

## REDUCING AND REVERSING PSEUDOMEMORIES WITH HYPNOSIS<sup>1</sup>

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### Abstract

As a forensic memory enhancement tool, hypnosis is problematic because it tends to increase pseudomemory responses and inflate confidence regardless of accuracy. A variety of evidence suggests that major influences in producing these effects are expectancy and demand characteristics. However, if expectancy and demand characteristics play a role in increasing false positive responses with hypnosis, it may be possible to use the same factors to reduce false positive responses. Some have argued that the standard misinformation effect in nonhypnotic situations may be influenced by expectancy and demand characteristics. Consequently, if subjects are given misleading information followed by an instruction suggesting that hypnosis will reduce the influence of misinformation, hypnosis may reduce rather than increase false positive responses, including spurious confidence in errors. In this paper two studies are described that lend some experimental support for this hypothesis. The first showed that, when participants are not given an opportunity to commit themselves to making errors, the misinformation effect can be eliminated if hypnosis is given together with a suggestion that it will help participants discriminate between correct and incorrect information. The second study showed that a similar posthypnotic suggestion was more effective than a warning alone in reducing or reversing misinformation errors even after participants had committed themselves to reporting such errors. There was no evidence of inflated confidence with hypnosis in either study. Copyright © 2008 British Society of Experimental & Clinical Hypnosis. Published by John Wiley & Sons, Ltd.

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**Key words:** demand characteristics, expectancies, misinformation effect, pseudomemories, response bias

### Introduction

The use of hypnosis as a method for facilitating memory of eyewitnesses has long been a source of controversy (see, for example, Kleinhauz, Horowitz and Tobin, 1977; Orne, 1979; Diamond, 1980; Haward and Ashworth, 1980; Reiser, 1980; Hibbard and Worring, 1981; Wagstaff, 1981, 1982a, 1982b, 1983; Haward, 1988). Although some memory enhancement effects with hypnosis have been reported (Geiselman, Fisher, MacKinnon and Holland, 1985; Ready, Bothwell and Brigham, 1997), the overwhelming majority of studies suggest that hypnotic procedures do not significantly improve accurate eyewitness recall to levels above those achievable under nonhypnotic conditions (for reviews see, Smith, 1983; Wagstaff, 1984; Erdelyi, 1994; Steblay and Bothwell, 1994); McConkey and Sheehan, 1996; Keibell and Wagstaff, 1998).

In an influential review of the relevant literature, Erdelyi (1994) reported that memory improvements associated with hypnosis tend to be confined to situations involving free recall of high sense stimuli, such as staged crimes, and, in such cases, the improvements are often accompanied by an increase in incorrect information. As a result, overall accuracy, as determined by the proportion of correct to incorrect responses is not improved. In fact, sometimes the increase in incorrect responses is such that overall accuracy deteriorates (see, for example, Dinges et al., 1992; Dywan and Bowers, 1983). Research also indicates that hypnosis may encourage witnesses to incorporate more misleading information into their reports, and/or be more confident in their incorrect reports resulting in a 'false confidence' effect (Zelig and Beidleman, 1981; Wagstaff, Traverse and Milner, 1982; Sheehan and Tilden, 1986; Nogrady, McConkey, and Perry, 1985; Whitehouse, Dinges, Orne and Orne 1988; Spanos, Quigley, Gwynn, Glatt, and Perlini, 1991; McConkey and Sheehan, 1996; Scoboria, Mazzoni, Kirsch and Milling, 2002; Wagstaff, Brunas-Wagstaff, Knapton, Winterbottom, Crean, Cole and Wheatcroft, 2004). One consequence of the false-confidence effect is that hypnosis can also result in a reduction in confidence accuracy (C-A) relationships (Wagstaff et al., 2004). For a good C-A relationship to exist, witnesses should be more confident in their correct than incorrect responses. In practice, a reduction in C-A relationships can be very important, as the confidence shown by witnesses is one of the main factors determining jurors' perceptions of witness credibility (Wheatcroft, Wagstaff and Kebbell, 2004).

One explanation for the hypnotic pseudomemory effect is that, because of the expectancies associated with hypnosis and pressure brought to bear by the investigating hypnotist to remember more, hypnotized witnesses sometimes adopt a more lax criterion for report by giving some additional details about which they were previously unsure, resulting in increases in incorrect information. In addition, they may report vague details or imaginings as confident memories, assuming that, because they are created in the hypnotic context, they will be accurate (see, for example, Dinges et al., 1992; Whitehouse, Dinges, Orne and Orne, 1988, 2005; Lynn and Nash, 1994; Miller and Wolford, 1999; Wagstaff, 1999a, 1999b; Webert, 2003). In support of this view, a variety of evidence suggests that hypnotically created pseudomemories and false confidence effects can sometimes be reduced to nonhypnotic levels under conditions that encourage more cautious and truthful reporting; such as being told that a 'hidden part' of them can describe their 'real' memories, cross-examined under oath (Spanos, Gwynn, Comer, Baltruweit and de Groh, 1989), given a financial incentive for accurate reporting (Murray, Cross and Whipple, 1992), or given an opportunity to deny being in a 'trance' (Wagstaff and Frost, 1996). False memory reports with hypnosis are also reduced when it is implied that the experiment is terminated (Barnier and McConkey, 1995); when subjects are contacted by telephone at their home after the experiment (McConkey, Labelle, Bibb, and Bryant, 1990); and when rapport with the hypnotist is downgraded (Sheehan, Green and Truesdale, 1992). Pseudomemory effects are rarely eliminated entirely using such procedures; however, the central issue here is not whether *all* pseudomemory effects (including those created outside the context of hypnosis) result from response bias, but why they appear to be more prevalent when hypnosis procedures are employed.

If the expectancy and situational demands associated with this stereotype account, at least in large part, for increases in false positive errors reported with hypnosis, these factors might ironically also place hypnosis in a unique position to reduce and resist attempts to mislead them. In other words, if expectancy and demand characteristics play a role in making hypnosis procedures particularly susceptible to false positive effects, it may be possible to manipulate these factors such that hypnosis can be used to reduce

false positive responses. Lindsay (1990) has argued that the standard misinformation effect in nonhypnotic situations may also be susceptible to expectancy and demand characteristics effects. Consequently, if subjects are given misleading information followed by an expectancy that hypnosis has a special capacity to reduce the influence of such information (rather than increase overall memory production), hypnosis may actually act to reduce false positive responses. The two studies described in this paper investigate this possibility.

## Experiment 1

In the 1970s Loftus and her colleagues developed a three stage paradigm for investigating the effects of misinformation on memory (Loftus, 1979). Participants are first presented with some information to remember: this is usually some kind of event presented on film or as a slide show. They then receive more information, such as a narrative or a series of questions, which includes misleading details or suggestions about the event. Participants are then tested on their memory for the original event. A large number of studies have confirmed that, compared to those who have not received post-event misinformation, participants tested using this paradigm make more errors, i.e. they tend to incorporate the misleading information into their responses (Loftus, Miller and Burns, 1978; Loftus, 1979; Lindsay, 1990; 2003). However, whilst the misinformation effect itself seems well established, debate continues over its explanation. For example, Loftus (1981) has argued that the memory trace of the original memory may be overwritten by the misinformation such that memory is permanently impaired. However, others have offered a variety of alternative explanations. One possibility, for example, is that the demand characteristics of the situation imply that conscientious experimental participants should pay attention to, and include, details from the misleading information, regardless of whether this accords with their actual memory of the original event (Lindsay, 1990). In support of this viewpoint, there is some evidence to suggest that, under certain conditions, memory for the original event remains intact if participants are tested in forced choice situations that do not offer misleading information as a possible response (McCloskey and Zaragoza, 1985; Zaragoza and McCloskey, 1989). Moreover, when questioned, participants rarely attribute suggested details to the original event alone (Lindsay, 1990). Although there may be other ways of interpreting these findings they are, nevertheless, consistent with the view that laboratory studies of the misinformation effect may at least be biased by expectations and demand characteristics; and if this is the case, there may be a role for hypnosis in reducing their influence.

Although the generally received view is that hypnotic subjects are more likely than nonhypnotic controls to incorporate misleading information into their testimony, this tends to occur when hypnotic subjects are acting under the expectancy that hypnosis operates as a general memory facilitation or production device. It should be emphasized, however, that this does not exhaust the possible range of expectancies that might produce this effect; for example, one might also expect hypnotic subjects to report pseudomemories if given an expectancy that hypnosis is a poor memory facilitation device that encourages false positive responses. Suppose, however, we change the experimental demands and expectancies by presenting hypnosis as a technique that enables participants to make accurate discriminations between correct and incorrect information; i.e. we provide instructions that imply that, when hypnotized, participants should use a response criterion that is particularly cautious and accurate. Under these conditions, if the misinformation effect is influenced by expectancy and demand characteristics effects,

one might expect hypnosis, at least, to partially reduce the misinformation effect, rather than exacerbate it. Also, although by inflating confidence in incorrect responses, hypnosis has previously been associated with poorer confidence-accuracy relationships (Wagstaff et al., 2004), it is possible that hypnosis, together with suggestions for accurate reporting, might reduce this tendency. The aim of the first experiment was to investigate these possibilities.

## **Method**

### *Participants*

There were 60 participants, 50 were undergraduate students from the University of Liverpool from various disciplines and the remainder were members of the general public ( $M$  age = 23.85, range = 18–56,  $SD$  = 8.86); none had any previous experience of hypnosis.

### *Materials and procedure*

Participants were randomly assigned to three conditions: Standard Misinformation, Hypnotic Warning and Control. There were 20 participants in each. Participants in all conditions then received a two minute audio recording of a conversation between two men planning to rob a woman carrying money from a shop to her bank.

Those in the Standard Misinformation condition then received a procedure designed to elicit the standard misinformation effect. This consisted of a further two minute audio recording of a woman recounting the first conversation to her female friend. She started the conversation, 'I overheard the craziest conversation this morning'. The woman then recounted most of the information mentioned in the first conversation, however, a number of critical details were changed; for example, the men said the shop was 'Kelly's Newsagent', whereas the woman referred to it as 'Kelly's Off-License'. Ten minutes later, they were asked to complete a questionnaire which contained 16 questions concerning details of the planned robbery; 11 of these asked for details that were discrepant between the two conversations; such as, 'what is the name of the shop?' Participants were specifically instructed to base their answers on the first conversation, to be as accurate as possible, and to provide an answer to every question. After each question they were required to rate their confidence in their answer on a scale of 1–5, where 1 indicates not at all confident, and 5 indicates extremely confident.

Those in the Hypnotic Warning condition were treated identically to participants in the Standard Misinformation condition (i.e. they heard the initial conversation followed by the conversation with misinformation), except that after the second recording and before memory testing they were administered an audiotape of a standard hypnotic relaxation induction procedure modified from Barber (1969); hypnotic depth was then measured using the LSS (Long Stanford Scale of Hypnotic Depth), which requires subjects to rate their degree of experienced depth on a scale from 0 'awake and alert, as you normally are', through 1 'borderline state, between sleeping and waking', 2 'lightly hypnotized', 5 'quite strongly and deeply hypnotized', 8–9 'very hypnotized' to 10 'very deeply hypnotized' (Tart, 1970; Wagstaff, Cole and Brunas-Wagstaff, 2008). Following this, they were told to concentrate very hard on the two audiotapes they had heard; however, they were warned that the second tape contained some incorrect information that was intended to mislead them. Nevertheless, they were told, 'If you concentrate very hard on the original conversation, in your relaxed hypnotic state you will find it easier to distinguish between the correct and incorrect information. So if you concentrate now

for a few minutes you will find the first conversation becoming clearer and clearer in your mind.' The induction and associated instructions lasted approximately 10 minutes. Participants were then asked to open their eyes, whilst remaining hypnotized, and answer the 16 questions concerning the planned robbery. Participants were again specifically instructed to base their answers on the first conversation and to be as accurate as possible. Following this, hypnosis was terminated.

Participants in the Control condition were treated identically to those in the Standard Misinformation condition, except that instead of receiving the second recorded conversation (i.e. the misinformation) they were required to listen to a two minute recording of a passage from *Lord of the Rings* by J.R. Tolkein.

## Results and discussion

Answers to the 16 questions on the memory test were coded as correct and incorrect by two independent raters; there was 100% agreement. Errors on the 11 misinformation questions (i.e. those questions that referred to information that was discrepant between the two conversations) for the three groups were analysed using a One-Way Analysis of Variance (ANOVA). There was an overall significant main effect for group,  $F(2,57) = 15.69$ ,  $p < 0.0001$ . The means and *SDs* are shown in Table 1; post hoc Tukey tests indicated that the Standard Misinformation group reported significantly more errors than the Hypnotic Warning and Control groups, which did not differ significantly from each other.

To estimate the effects of the various manipulations on overall memory performance, correct responses to all 16 items on the memory test for the three groups were also analysed using a One-Way ANOVA. Again there was an overall significant main effect for group,  $F(2,57) = 13.38$ ,  $p < 0.0001$ . The means and *SDs* are shown in Table 1; post hoc Tukey tests indicated that the Standard Misinformation group reported significantly fewer correct responses than the Hypnotic Warning and Control groups who did not differ significantly from each other.

One-Way between Groups ANOVAs on the overall confidence scores for the 16 questions together, and confidence in errors on the 11 critical questions, showed no significant main effects, i.e. there was no evidence that hypnosis inflated confidence scores. To assess the relationships between confidence and accuracy, Pearson's between subjects confidence-accuracy (C-A) correlations ( $n = 20$ ) were computed for each group by correlating total correct recognition responses with total confidence scores. C-A correlations within both the Control and Hypnotic Warning conditions were significant (0.70,  $p < 0.002$ , and 0.51,  $p < 0.03$ , respectively) and each differed significantly from that for the Standard Misinformation condition ( $z > 2.12$ ,  $p < 0.02$ ), but not from each other.

**Table 1.** Mean errors on misleading questions and mean correct responses for the Control, Standard Misinformation and Hypnotic warning groups (*SDs* in brackets)

	Errors misleading Qs	Overall Correct Rs
Control	2.80 (2.14)	14.45 (2.84)
Standard Misinformation	6.75 (2.34)	9.65 (2.91)
Hypnotic warning	3.95 (2.39)	12.75 (3.21)

Indeed, the C-A correlation for the Standard Misinformation group was negative ( $-0.22$ ,  $p > 0.35$ ).

Within the Hypnotic Warning group, hypnotic depth as determined by LSS reports (Range 1–5;  $M = 2.40$ ,  $SD = 1.31$ ) did not correlate significantly with errors to the critical questions, correct reports, or confidence scores ( $p > 0.10$ ).

Taken together, these results suggest that when participants are tested in a standard misinformation paradigm, the misinformation effect can be eliminated if participants are given hypnosis together with a suggestion that this will help them discriminate between correct and incorrect information. Moreover, the use of hypnosis in this way does not inflate confidence; indeed, it appears to prevent any reduction in confidence-accuracy relationships resulting from the receipt of misinformation.

However, because the Standard Misinformation group did not receive a warning that some of the information they had received was incorrect, it could be argued that it was this warning alone that was responsible for any effects. Moreover, arguably, the situation employed here would be that most likely to yield a reduction in the misinformation effect as participants had not previously committed themselves to giving incorrect responses. A far more stringent test for the efficacy of hypnosis in reducing the misinformation effect would be, therefore, one in which a) a warning is offered to all misinformed participants, regardless of whether they receive hypnosis; and b) hypnosis, with the suggestion to motivate participants to distinguish between correct and incorrect information, is given *after* participants have already committed themselves to making errors; i.e. the aim is not simply to reduce the misinformation effect with hypnosis, but *reverse* it. From an applied perspective, it would also clearly be advantageous if any reversal of the misinformation effect could be manifest outside the context of the hypnosis procedure *per se*; i.e. elicited by a post-hypnotic suggestion. With these considerations in mind, the following study was conducted.

## Experiment 2

### Method

#### *Participants*

The participants were 60 non-psychology undergraduate students from the University of Liverpool ( $M$  age = 20.58, range = 18–24,  $SD = 1.73$ ). None had any previous experience of hypnosis.

#### *Materials and procedure*

Participants were randomly assigned to three groups or conditions, Pre-warned, Post-warned, and Hypnosis, 20 participants in each. Participants in all groups then received 24 colour slides, presented via an automatic slide projector at a rate of one per five seconds. The slides depicted a woman who is threatened with a knife, and then assaulted and robbed of her purse. Immediately following the slides, participants were asked to answer 10 forced choice questions (initial misleading questions, or IMQ), six of which contained false or misleading information in the question; for example, although the victim's car in the slides was a blue Fiesta, the question asked 'As the green fiesta car drove towards the cash-point, the traffic lights in the distance were a) at green, b) at red, etc.' After each question they were required to rate their confidence in their answer on a scale of 1–5, where 1 indicates not at all confident and 5 indicates extremely confident.

Those in the Pre-warned condition then warned that some of the questions they had just been asked contained incorrect information that had been included deliberately to mislead them. They were then told to answer a second set of questions trying hard to avoid being misled; indeed, they were informed that, 'The aim of this experiment is to see how well you can avoid being misled by incorrect information.' They were given five minutes to familiarize themselves with these instructions. They were then given memory test A; this consisted of 10 forced choice questions relating to the event depicted in the slides. Answers to six of the questions involved an incorrect alternative suggested in the initial misleading questions (IMQ); for example, 'What was the colour of the victim's vehicle: a) brown, b) black, c) blue, d) green?' Following this, participants were given five minutes to re-read the warning instructions and to 'try even harder to remember'. They were then asked answer the 10 forced choice questions again, and rate their confidence in their answers, i.e. memory test B. They were reminded that the aim of the experiment was to see how well they can avoid being misled by incorrect information.

Participants in the Post-warned condition were treated the same as those in the Pre-warned condition, except after the initial questions (IMQ), instead of a warning, they were simply told to relax for five minutes before receiving the test A questions. After answering the test A questions they were then given exactly the same warning and instructions issued to the control group. They were then given five minutes to reflect on the instructions before answering the test B questions (i.e. in this condition, the warning was given *after* participants had answered the test A questions).

Those in the Hypnosis condition were treated identically to participants in the Post-warned condition, except that after answering the test A questions, and before answering the test B questions, they were given the general warning instructions followed by a slightly shortened version of the hypnotic induction procedure used in Experiment 1 together with the LSS. After the LSS, a posthypnotic suggestion was included which informed participants that '...if you concentrate on the slides in your relaxed hypnotic state, you will find it easier to distinguish between correct and incorrect information... note how clear the slides are becoming...the slides are now very clear. So when you wake up in a few moments, you will find that you will no longer be misled and you may wish to alter some of your answers.' The instructions and brief hypnosis procedure lasted approximately five minutes, after which hypnosis was terminated and participants answered the test questions again (test B).

To summarize: the basic design was one in which the Pre-warned group received the initial misleading questions (IMQ) followed by a warning, then test A, a repeat of the warning, and then test B. The Post-warned group received the IMQ, followed by test A, followed by a warning, then test B. The Hypnosis group received the IMQ, followed by test A, followed by a warning and hypnosis with a posthypnotic suggestion for reduced errors, followed by test B after the termination of hypnosis. This design enabled tests to be made of two hypotheses based on the assumption that misinformation effects can be influenced by expectancies and demand characteristics; these were: 1) a warning that certain information is incorrect will be more effective in limiting misinformation errors if given before participants have committed themselves to making such errors; but nevertheless 2) the same warning given after participants have committed errors may be equally as effective as the warning delivered before participants have committed themselves to making errors, if given together with an hypnotic suggestion designed to reduce such errors.

## Results and discussion

Originally it was proposed to analyse the data for the test A and B questions using an ANCOVA, with correct responses to the initial misleading questions (IMQ) as a covariate to control for possible group differences in memory performance before the different experimental manipulations. However, the assumption of equivalent slopes was not met. Instead, therefore, the IMQ data were analysed using a one-way ANOVA to test for any confounding group differences, followed by ANOVAs on tests A and B.

No significant differences between groups were found on answers to the IMQ,  $F(2,59) = 1.99$ ,  $p > 0.16$ . The means were 6.05 ( $SD = 1.23$ ), 5.35 ( $SD = 1.46$ ) and 6.10 ( $SD = 1.37$ ) for the Pre-warned, Post-warned and Hypnosis groups, respectively.

Mean errors on the critical six misleading questions in the two memory tests are displayed in Table 2. These data were analysed using a  $3 \times 2$  mixed model ANOVA (Group  $\times$  test). There was an overall significant main effect for group,  $F(2,57) = 50.76$ ,  $p < 0.0001$ , which was qualified by a significant group by test interaction,  $F(2,57) = 24.01$ ,  $p < 0.0001$ . Post-hoc analyses of this interaction using univariate  $F$  tests ( $p < 0.05$ ) showed significant reductions in errors to misleading questions on test B (i.e. fewer errors on test B than test A) only in the Post-warned and Hypnosis groups; however, the effect size was considerably greater for the Hypnosis ( $\eta^2_p = 0.72$ ) than the Post-warned group ( $\eta^2_p = 0.23$ ). Also, the Hypnosis group made significantly fewer errors than the Post-warned group on test B. However, the test B mean for the Hypnosis group was significantly lower than that for the Pre-warned group; i.e. hypnosis was not entirely successful in overcoming the effects of commitment.

To estimate the effects of the various manipulations on overall memory performance, total correct responses on the main tests (A and B) were also analysed using a  $3 \times 2$  mixed model ANOVA (Group  $\times$  test). Again there was an overall significant main effect for group,  $F(2,57) = 14.04$ ,  $p < 0.0001$ , and the significant group by test interaction nearly achieved significance,  $F(2,57) = 2.95$ ,  $p < 0.06$ . Univariate  $F$  tests ( $p < 0.05$ ) show that only the Hypnosis group showed an increase in correct responses on test B. However, again the test B mean for the Hypnosis group was still significantly lower than that for the Pre-warned group.

Overall confidence scores on 10 questions were also analysed using a  $3 \times 2$  mixed model ANOVA (Group  $\times$  test). There was a significant main effect for test,  $F(1,57) = 10.63$ ,  $p < 0.003$ . Overall, confidence was greater on test B than test A; the means were 2.88 ( $SD = 0.73$ ) and 2.71 ( $SD = 0.82$ ), respectively. None of the other effects was significant; i.e. again there was no evidence that hypnosis inflated confidence overall.

**Table 2.** Mean errors on misleading questions, and mean correct responses for the Pre-warned, Post-warned and Hypnosis groups for the two test questionnaires ( $SD$ s in brackets)

	Errors on misleading questions		Correct responses	
	Test A	Test B	Test A	Test B
Pre-warned	1.25 (1.02)	1.15 (0.93)	6.60 (1.67)	6.55 (1.91)
Post-warned	4.65 (1.04)	4.35 (1.04)	3.83 (1.73)	4.05 (1.90)
Hypnosis	4.30 (1.17)	2.35 (1.57)	4.05 (1.79)	4.60 (1.90)



**Table 3.** Mean confidence in errors on misleading questions for the Pre-warned, Post-warned and Hypnosis groups for the two test questionnaires, A and B (*SDs* in brackets)

	Test A	Test B
Pre-warned	1.31 (0.93)	1.72 (1.15)
Post-warned	2.03 (0.44)	2.00 (0.40)
Hypnosis	2.06 (0.24)	1.57 (0.80)

A  $3 \times 2$  mixed ANOVA (Group  $\times$  AB test) on confidence scores for incorrect responses on the six misleading questions produced a rather different pattern of results; see Table 3. There was a significant main effect for group,  $F(2,57) = 6.76$ ,  $p < 0.05$ , qualified by a significant group by test interaction,  $F(2,57) = 2.05$ ,  $p < 0.003$ . Univariate  $F$  tests ( $p < 0.05$ ) showed a reduction in confidence in errors on misleading items on test B only for the Hypnosis group.

Overall, these results suggest that a posthypnotic suggestion was more effective than a warning alone in reducing or reversing misinformation errors even after participants had committed themselves to reporting such errors. However, the reversal achieved through hypnosis was not equivalent to that achieved without hypnosis by delivering the warning before participants had committed themselves to making such errors. Again there was no evidence of inflated confidence with hypnosis; in fact, when errors on misleading questions were considered, hypnosis actually seemed to reduce confidence judgments.

## Discussion

Arguably the results of the two studies presented here are consistent with the view that the often cited connection between the use of hypnosis techniques, reports of pseudomemories and inflated confidence, arises more because of the expectancies and situational demands present than some intrinsic feature of 'hypnosis'. Consequently, when those expectancies and demands are changed such that precise, accurate reporting is encouraged, hypnotic suggestion may actually be used to reduce and sometimes reverse false memory effects, including false confidence effects, if only to a limited extent.

It can be noted, however, that the paradigms used here were different to those used generally in research on hypnosis and memory. Here the misleading information was introduced *before* the induction of hypnosis, rather than, as is more typical, *during* the hypnosis session; i.e. here hypnosis was used to reduce and reverse pseudomemories created outside the context of hypnosis. Given this, it would be interesting to test whether, using appropriate instructions and a pre-warning, it is possible to overturn received wisdom and make participants more resistant to misleading information when it is delivered in the context of hypnosis. To achieve this effect, however, the exact information conveyed in the instructions and warning would be critical. For example, Lynn, Milano and Weekes (1991) found that informing participants that hypnosis enhances or does not enhance memory had no effects on pseudomemory rates or confidence. Also, Green, Lynn and Malinoski (1998) found that a warning that hypnotized individuals may confuse what they imagine with what really happened was ineffective in preventing reports of a pseudomemory subsequently suggested during hypnosis. However, as Green et al. acknowledge, it could be that some participants discerned that the purpose of the experiment was

to report pseudomemories despite warnings, and behaved accordingly. Alternatively, they might actually have perceived what was supposed to be a warning as a cue, or suggestion, to report pseudomemories (for example, they might have assumed that a good hypnotic subject would confuse imagination and reality).

The warnings used in the two experiments reported in the present paper were derived from Lindsay's (1990) work on the misinformation effect in nonhypnotic contexts. Recognizing the potential problem of the influence of demand characteristics in research into the misinformation effect, Lindsay devised what he called the 'opposition test', because it is supposed to set in opposition a person's tendency to report misinformation. Essentially the opposition test is a warning to participants that they have been given (or will be given) information designed to mislead them and that they should ignore this information. Arguably this kind of warning, together with a suggestion or instruction that hypnosis enables people to ignore misleading information, is likely to be more effective in reducing hypnotically created pseudomemories than general statements concerning the negative effects of hypnosis on memory. It should be cautioned, nevertheless, that the extent to which any warning can completely overcome the effects of expectancy and demand characteristics is debatable. For example, some researchers have assumed that the opposition test type of warning completely eliminates response-bias effects (Lindsay, 1990; Eakin, Schreiber and Sergent-Marshall, 2003). However, as Green et al. (1998) suggest, when given a warning, some participants might assume that the purpose of the experiment is to show pseudomemories can still exist despite warnings. Indeed, the results of the second experiment here suggest that, by itself, Lindsay's 'opposition test' may not be sufficient to overcome the influences of expectancy and demand characteristics, as hypnotic suggestion produced a reduction in misinformation errors over and above that attributable to the opposition test style warning.

However, there is, of course, also another possible way of explaining the efficacy of hypnosis in reducing misinformation errors; perhaps hypnosis does actually enhance memory such that misinformation errors are reduced. For instance, according to Lindsay (1990), misinformation errors occur when there is a failure of source monitoring; i.e. people remember the information, but confuse or misattribute the source. Perhaps hypnosis reduces this kind of failure. The difficulty, however, in proposing that hypnosis can reduce source monitoring errors, is coming up with a mechanism. Non-response bias accounts of the effects of hypnosis on memory tend to argue that hypnosis is more likely to *increase* source monitoring errors than decrease them (Dywan, 1995). Having said this, there is evidence that, when divorced from the context of hypnosis, some procedures containing elements common to standard hypnotic induction procedures, for example, eye-closure and focused meditation, may actually help to improve recall without an increase in false positive responses (Wagstaff et al., 2004). Whether, in addition to a warning, a short, focused meditation procedure with eye-closure might also be useful in reducing misinformation errors remains to be seen.

Interestingly no effects of hypnotizability were found in either experiment. This was surprising given that a variety of research has linked pseudomemory responding to hypnotizability (McConkey, Barnier and Sheehan, 1998). One problem may have been the use of the LSS as a measure of hypnotizability instead of a conventional suggestion-based measure. However, although not often used as a measure of hypnotizability, a variety of evidence suggests that the LSS can be considered as reliable and valid a measure of hypnotizability as standard suggestion-based measures (see Wagstaff et al., 2008). Other problems include the small sample sizes and the possibility that the samples in both experiments were too homogeneous in terms of depth scores for hypnotizability

effects to emerge; in the first experiment there were no scores above five, and in the second, the minimum score was two. Another possibility is that the hypnotic induction was actually irrelevant and a suggestion for more accurate reporting by itself might have been equally effective (though given the usual positive relationship between hypnotic and non-hypnotic suggestibility, one would still have expected to find some influence of hypnotizability). These issues clearly need addressing in future research.

To sum up, notwithstanding their limitations, the results of present studies would appear to question the view that there is some kind of intrinsic or natural connection between the use of hypnosis, or the induction of a hypnotic state or condition, and the production of pseudomemory errors. Indeed, they suggest that, under some circumstances, hypnotic procedures may actually serve to reduce such errors. However, whether this indicates that hypnosis may still have a role to play in practical forensic investigations may depend on the type of investigation. Given the volume of literature connecting hypnosis with false memory effects, and the likelihood that, in practice, hypnotically elicited testimony may be thrown out of court as a matter of principle, it would seem inadvisable to suggest the use of hypnosis in any role on a witness who has subsequently to testify in court (Diamond, 1980; Wagstaff, 1999a, 1999b; Webert, 2003). Nevertheless, one can perhaps envisage the use of hypnosis in an evidence-gathering role (i.e. to provide leads that could be corroborated by further forensic evidence) in certain cases where an offender or witness has previously provided an erroneous account (Wagstaff, 1999a, 1999b). There are a number of reasons why a witness or offender might provide an inaccurate account of an event when, in fact, he or she remembers perfectly well what happened. These could include fear of reprisals for telling the police, pressure from interrogators to proffer a different account, a reluctance to talk about embarrassing and abhorrent acts, or the fact that the witness may feel (or is) responsible for the crime committed. However, over the passage of time, some witnesses may subsequently wish to change their inaccurate or incomplete testimony and provide the correct and/or missing details. In such cases, in the guise of a special memory facilitation technique, hypnosis could be used to create a context that provides 'permission' to report such information whilst saving face. By permitting the witness to testify in this way, important new information may be produced. In some respects, one could argue that Experiment 2 represents a laboratory analogue of the application of hypnosis to this kind of situation.

## Note

- 1 This research was conducted in full accordance with American Psychological Association and British Psychological Society ethical guidelines.

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