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MEMORY FOR PROSE IN KORSAKOFF AND SCHIZOPHRENIC POPULATIONS

DAVID C. RUBIN
Duke University

E. H. OLSON and MARY RICHTER
Lawrence University

and

NELSON BUTTERS
Psychology Service, Boston VA Medical Center
and
Neurology Department, Boston University School of Medicine

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Twelve alcoholic Korsakoff patients, their 12 alcoholic controls, and 27 institutionalized schizophrenics and their 19 controls, recalled two stories. The clinical populations recalled approximately half as much as their controls, yet recalled the same parts of the stories as their controls. For both groups the ability to process simple prose does not seem to be severely impaired when what is recalled rather than how much is recalled is measured.

The traditional approach to studying quantitative differences in memory for meaningful material has been to measure differences in the amount recalled (e.g., Wechsler, 1945). Recently psychologists have started to look quantitatively at which units, as opposed to how many units, of passages are recalled (Kintsch & van Dijk, 1978; Rubin, 1977, 1978). Rubin (1978) found that: (a) which units individual college students recall could be predicted with accuracy using the group's rank ordering of units from most to least likely to be recalled (i.e., the data are Guttman scalable), and (b) the rank ordering of units from most to least likely to be recalled was remarkably stable over changes in the retention interval, motivational level, and the age of the subjects tested, even though the standard differences in amount recalled were observed. Similar results were found for material learned in the natural environment (Rubin, 1977) as well as in the laboratory.

Examining which, as well as how many, units are recalled makes comparisons among groups more complete. In addition to asking the traditional question of which group recalls more, one can ask if groups tend to recall the same items independent of differences in the level of total recall. This can be accomplished without additional data simply by summing over subjects to yield a percentage recalled value for each unit of a passage. More generally, Clark (1973) has argued that both unit and subject analyses are necessary if psychologists are to generalize over materials as well as over subjects.

Examining which units are recalled could be especially revealing for clinical populations. Differences in the total amount recalled can be attributed to differences in motivational level, attention, and other factors which often only incidentally relate to the cognitive processes under study. Differences in which units are recalled are less likely to be affected by such factors (Rubin, 1978). Moreover, knowing which units are recalled provides a rich data base from which to draw inferences about processing. Thus, Korsakoff syndrome patients may show more of a primacy

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effect than their control due to interference, or schizophrenics may recall certain constructions more poorly than others. That is, differences in which units are most memorable are predicted by most models of processing that specify a particular form of deficit. If little difference is found in which units are recalled, it would argue that the processing of text is similar in the groups being compared.

The two clinical populations were chosen because their memory deficits have been studied previously and because their deficits appear to be quite different. Both groups are known to have deficits in the amount recalled as well as in the organization of what is recalled. Nonetheless, for many topics both groups can hold normal conversations, indicating that they can in fact process some meaningful material in a fairly normal way. Thus, for recall of meaningful passages, it might be expected that both groups would show less recall than their appropriate controls, but it is not clear from previous research how the particular units they recall will compare to those of their controls.

The memory deficit of Korsakoff patients is fairly specific. Korsakoff patients show dramatic deficitis in their ability to learn new material. For example, they often do not know the name of their doctor or the current president of the United States. Memory for events earlier in their lives appears less disturbed. Their deficit affects material that can be verbally coded to a much greater extent than material that cannot be verbally coded, regardless of whether the material is presented in the auditory, visual, or tactile mode (Butters, Lewis, Cermak, & Goodglass, 1973). The main loss is in the ability to organize spontaneously material semantically with little or no deficit in the ability to use associations among items to aid recall (Butters & Cermak, 1974; Cermak & Butters, 1973; Cermak, Butters, & Gerrein, 1973; Cermak, Naus, & Reale, 1976).

While there has been extensive research on cognitive processes in schizophrenia (Chapman & Chapman, 1973; Koh, 1978; Maher, 1977; Rabin, Doneson, & Jentons, 1979; Wynne, Cromwell, & Matthysse, 1978), no clear consensus appears. One caution, however, is apparent from almost all of the literature. Schizophrenia is too broad a label to be useful for most experimental work. Here, chronic, institutionalized, process, nonparanoid schizophrenics were tested while they were on maintenance levels of drugs. The results obtained may not be true of schizophrenics differing in any of these descriptions in the same way that the results of the Korsakoff patients may not be representative of other amnesia patients.

While the descriptions of the cognitive processes of schizophrenics are varied, there is little overlap with those of Korsakoff patients. That is, although the research on schizophrenics is complex, it indicates that schizophrenics appear to have different deficits than Korsakoff patients, and thus the two clinical populations tested here should be distinct enough to allow for some generalizability of the results.

METHOD

Subjects

Four groups took part in the investigation: 12 clinically diagnosed alcoholic Korsakoff patients and their alcoholic controls, and 27 institutionalized, process, nonparanoid schizophrenics and their 19 controls. The Korsakoff patients all had severe memory deficits as assessed by clinical methods; however, none showed evidence of dementia: their average IQ, based on the WAIS, was 101 (range of 91 to 116). The control group consisted of 12 hospitalized alcoholics without clinical memory deficits. The average ages of the Korsakoff patients and alcoholic controls were 60 (range of 48 to 68) and 52 (range of 45 to 64), respectively.

The testing of schizophrenics was spread over a period of several months. Due to their availability at the time of the testing, 27 different schizophrenics were sampled in order to obtain 19 recalls for each story; that is, 16 subjects provided one recall and 11 subjects provided two recalls. The control group for the schizophrenics were students enrolled in an evening course at a local technical institute. While not matched in a formal way to the schizophrenics, they were drawn from the same local population. The average ages of the schizophrenics and their controls were 50 years (range of 21 to 83) and 29 years (range of 18 to 54), respectively. None of the schizophrenics were diagnosed as retarded; all had been hospitalized for a minimum of 3 years, and all were on maintenance levels of the major ataractics with Cojentin as necessary to compensate for pseudo-Parkinsonian symptoms.

Materials

The Logical Memory subtest of the Wechsler Memory Scale Form II (Stone, Girdner, &

Albrecht, 1946) was used. This form of the Wechsler Memory Scale had not previously been administered to any of the subjects. The subtest consists of two passages, approximately 50 words long. The Wechsler Memory Scale divides each of these passages into units by a slash after each word or phrase that, by some arbitrary criterion, was thought to be a complete idea. The system and the passages used actually predate the Wechsler Memory Scale (Yerkes, 1921), and while the system is sufficient for providing a measure of the total amount recalled, a more modern, systematic approach was desired. For the current investigation, two existing systems were used in addition to Wechsler's. The first (Rubin, 1978) uses content word units. The second (Kintsch, 1974) uses propositional units. As all three systems led to equivalent conclusions, only the one with the most reliable scoring, the content word system, will be reported here. Nonetheless, the initial use of all three systems indicates that the results obtained are not being forced by the particular system of units employed.

In the word system all content words as defined by Fries (1952) (roughly all nouns, verbs, adverbs, and adjectives) became word units. All word units with the same referent, or with meanings too similar to have distinct synonyms, were then combined to form 27 scoring units for the "Dogs" passage and 21 scoring units for the "School Children" passage. The scoring of the recall protocols allowed for synonyms.

Procedure

All subjects were tested individually. The sessions were taped and transcripts used in the scoring of the recalls. Due to differences in the availability of the various subject populations, slightly different orders of presentation of the stimulus passages were necessary. For the Korsakoff patients and their alcoholic controls, the "Dogs" story was read to a subject, who immediately attempted to recall it. After a 5-minute conversation not related to the experiment, the "School Children" story was read and a recall attempt made. Thus, Wechsler's procedure for administering the Logical Memory subscale was followed except for the 5-minute conversation. This modification was introduced in an attempt to minimize the interference effects shown by Korsakoff patients (Cermak, Butters, & Moreines, 1974) and try to insure that the learning of the two stories would be two separate events for the subjects. A similar procedure was used for the schizophrenic subjects with the modification that each story was presented on a separate day. The schizophrenic control group received both stories in the same session.

RESULTS

Two judges were given a set of typed rules and examples of words accepted and not accepted as synonyms for the Form I Wechsler stories and independently scored the two stories. A third judge resolved discrepancies. The interjudge reliability, measured by correlating the percentage of units scored correct by each judge, was above 0.95 for all eight story-group combinations.

The expected differences in the amounts recalled by the subjects were observed. The alcoholic controls remembered significantly more of the stories than the Korsakoff patients: 50% vs. 18% for the "Dogs" story, $t(22) = 4.80$, $p < 0.001$, and 51% vs. 31% for the "School Children" story, $t(22) = 3.57$, $p < 0.01$. The schizophrenic controls also remembered about twice as much as the schizophrenics: 45% vs. 18%, $t(36) = 4.92$, $p < 0.001$, and 47% vs. 21%, $t(36) = 5.83$, $p < 0.001$, for the two stories, respectively. However, both clinical groups tended to remember the same units as their controls. The correlation between the numbers of Korsakoff patients and the number of alcoholic controls remembering each unit is 0.717 for the "Dogs" passage and 0.734 for the "School Children" passage, compared to average reliabilities (α; Cronbach, 1951) of 0.851 and 0.866, respectively. Corresponding correlations for the schizophrenic subjects and their controls are 0.800 and 0.827, compared to reliabilities of 0.877 and 0.895.

Another way to examine whether different groups recall the same items is Guttman scaling. This method examines individual subject as opposed to group behavior and allows for statistical significance testing, which correlations over nonindependent units do not (Rubin, 1978). Given the groups' rank ordering of units from most to least likely to be recalled and the number of units individual subjects recall, we can predict which units will be recalled with an accuracy equivalent to the Guttman coefficient of reproducibility (Kenny & Rubin, 1977). By combining the data from a clinical group and its control group we can ask whether the rank ordering of units from most to least likely to be recalled from the two individual groups are better predictors than the rank ordering from the groups combined (Rubin, 1978). All coefficients of reproducibility for the individual groups are greater than their chance levels, indicating that the recalls are Guttman scalable (all ps <0.001 using Green's method as the basis of calculating chance levels [Kenny & Rubin, 1977] and standard errors [Chilton, 1969]). Of more importance, there is only a slight decrease in scalability when clinical subjects are combined with their controls. The coefficients of reproducibility for the "Dogs" passage are for Korsakoff: 0.858, their controls: 0.827, and combined: 0.836; schizophrenics: 0.910, their controls: 0.797, and combined: 0.838. The coefficients of reproducibility for the "School Children" passage are Korsakoff: 0.802, their controls: 0.873, and combined: 0.794; schizophrenics: 0.880, their controls: 0.779, and combined: 0.817.

Thus, it appears that the clinical and the control groups tend to process simple prose in similar ways, the main difference between the groups being in how many, not which, units are recalled

DISCUSSION

Given the differences in the cognitive deficits of the two clinical populations tested and the similarity in the results obtained, it seems reasonable to interpret the prose data, not in terms of the particular populations sampled, but rather in terms of the task used and its analysis.

Both clinical populations recalled less, but essentially the same items from the passages used as did their controls. This finding is limited in two ways. First, it is limited to the type of population tested. It is doubtful that similar results would be obtained with all categories of schizophrenia or amnesia. For some clinical populations there will probably be large differences in which, as well as how many, units are recalled. Second, the results are limited by the stimuli used. If the passages contained topics more sensitive to the subjects tested, or if they contain constructions that the patients were known to find difficult, the results might have been different. It was not the purpose of this study, however, to probe suspected trouble areas, but rather to obtain a fair sample of behavior in a prose recall task.

One way to view the finding that clinical patients and their controls tend to recall the same things from passages is to note that the passages themselves are highly structured on both the semantic and syntactic level. This structure provides constraints on what can be said, cues as to what should be said next, and, in general, an organization for recall. Such structure is deliberately eliminated in most of the tests of memory developed and studied by experimental psychologists. It should be noted that while the passages used were highly structured in comparison with most experimental materials, such as lists of words, they were not especially well-structured examples of prose. Given a more familiar plot structure, even higher correlations among groups might have been obtained.

Differences in how many but not which units are recalled are not restricted to clinical populations. Similar results were obtained when the age of the subject population was varied from junior high school students to men over 50 (Rubin, 1978). Thus, while expected differences in the number of units have been found, differences in which units have not been apparent over a range of populations. This is not due to an artifact of the analysis nor an insensitivity of the measures: Differences as to which units are recalled can be found by differing the interpretation of the passage or by changing the retrieval task from recall to recognition (Rubin, 1978). Rather, there seem to be regularities in the processing of meaningful material that determine which units tend to be recalled. In fact, there is enough regularity to predict which units an individual subject recalls from grouped data, as witnessed by the Guttman scalogram analysis of the data.

In addition, while the similarities among clinical and control populations are being stressed, the result is not a proof of the null hypothesis. Approximately two-to-one differences in the amount recalled from the stories were noted in the same data for which differences in which units were recalled were not apparent. Thus, while some differences in which units are recalled may be present, they are small compared with the differences in amount. If enough subjects were used to raise the reliability of which units are recalled by each individual group, systematic differences might appear, but they would still be small with regard to the differences in amount recalled.

What results from this analysis of prose recall is the observation that different analyses on the same data can lead to quite different interpretations; the expected deficits in amount recalled were found, but differences in which parts of the story were recalled were not. Thus, the clinical patients look much healthier when one asks if they remember the same kind of things as their controls do than when one asks if they remember the same amount. As differences in amount of recall can be affected by a multitude of factors not relating to human memory, such as general attentional level or motivation, they are of little use for diagnosis or understanding when taken in isolation (Erickson & Scott, 1977). As various theories would predict, specific differences in which items would be recalled (e.g., certain interference theories would predict primacy) that general noncognitive factors such as motivational level might not, differences in which units are recalled would be revealing. The lack of a marked difference, however, is also informative. It indicates a domain in which a deficit is not as apparent, thus narrowing the places to search for deficits. Of more practical importance, it indicates those domains in which patients will appear most normal and from which possible memory aids may be taken.

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