combination of colors. For two of the sessions, the subjects were instructed to choose the painting they liked the best and to indicate whether they liked it "very much more than," "somewhat more than," or "almost the same as" the other painting of the pair. For the other two sessions, the subjects were instructed to choose the most familiar item in each pair, and indicate whether they were "very sure," "quite sure," or "guessing." On Day 1, two acquisition lists were followed by preference tests, and on Day 2, two acquisition lists were followed by recognition tests. The first 2 days of testing were separated by an average of 3.75 days (range = 2-6). Approximately 20 days (range = 10-29) after Day 2, subjects received a single recognition test consisting of all test pairs seen in the previous four sessions (hence, the distractors were repeated). Subjects indicated the item in each pair that was most familiar and their confidence in their decisions.

The preference tests on Day 1 were originally included to determine whether Korsakoff patients prefer previously exposed stimuli (Johnson et al., 1985; Zajonc, 1980). However, because neither the controls nor

the Korsakoff patients showed an exposure effect with these materials, the preference data will not be discussed further. However, subjects subsequently were tested on Day 3 for recognition of these paintings, and those data will be discussed later.

RESULTS

The proportion of Day 2 items correctly recognized (collapsed across the two recognition sessions on Day 2) is shown in Table 1. Recognition increased with frequency of exposure [$F(2,32) = 12.10$, $MSe = .03$, $p < .001$]. The Korsakoff patients and controls did not differ ($p < .13$), and there was no subject-group × condition interaction ($p < .44$). An advantage for the controls might be masked by a ceiling effect; therefore, recognition choice was weighted by confidence for a potentially more sensitive measure (see Table 1). Again, the effect of number of exposures was significant [$F(2,32) = 28.39$, $MSe = .28$, $p < .001$], and neither the main effect of group ($p < .11$) nor the group × condition interaction ($p < .64$) was significant.

Scores on the overall Day 3 recognition test that was given approximately 20 days after the last acquisition session are shown in Table 2. Although the overall level of performance is of course lower, the pattern of results is the same as obtained for the initial recognition tests. More exposures led to better recognition, as measured both by proportion correct [$F(2,32) = 7.88$, $MSe = .05$, $p < .01$] and recognition weighted by confidence [$F(2,32) = 8.27$, $MSe = .51$, $p < .001$]. Neither the effect of subject group (proportion correct, $p < .11$; confidence, $p < .20$) nor the interaction of the group × condition (proportion, $p < .41$; confidence, $p < .66$) were significant. (Although the interaction was not significant, the means in Table 2 clearly suggest that it takes more than 5, and perhaps as many as 10, repetitions for Korsakoff patients to show above-chance forced-choice recognition of such materials after 20 days.

Table 1
Recognition Scores on Immediate Test (Retention Interval was Approximately 5 Minutes)

	Number of Exposures		
	1	5	10
Mean Proportion Correct (Forced-Choice)			
Korsakoff	.67	.81	1.00
Control	.78	.94	1.00
Choice Weighted by Confidence*			
Korsakoff	4.03	4.72	5.33
Control	4.31	5.31	5.64

**Correct choice: six = very sure; five = quite sure; four = guessing. Incorrect choice: three = guessing; two = quite sure; one = very sure.*

Table 2
Recognition Scores on Delayed Test (Retention Interval was Approximately 20 Days)

	Number of Exposures		
	1	5	10
Mean Proportion Correct (Forced-Choice)			
Korsakoff	.56	.54	.78
Controls	.53	.71	.86
Choice Weighted by Confidence*			
Korsakoff	3.65	3.82	4.46
Control	3.60	4.19	4.72

**Correct choice: six = very sure; five = quite sure; four = guessing. Incorrect choice: three = guessing; two = quite sure; one = very sure.*

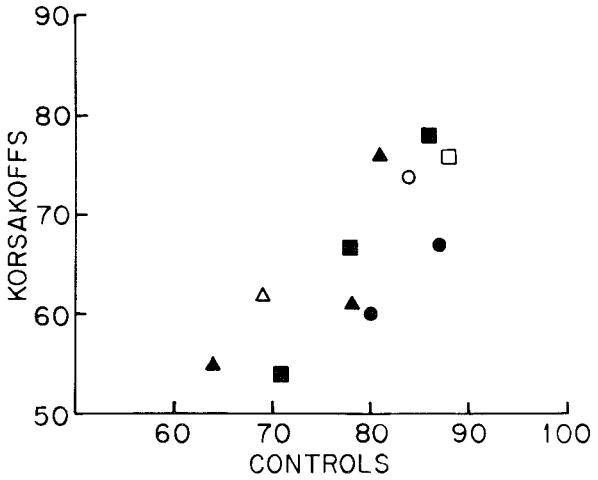

Figure 1. Relative performance of Korsakoff patients and control subjects on picture recognition. Data are from the following studies: Biber, et al., 1981 (▲); Cutting, 1981 (△); Huppert & Piercy, 1976 (○); Huppert & Piercy, 1977 (●); Talland, 1965 (□); the present experiment (■).

DISCUSSION

Under the present conditions, Korsakoff patients appeared mildly, though not significantly, impaired in recognition memory (p values for the Korsakoff vs. control comparison ranged from .11 to .20). Korsakoff patients clearly profited from repetitions of events. In fact, with 10 exposures, Korsakoff patients' recognition performance after 20 days was a remarkably good 78%, compared to 86% for controls (for excellent recognition of a face after a year's retention interval, see Johnson et al., 1985). Furthermore, Korsakoff patients appeared to use confidence ratings similarly to the way normals used them. Thus, these data suggest that amnesics do have familiarity responses and are able to express differential confidence about them under certain conditions. Apparently, Korsakoff patients retain some ability to monitor internal processes.

In order to put the present findings in perspective, the results were compared with previous studies reported by different investigators of picture recognition in Korsakoff patients. Studies of other types of amnesics or amnesic groups of mixed etiology were excluded because of the possibility that different amnesic syndromes have different characteristics (Squire, 1982; Starr & Phillips, 1970). Figure 1 shows the relative performance of Korsakoff and control subjects who were tested under comparable conditions (e.g., the same length of list, presentation rate, number of trials, retention interval). To avoid ceiling problems, comparisons were excluded if the control performance exceeded 90%. (Figure 1 is not presented as the result of an exhaustive literature search, but no data were purposefully omitted.) Figure 1 includes 11 data points from six different experiments using abstract paintings (the present experiment), faces (Biber et al., 1981), miscellaneous magazine pictures (Huppert & Piercy, 1976, 1977), magazine covers (Talland, 1965, p. 208), and patterns (histological photographs, Cutting, 1981). The correlation between performance of Korsakoff patients and that of normals is quite clear ($r = .80$, $t = 4.00$, $p < .05$). Strictly speaking,

computing the correlation is not appropriate because the data points are not all independent; in some cases, the same subjects contributed to more than one observation because they were tested in more than one condition or after more than one retention interval. However, the pattern that emerges is suggestive: those conditions that produce better performance in normals also do so for Korsakoff patients.

The comparison across experiments in Figure 1 conforms to the picture that is emerging from within-experiment comparisons. Korsakoff patients' picture recognition profits from repetitions (the present experiment; Huppert & Piercy, 1977), and increases with exposure time (Huppert & Piercy, 1977). Their recognition performance is affected by variations in orienting tasks (Biber et al., 1981; Mayes, Meudell, & Neary, 1980), and they can use confidence-rating scales (the present experiment; Biber et al., 1981; Cutting, 1981; Mayes et al., 1980). Furthermore, it appears that these variables have effects of comparable magnitude in Korsakoff and control conditions, although this latter conclusion should be made cautiously because of potential ceiling problems in the normal groups in a number of experiments.

The fact that recognition performances in Korsakoff patients and normal controls are sensitive to the same variables supports the idea that picture recognition involves memory processes that are relatively intact in amnesia. Also supporting this idea is evidence that amnesics show less disruption of recognition than of recall (Hirst et al., in press). Although the materials in the Hirst et al. study were words, we expect a similar finding with pictures. Several researchers have proposed that recognition may tap the more direct perceptual consequences of experience as well as the more elaborated relations between events or between events and their contexts (Jacoby, 1982; Johnson, 1983; Mandler, 1980). The revival of previous elaborations gives a memory a specific, "episodic" (Tulving, 1983) quality, but is not necessary for a feeling of familiarity. Thus, it is possible for a stimulus to be familiar without the subject's being able to identify its origin, as indicated by studies of list discrimination (e.g., Winograd, 1968), temporal judgments (Hirst & Volpe, 1982), reality monitoring (Johnson & Raye, 1981), and source amnesia (Schacter, Harbluk, & McLachlan, 1984; Schacter & Tulving, 1982). Presumably, it is the elaborative or more "reflective" processes that are most disrupted in amnesia (e.g., Johnson, 1983). Amnesics clearly have difficulty recapturing origin information about events that have been recorded in memory and that even might seem familiar (Hirst & Volpe, 1982; Schacter et al., 1984). This is an indication of their profound inability to go very far beyond the immediate cognitive consequences of perceptual experience. Evidently, picture recognition is a task in which the memory consequences of perceptual experience serve the Korsakoff amnesic quite well in identifying an event as familiar and in which reflective activity is relatively less important (see Johnston, Dark, & Jacoby, 1985).

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