Journal of Clinical and Experimental Neuropsychology

ISSN: 1380-3395 (Print) 1744-411X (Online) Journal homepage: https://www.tandfonline.com/loi/ncen20

Detecting the Faking of Amnesia: A Comparison of the Effectiveness of Three Different Techniques for Distinguishing Simulators from Patients with Amnesia

J. R. Hanley , G. A. Baker & S. Ledson

Journal of Clinical and Experimental Neuropsychology
1999, Vol. 21, No. 1, pp. 59-69
1380-3395/99/2101-059$15.00

Detecting the Faking of Amnesia: A Comparison of the Effectiveness of Three Different Techniques for Distinguishing Simulators from Patients with Amnesia*

J.R. Hanley[1], G.A. Baker[2], and S. Ledson[3]
[1]University of Essex, Colchester, UK, [2]Walton Centre for Neurology and Neurosurgery, Liverpool, UK, and [3]University of Liverpool, UK

ABSTRACT

This paper compared the effectiveness of three different procedures that have been put forward as possible ways of distinguishing patients with genuine memory problems from those who are attempting to simulate amnesia. The performance of 20 patients with amnesia was compared with the performance of 20 normal control individuals and 20 normal individuals who had been asked to simulate amnesia on the distraction/no distraction test (Baker, Hanley, Kimmance, & Slade, 1993), the coin-in-the-hand test (Kapur, 1994) and word fragment completion (Horton, Smith, Barghout, & Connolly, 1992). The distraction/no distraction test and the coin-in-the-hand test both proved successful in distinguishing patients with amnesia from simulators ($p < .01$). Excellent performance by virtually all patients with amnesia coupled with chance or below chance performance by 19/20 simulators on the coin-in-the-hand test was particularly striking. Consistent with the results of Horton et al. (1992), the word fragment completion test successfully discriminated between the performance of simulators and controls ($p < .01$). However, the fragment completion test proved incapable of distinguishing between the performance of patients with amnesia and simulators ($p > .05$). It is argued that there may be problems inherent in the use of tests designed to investigate implicit memory in attempts to detect malingering.

In recent years, an increasingly large number of studies have reported attempts to discover ways of distinguishing between malingerers and patients who are genuinely suffering from memory problems as a result of brain injury. In the majority of these studies, the performance of a group of individuals who have been told to simulate amnesia is compared with that of a brain-injured control group (for reviews see Brandt, 1988; Nies & Sweet, 1994). The simulators are typically asked to perform in a way that might be representative of someone with genuine memory problems. The aim of the experiments is to produce manipulations that will lead simulators to behave in ways that are either qualitatively or quantitatively different from those observed in the brain-injured group.

One important finding is that simulators perform particularly poorly on tests of recognition memory relative to their performance on tests of recall when they are compared with head-injured patients (e.g., Bernard, 1990; Brandt, Rubinsky, & Lassen, 1985; Flowers, Sheridan, & Shadbolt, 1996; Iverson, Franzen, & McCracken, 1991; Wiggins & Brandt, 1988). Poor performance on recognition memory tests has also been shown in patients claiming financial compensation, who might be considered to be potential malingerers, compared with patients not seeking compensation (Binder & Willis, 1991; Millis, 1992). A potential problem with the use of recognition memory tests to detect malingering is that some patients with amnesia genuinely experience severe problems on recognition

* Address correspondence to: J.R. Hanley, Department of Psychology, University of Essex, Wivenhoe Park, Colchester, CO4 3SQ UK. E-mail: rhanley@essex.ac.uk.
Accepted for publication: August 27, 1998.

memory tests (Warrington, 1984), and there is a danger that these patients might be misclassified as malingerers. However, malingerers have sometimes been shown to produce poor performance even on relatively easy forced choice recognition tests such as the Hiscock and Hiscock (1989) Test and the Portland Digit Recognition Test (e.g., Binder, 1993; Binder & Willis, 1991). Performance by some patients on these tests can sometimes fall below chance levels (e.g., Binder, 1990, 1992), providing strong evidence that they should be classified as malingerers.

Some researchers have exploited the finding that the recall ability of patients with amnesia is usually well preserved if a relatively small amount of information must be recalled from memory following an unfilled retention interval (see Baddeley, 1990). Baker, Hanley, Jackson, Kimmance, and Slade (1993) therefore compared the performance of simulators and genuine patients with amnesia in recalling sets of three words under distraction conditions in which individuals had to count backwards between presentation and recall, and under no-distraction conditions in which the retention interval was unfilled. Genuine patients with amnesia performed significantly worse than controls under distraction conditions, but performed relatively well under no-distraction conditions. Many of the simulators, however, performed as badly under no-distraction as under distraction conditions. When Baker et al. (1993) also took into account overall level of performance, it was possible to distinguish reliably between the performance of over 80% of the simulators and patients with amnesia.

Kapur (1994) recommended the use of a much simpler test to distinguish simulators from patients with amnesia. Kapur referred to this as the ‘‘coin-in-the-hand test’’. In it, a coin is placed in either the experimenter’s left or right hand. The hand is then closed, and the individual is asked to count backwards from 20 with their eyes shut. They are then asked to indicate the hand which is holding the coin. Kapur showed that two patients whom he suspected of malingering performed at chance levels when given 10 trials of this test, whereas five patients considered to be genuine patients with amnesia performed 10 trials without error.

Blaxton (1992) and Graf, Squire, and Mandler (1984) have shown normal performance by patients with amnesia on tests of implicit memory involving word stem and fragment completion. Wiggins and Brandt (1988) investigated whether performance on a test of word stem completion might distinguish the performance of patients with amnesia, simulators, and controls. They found that although simulators performed as poorly as the patients with amnesia on a test of recall, they performed in a similar way to patients with amnesia and controls on the test of stem completion. Horton et al. (1992) performed a similar study, but told the participants that half of the stems or fragments could be completed with words from the list that they had recently studied. Horton et al. (Experiment 1) found that simulators performed badly on the stem and fragment completion test for previously studied items, consistent with the view that they were deliberately withholding correct answers on the completion tests. Moreover, whereas all of their 16 control individuals completed more fragments of target words than fragments of words not presented previously, none of the 16 simulators showed this effect. Overall this manipulation proved 100% successful in distinguishing normal controls and simulators. However, Horton et al. did not compare the performance of their simulators with a set of memory impaired patients.

The question of whether or not patients with amnesia will perform at the same level as control individuals on the completion test when their attention is drawn to the relationship between the fragment test and the prior study episode was one of the main issues that we investigated in the present study. In addition, we investigated further the value of Kapur’s (1994) coin-in-the-hand procedure by examining its ability to distinguish between the performance of patients with amnesia and simulators. In order to achieve this, we directly compared its effectiveness with the effectiveness of the techniques developed by Baker et al. (1993) and by Horton et al. (1992). If a test as easy to prepare and administer as the coin-in-the-hand test turns out to be as sensitive as the more complex procedures used by Baker et al. and Horton et al. in its ability to identify simulators, then it should indeed prove to be an extremely important tool in the detection of malingering. This study also provides an opportunity to compare directly the effectiveness of the use of fragment completion and no distraction tests in identifying simulators, and to ascertain whether or not simulators who can successfully pass themselves off as patients with amnesia on any one of these memory tests are also able to simulate amnesia on the other two. Finally, we also tested the explicit memory performance of our participants on standard recall tests. This enabled us to confirm the severity of the episodic memory deficit in our amnesic sample, and to discover how successfully our simulators were able to feign it.

METHOD

Participants

A total of 60 participants took part in this study. Twenty of these were patients (mean age = 40.4 years, *SD* = 15.46) from Neurology Departments at hospitals in Liverpool suffering from a permanent amnesia derived from a variety of aetiologies. Eleven of them had suffered a closed-head injury, one was post-encephalitic, 1 had undergone surgery to remove a brain tumor, 4 had suffered CVAs, 1 had suffered cerebral anoxia, and 2 were suffering from a neurodegenerative disease. The performance of all 20 patients was severely impaired on Warrington's (1984) Recognition Memory Test, and the Wechsler Memory Scale Revised (Wechsler, 1988), indicating that they were suffering from anterograde amnesia. All of them complained of having poor memories, but none were seeking financial compensation. Their mean WAIS IQ was 85.8 (*SD* = 13.67). Normal controls comprised 20 unpaid volunteers drawn from the local community with a mean age of 35.4 years (*SD* = 14.27) and mean IQ, as estimated by Nelson's (1982) National Adult Reading Test (NART), of 114.2 (*SD* = 11.41). Twenty volunteers drawn from the same population served as the 'simulators'; their mean age was 34.8 years (*SD* = 14.46) and their mean IQ as estimated by the NART was 112.7 (*SD* = 11.88). Individuals were assigned at random to the simulator and control groups. There was no significant difference between the ages of the three groups ($p > .20$). There was a significant difference between the IQ scores of the three groups, $F(1, 57) = 36.48$ ($p < .01$). Newman-Keuls post hoc analyses revealed that the patients with amnesia had significantly lower IQ scores ($p < .01$) than either of the other two groups who did not differ significantly from one another ($p > .05$).

Procedure and Apparatus

At the start of the experiment, each individual was given an envelope containing some instructions. For control and amnesic individuals, these read: ''This is a study about memory using several tests that I have brought along today. I would be grateful if you would try your best and get as many right as you can.'' For the simulators, they read ''This is a study about memory using several tests that I have brought along today, but please listen to this very carefully: I want you to imagine that you have had an accident at work which has left you with a temporary bad memory. Only you know that this is now cured. In order to gain compensation, you have to convince doctors that you still have a bad memory, which will be reflected in your performance on these tests''. They were told that they should follow these instructions throughout the entire testing session.

All individuals performed the following tests in the following order: fragment completion, coin-in-the-hand test, memory for prose, distraction/no distraction. The only exception to this was that the order of the fragment completion and distraction/no distraction tests was reversed for half of the individuals in each of the three groups. The procedure used in each of these tests is outlined below.

Fragment completion

Thirty-two words were selected from the set used by Tulving, Schacter, and Stark (1982), and randomly divided into two sets of 16 words (list A and list B). The words on list A were: pendulum, madeira, universe, lettuce, rainbow, horizon, assassin, anatomy, flamingo, migraine, octopus, mascara, hexagon, bladder, leprosy, gondola. The words on list B were: inferno, vicarage, borough, surgeon, dinosaur, chimney, conifer, tricycle, anybody, rhubarb, espresso, hyacinth, cinnamon, sapphire, flannel, broccoli. The words from one of these lists were presented to individuals one at a time on white 6 by 4 inch cards in uppercase at a rate of 1 word every 3 s. Individuals were told to study these items but were not informed as to the nature of the subsequent memory tests. Immediately following presentation, individuals were handed a sheet of paper containing 32 fragments written in the same font and size as before. The 32 items contained fragments of all the words from list A and list B. They were told to attempt to complete the fragments with English words. They were told that half of the fragments could be completed with words that they had just seen. They were also advised to spend no longer than 15 s on a fragment if they could not solve it. Half of the individuals in each of the three groups received the words from list A as targets, and half received the words from list B as targets. As soon as the fragment completion test was over, individuals were given a blank sheet of paper and were asked to write down as many words as they could remember from the prior study list.

Coin-in-the-hand test

Participants were asked to note carefully in which hand a British ten pence coin (diameter = 2.5 cm, color = silver) was being held by the experimenter. The hand was held open for 2 s. Individuals were then asked to close their eyes and count backwards in ones from 10 to 1. During this time, the experimenter clenched both hands, and the coin was hidden from view. When individuals had finished counting, they were instructed to open their eyes and tap the hand that contained the coin. The individuals were told that the task involved no conjuring and that the coin would always be in the hand in which it had been shown to them a few seconds earlier. Ten separate trials were administered to the participants. The order determining the hand in which the coin was held on each trial was randomized. The order, which was the same for every participant, was as follows: right hand, left hand, left hand, right hand, right hand, left hand, right hand, left hand, right hand, left hand.

Memory for prose

Individuals were asked to remember the two prose passages from the Logical Memory test in the Wechsler Memory Scale-Revised (Wechsler, 1988). In this test, the experimenter reads out a short passage that the individual must attempt to recall in as much detail as possible once the passage is finished. This procedure is then repeated with a second passage. Each passage is scored out of a maximum possible of 25.

Distraction/No Distraction Test

Each individual was presented with 30 white 6 by 4 inch cards one at a time. Each card contained three different nouns in uppercase arranged in a horizontal line. The three words on each card were all related to a different semantic category and were not normatively associated with each other. Wherever possible, high frequency words were used, and words with multiple meanings were excluded.

At presentation, individuals were required to read aloud the three words on the stimulus card, and were tested 20 s later. The words used can be found in Baker et al. (1993, page 684). In the no distraction condition, the delay between presentation and test was silent. In the distraction condition, individuals were required to count backwards by ones from a random three-digit number during the 20-s delay. Half the individuals in each group received the first 15 cards in the distraction condition and the second 15 cards in the no-distraction condition. For the remaining individuals, this order was reversed.

At test, individuals were presented with semantic category cues (e.g. ‘‘an item of furniture’’ for the target word ‘‘table’’) one at a time spoken aloud by the experimenter. As each cue was presented, the individual attempted to recall the word from the card they had seen 20 s earlier that was a member of that category. Individuals spoke their response, which was recorded by the experimenter. If individuals did not know the answer, they were encouraged to guess. Each category was used as a cue once only for each individual.

RESULTS

Group Means

Table 1 summarizes performance on the fragment completion test. A two-way ANOVA revealed a significant effect of group, $F\ (2, 114) = 126.89$ ($p < .01$), a significant effect of targets versus baseline items, $F\ (1, 114) = 209.85$ ($p < .01$), and a significant interaction between these two factors, $F\ (2, 114) = 25.35$ ($p < .01$). Newman-Keuls post hoc analyses revealed significantly higher scores for target than baseline items in all three groups ($p < .01$), and significantly higher performance by the controls than by simulators and patients with amnesia on both target and baseline completion ($p < .01$). The performance of the patients with amnesia and simulators did not differ significantly ($p > .05$). A one-way ANOVA on the differences between target and baseline items showed a significant effect of group, $F\ (2, 57) = 29.34$ ($p < .01$). Newman-Keuls tests revealed a significantly larger difference between target and baseline items in the control group than in the simulators

($p < .01$) and the patients with amnesia ($p < .01$). The performance of the patients with amnesia and simulators did not differ significantly ($p > .05$). In summary, therefore, all three groups show a significant priming effect, but the amount of priming is greatest in the control group. There was also significantly better performance by the control individuals on completion of both target and baseline items.

Table 2 summarizes performance when individuals were asked to recall the target words from the completion test. A one-way ANOVA revealed a significant effect of group, F (2, 57) = 42.90 ($p < .01$). Newman-Keuls tests revealed significantly higher performance by controls than by simulators ($p < .01$) or by the patients with amnesia ($p < .01$). There was no significant difference between recall performance by the patients with amnesia and simulators ($p > .05$).

Table 3 summarizes the ability of the individuals to recall the prose passages from the Wechsler (1988) memory test. A one-way ANOVA revealed a significant effect of group, F (2, 57) = 68.28 ($p < .01$). Newman-Keuls tests revealed significantly superior performance by control individuals than by simulators ($p < .01$) and than by the patients with amnesia ($p < .01$). There was no significant difference between the recall performance of the patients with amnesia and the simulators ($p > .05$). Tables 2 and 3 confirm the severe nature of the memory deficit experienced by individuals in the amnesic group, and the ability of the simulators to feign it.

Table 4 summarizes performance on the distraction and no distraction tests. A two-way ANOVA revealed a significant effect of group, F (2, 114) = 340.69 ($p < .01$), and a significant effect of distraction, F (1, 114) = 42.53 ($p < .01$). The interaction between these factors was also highly significant, F (2, 114) = 12.00 ($p < .01$). Newman-Keuls tests revealed significantly higher overall performance by controls than by simulators ($p < .01$), by controls than by the patients with amnesia ($p < .01$), and by the patients with amnesia than by simulators ($p < .01$) under both distraction and no distraction conditions. There was a significant difference between distraction and no distraction conditions in both the control individuals ($p < .01$) and the amnesic individuals ($p < .01$), but no significant difference between distraction and no distraction conditions in the simulators ($p > .05$).

Table 5 summarizes performance on the coin-in-the-hand test. A one-way ANOVA revealed a significant effect of group, F (2, 57) = 119.57 ($p < .01$). Newman-Keuls tests revealed significantly worse performance by simulators than by controls ($p < .01$) or patients with amnesia ($p < .01$). There was no significant difference between the performance of the patients with amnesia and the controls ($p > .05$). Two of the simulators performed below chance on this test, with scores of 1/10 ($p = .01$), and 0/10 ($p = .001$). Two of the simulators achieved scores of 2/10 ($p = .055$). Only one of the simulators scored significantly higher than chance. Nineteen of the controls had perfect scores on this test, one individual scoring 9/10. Seventeen of the 20 patients with amnesia had perfect scores, the remaining 3 scoring 9/10, 8/10 and 6/10.

Individual Performance

How sensitive are the tests that were administered in this study in distinguishing between the

Table 1. Performance on the Fragment Completion Test.

	Number Correct								
	Target Words			Baseline words			Target-Baseline		
	M	(*SD*)	Range	*M*	(*SD*)	Range	*M*	(*SD*)	Range
Simulators	3.80	(2.02)	0–>7	1.10	(1.07)	0–>4	2.70	(2.30)	–3–>7
Amnesics	4.15	(2.64)	0–>9	0.45	(0.76)	0–>3	3.70	(2.66)	0–>9
Controls	12.15	(2.30)	8–>16	3.95	(1.50)	2–>7	8.20	(2.17)	6–>13

Note. Maximum score = 16.

Table 2. Free Recall performance of the Target Words from the Fragment Completion Test.

	M	(*SD*)	Range
Simulators	2.45	(1.28)	1–>5
Amnesics	1.65	(0.81)	0–>3
Controls	6.35	(2.56)	2–>12

Note. Maximum score = 16.

performance of individual participants in the amnesic, simulator, and control groups ? We first looked at the number of simulators whose performance on each test set fell outside the range of scores obtained by the patients with amnesia. Virtually identical results would have been obtained if we had used instead a cut-off point of two standard deviations from the mean score of the patients with amnesia.

On recall of prose passages, 18/20 simulators performed within the range of scores produced by the patients with amnesia. On free recall of words from the fragment test, 16/20 simulators performed within the amnesic range. This provides further support for the conclusion that simulators can accurately feign the amnesic deficit on typical tests of recall from secondary memory.

When performance on the fragment test itself was examined, the difference between the number of target and baseline items correctly completed on the fragment test was used. The performance of all of the simulators using this measure was *within* the amnesic range. The fragment task therefore clearly cannot distinguish between the performance of simulators and patients with amnesia. Only two of the simulators performed within the range of the control scores on this measure, consistent with the results of Horton et al. (1992).

On the coin-in-the-hand test, performance by 19/20 of the simulators was outside the amnesic range. This indicates that virtually all simulators can be distinguished from the patients with amnesia because they produced a score that is too low on this test.

When the difference between performance on the no distraction and distraction tests was used, 13/20 of the simulators were outside the range of amnesic scores. When performance on the no distraction task was considered in isolation, performance by 19/20 of the simulators fell outside the amnesic range, indicating that this test is as successful as the coin-in-the-hand test at distinguishing patients with amnesia and simulators.

We also examined whether or not the tests were able to distinguish between the individual performance of the patients with amnesia and the control individuals. As would be expected from inspection of Tables 2 and 3, only one of the control individuals fell within the amnesic range on the prose recall test, and only three control individuals were within the amnesic range on free recall of words from the fragment completion test. On the difference between the number of target and baseline fragments completed, 15/20 of the patients with amnesia performed below the range of the control individuals. On the no distraction test, all of the controls performed above the amnesic range. On the dif-

Table 3. Recall Performance on the Prose Passages from the Wechsler (1987) Memory Test.

	M	(*SD*)	Range
Simulators	12.60	(5.43)	3–>26
Amnesics	14.55	(5.07)	5–>22
Controls	28.75	(3.61)	22–>35

Note. Maximum Score = 50.

Table 4. Performance on the Distraction and No Distraction Tests.

	Number Correct								
	No Distraction			Distraction			No Distraction-Distraction		
	M	(*SD*)	Range	*M*	(*SD*)	Range	*M*	(*SD*)	Range
Simulators	15.55	(6.93)	1–>29	13.85	(6.21)	1–>26	1.80	(3.92)	–9–>9
Amnesics	35.80	(4.23)	27–>42	24.00	(5.40)	17–>35	11.80	(4.34)	4–>20
Controls	44.95	(0.22)	44–>45	41.10	(2.81)	35–>45	3.85	(2.80)	0–>10

Note. Maximum score = 45.

ference between performance on the distraction and no distraction items, 10/20 of the control individuals performed within the amnesic range, and 10 fell below it.

In conclusion, therefore, the fragment completion test, the prose recall test, and free recall of words from the fragment test were successful at distinguishing between the performance of the patients with amnesia and the controls but did not distinguish between the patients with amnesia and simulators. The difference between performance on the distraction and no-distraction tests was reasonably successful at distinguishing the patients with amnesia and simulators, and slightly less successful at distinguishing the patients with amnesia and controls. The coin-in-the-hand-test was virtually perfect at distinguishing the patients with amnesia and simulators, but could not distinguish the patients with amnesia and controls. Only the no-distraction test distinguished between both the patients with amnesia and simulators, and between the patients with amnesia and controls.

Finally, we also examined the sensitivity of the somewhat more intricate procedures adopted by Baker et al. (1993) on the distraction/no distraction test. Baker et al. (1993, Experiment 1), found that 8/10 of their patients with amnesia produced a difference of at least 15% between their performance under no distraction and distraction conditions. None of their control individuals or simulators showed a difference of this magnitude. Control individuals always scored above 65% overall, whereas 19/20 simulators scored below 65%. In other words simulators produced poor overall performance and failed to produce a sufficiently large difference between distraction and no distraction conditions relative to the patients with amnesia. In the present study, all of the simulators scored less than 65% overall, and only 2/20 of them produced a difference of 15% or more between their performance under no distraction and distraction conditions. In contrast, 17/20 of the patients with amnesia produced a difference of more than 15% between distraction and no distraction conditions. All of the control individuals scored over 65% overall, so none of them would be classified as simulators. However, 5/20 of them showed a difference of over 15% between distraction and no distraction conditions, and so would be classified as a patient with amnesia.

Table 5. Performance on the Coin-in-the-Hand Test.

	M	(*SD*)	Range
Simulators	4.10	(2.10)	0–>10
Amnesics	9.65	(0.99)	6–>10
Controls	9.95	(0.22)	9–>10

Note. Maximum Score = 10.

One important potential difference between the amnesic group and the normal individuals in this experiment concerns general intellectual ability. The patients with amnesia had a lower mean WAIS IQ than would be predicted in the normal individuals on the basis of their NART (Nelson, 1982) score. It seems unlikely, however, that differences between simulators and patients with amnesia on the coin-in-the hand test and under no distraction conditions in the distraction/no distraction test, might have come about because the patients with amnesia were less intelligent or less well educated. This is because simulators performed *badly* relative to the patients with amnesia on these two tests. A further advantage of using high ability control individuals is that it is likely to be more difficult to detect malingerers of high than low intellectual ability.

DISCUSSION

Free recall and Memory for Prose

The simulators in this study successfully simulated amnesic performance on the free recall of words from the fragment completion test and on the recall of prose passages from the Wechsler (1988) memory test. These are tests that tap explicit retrieval of information from secondary memory, and are therefore tests where one would expect patients with amnesia to perform significantly worse than controls. On these tests, mean performance by simulators differed significantly from controls but not from the patients with amnesia, and the performance of virtually all of the simulators fell within the amnesic range.

Fragment Completion

Performance on the fragment completion task by the simulators and controls was broadly similar to that observed by Horton et al. (1992). None of the simulators completed as many target fragments as the lowest scoring control individual. Unlike Horton et al.'s study, the simulators appeared to have withheld some correct responses to baseline items also. However, the performance of the amnesic individuals on the fragment completion test was very striking. Although they did show an effect of priming on the number of fragments completed, they clearly found the task of fragment completion to be very difficult, and completed fewer items than control individuals. Critically, the amount of priming that they showed was significantly less than in the control group. The outcome was that performance was very similar in the patients with amnesia and in the simulators on all aspects of the fragment completion test.

Why might the patients with amnesia have shown relatively small priming effects on the fragment test ? Ostergaard (1994) reported reduced priming in patients with amnesia on tests of word identification, and attributed this to high baseline performance level. As our patients with amnesia showed very low baseline performance on the fragment completion task, it seems unlikely that this can explain the relatively small priming effect observed in the present study, however. Another possibility is that there is something atypical about the performance of the patients with amnesia in this study on this test. Unfortunately, Horton et al. did not include a group of amnesic individuals in their study, but in support of this view one might point out that normal priming by memory-impaired individuals on tests of fragment completion has been observed previously (Blaxton, 1992). It is possible that more intellectually able patients with amnesia than those who took part in this study would have performed differently from simulators and produced equivalent levels of priming to the control individuals. Even if this is so, the present results make it clear that at least some patients with memory impairments following brain injury do not show normal priming on tests of fragment completion. If reduced priming on tests of fragment completion is used to diagnose malingering, then some genuine patients with amnesia may easily be misclassified as malingerers.

We believe, however, that there is a more fundamental reason why the patients with amnesia did not show normal priming on the fragment completion test, and that this raises a very important concern about the efficacy of using implicit memory tests in attempts to detect malingered amnesia. In the Blaxton (1992) study, none of the control or memory-impaired individuals were given any information about the relationship between the fragment completion test and the prior presentation of the word list. However, in order to make simulators perform differently from normal individuals on tests of implicit memory, it is necessary to draw the attention of participants to the fact that some of the questions on the ''implicit'' test can be answered by words that have been recently studied (Horton et al., 1993; Wiggins & Brandt, 1988). The effect of this instruction is likely to allow explicit memory to exert a much more profound influence on the fragment completion tests than is the case when individuals are not informed about the relationship between the implicit memory test and the prior study episode (Roediger, Weldon, Stadler, & Riegler, 1992). In other words, under these circumstances, the fragment completion test is no longer a genuine test of implicit memory. The consequence of increasing the contribution of explicit memory in this way is that patients with amnesia can no longer be expected to perform at the same level as controls (cf. Graf et al., 1984). If this is the case, then it appears doubtful whether patients with amnesia will perform at normal levels on any ''implicit'' memory test that can be used to catch malingerers.

Distraction/No Distraction

Simulators were less successful on the distraction/no distraction test (Baker et al., 1993). Unlike the patients with amnesia, the simulators did not show a significant difference between mean performance on the distraction and no distraction tests, and relatively few of the simulators produced a difference between distraction and no distraction conditions that was within the range of difference scores observed in the patients with amnesia. Using the more elaborate criteria of Baker et al. (1993), which also takes into account both this measure and overall performance level, 17 of the simulators and 18 of the patients with amnesia were appropriately classified. Interestingly, performance on the no distraction test by itself was able to distinguish almost perfectly between simulators, controls, and patients with amnesia. This was quite surprising as scores on this test had failed to distinguish between controls and patients with amnesia in Baker et al.'s (1993) study.

The Coin-in-the-Hand-Test

Mean performance by the simulators on the coin-in-the-hand test (Kapur, 1994) was significantly worse than the mean performance of the patients with amnesia. Furthermore, only one of the simulators performed within the amnesic range on this test. Although the coin-in-the-hand test is very accurate at separating simulators from patients with amnesia and controls, it is not at all successful at distinguishing patients with amnesia from controls relative to the criteria employed by Baker et al. (1993).

From a clinical perspective, of course, the most pressing need is for a test that can distinguish malingerers from patients with amnesia. It is therefore difficult not to be impressed by the ability of the coin-in-the-hand test to distinguish simulators from genuine patients with amnesia bearing in mind the fact that this test requires no preparation of stimuli, can be administered in a very short period of time, and the results are simple to interpret. It is worth pointing out that the one simulator who performed normally on the coin-in-the-hand test *was* identified as a simulator on the distraction/no distraction test. Nevertheless, the coin-in-the-hand test was so successful in identifying simulators, that it really makes redundant discussion of whether or not it is worthwhile to employ a battery of tests to detect malingering.

Of course it is important to know whether our results with the coin-in-the-hand test can be replicated in other laboratories using a larger numbers of simulators. It would also be interesting to compare the effectiveness of the coin-in-the-hand test and the no distraction test with the Portland Digit Recognition Test (e.g., Binder & Willis, 1991). Another important question is whether or not simulators would continue to perform badly on the coin-in-the-hand test when the instructions emphasize that they must fake amnesia in what they consider to be a *credible* way, and when they are given financial incentives to avoid detection (see Rogers, 1988). It is also questionable whether either the coin-in-the-hand test or the no distraction test would lead a really knowledgeable simulator to perform differently from genuine patients with amnesia (cf Schagen, Schmand, Sterke, & Lindeboom, 1997). As with all studies of this kind, there is no guarantee that the results obtained when normal individuals are asked to simulate amnesia will generalize to real life situations in which clinicians attempt to distinguish genuine from malingered amnesia. Nevertheless, if a patient performs badly on the coin-in-the-hand test then our results suggest that they are much more likely to a simulator than a genuine patient with amnesia.

REFERENCES

Baddeley, A.D. (1990). *Human memory: Theory and practice.* London: Lawrence Erlbaum.

Baker, G.A., Hanley, J.R., Jackson, H.F, Kimmance, S., & Slade, P. (1993). Detecting the faking of amnesia: Performance differences between simulators and patients with memory impairment. *Journal of Clinical and Experimental Neuropsychology, 15,* 668-684.

Bernard, L.C. (1990). Prospects for faking believable deficits on neuropsychological tests and the use of incentives in simulation research. *Journal of Clinical and Experimental Neuropsychology, 12,* 715-728.

Binder, L.M. (1990). Malingering following minor head trauma. *The Clinical Neuropsychologist, 4,* 25-36.

Binder, L.M. (1992). Malingering detected by forced-choice testing of memory and tactile sensation: A case report. *Archives of Clinical Neuropsychology, 7* , 155-163.

Binder, L.M. (1993). Assessment of malingering after mild head trauma with the Portland Digit Recognition Test. *Journal of Clinical and Experimental Neuropsychology, 15,* 170-182.

Binder, L.M., & Willis, S.C. (1991). Assessment of motivation after financially compensatable minor head trauma. *Psychological Assessment: A Journal of Consulting and Clinical Psychology, 3,* 175-181.

Blaxton, T.A. (1992). Dissociations among memory measures in memory-impaired subjects: Evidence for a processing account of memory. *Memory and Cognition, 20,* 549-562.

Brandt, J. (1988). Malingered amnesia. In R. Rogers (Ed.), *Clinical assessment of malingering and deception* (pp. 65-83). New York: Guilford Press.

Brandt, J., Rubinsky, E., & Lassen, G. (1985). Uncovering malingered amnesia. *Annals of the New York Academy of Sciences, 444,* 502-503.

Flowers, K.A, Sheridan, M.R., & Shadbolt, H. (1996). Simulation of amnesia by normals on Rey's Auditory Verbal Learning Test. *Journal of Neurolinguistics, 9,* 147-156.

Graf, P. Squire, L.R., & Mandler, G. (1984). The information that amnesics do not forget. *Journal of Experimental Psychology: Human Learning and Memory, 10,* 164-178.

Hiscock, M., & Hiscock, C.K. (1989). Refining the forced-choice method for the detection of malingering. *Journal of Clinical and Experimental Neuropsychology, 11,* 967-974.

Horton K.D., Smith, S.A., Barghout, N.K., & Connolly, D.A. (1992). The use of indirect memory tests to assess malingered amnesia: A study of metamemory. *Journal of Experimental Psychology: General, 121,* 326-351.

Iverson, G., Franzen, M., & McCracken, L. (1991). Evaluation of an objective assessment technique for the detection of malingered memory deficits. *Law and Human Behavior, 15,* 667-676.

Kapur, N. (1994). The coin-in-the-hand test: A new ''bedside'' test for the detection of malingering in patients with suspected memory disorder. *Journal of Neurology, Neurosurgery and Psychiatry, 57,* 385-386.

Millis, S. (1992). The recognition test in the detection of malingered and exaggerated memory deficits. *The Clinical Neuropsychologist, 6,* 406-414.

Nelson, H. (1982). *The New Adult Reading Test.* Windsor, UK: NFER Publishing.

Nies, K.J., & Sweet, J.J. (1994). Neuropsychological assessment and malingering: A critical review of past and present strategies. *Archives of Clinical Neuropsychology, 9,* 501-552.

Ostergaard, A.L. (1994). Dissociations between word priming effects in normal subjects and patients with memory disorders: Multiple memory systems or retrieval ? *Quarterly Journal of Experimental Psychology, 47A,* 331-364.

Roediger, H.L., Weldon, M.S., Stadler, M.L., & Riegler, G.L. (1992). Direct comparison of two implicit memory tests: Word fragment and word stem completion. *Journal of Experimental Psychology: Learning Memory and Cognition,18,* 1251-1269.

Schagen, S., Schmand, B., de Sterke, S., & Lindeboom, P. (1997) Amsterdam short-term memory test: A new procedure for the detection of feigned memory deficits. *Journal of Clinical and Experimental Neuropsychology, 19,* 43-51.

Tulving, E., Schacter, D.L., & Stark, H.A. (1982). Priming effects in word fragment completion are independent of recognition memory. *Journal of*

Experimental Psychology: Learning Memory and Cognition, 8, 336-342.
Warrington, E.K. (1984) *Recognition Memory Test.* Windsor, UK: NFER Publishing.
Wechsler, D. (1988). *Wechsler Memory Scale – Revised.* New York: Harcourt Brace Jovanovitch.
Wiggins, E.C., & Brandt, J. (1988). The detection of simulated amnesia. *Law and Human Behavior, 12*, 57-78.