

## AN INVESTIGATION OF THE ‘STATE-DEPENDENCY’ OF RECALL DURING HYPNOTIC AMNESIA

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### Abstract

If hypnosis was to be considered a state, one would expect that entering or leaving it would lead to spontaneous state-dependent effects on free recall (e.g. Tulving and Thompson, 1973; Eich, 1980). In apparent support of the contrary view, that hypnosis does not provide state-cues that facilitate free recall, Kihlstrom, Brennenman, Pistole and Shor (1985) found that the reinduction of hypnosis did not differentially facilitate the breaching of post-hypnotic amnesia compared to a non-reinduction group. However, following the second deinduction of hypnosis, subjects’ recall level *decreased*, whereas subjects’ recall level in the non-reinduction group increased. This apparent state-dependent effect is interpreted here as indicating that ‘state incongruence’ can constitute a task-demand for greater amnesia. In order to test this suggestion, subjects in the present study memorized a word-list either before or after a hypnotic induction. Following an amnesia suggestion, subjects who learned the word-list before the induction recalled fewer items than those who learned it afterwards, which could be interpreted as a state-dependent effect. However, an equivalent recall level in the two groups following the reversal of the amnesia and before the deinduction of hypnosis, suggests that the apparent state-dependency of amnesic recall reflects subjects’ belief that hypnosis represents an ‘altered state’ rather than an effect of the presence of state-cues *per se*.

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**Key words:** hypnosis, amnesia, free-recall, state dependency, sociocognitive theory

### Introduction

Is hypnosis an altered state? Although alternative theories of hypnosis continue to be dichotomized by the response to this question (e.g. Kirsch and Lynn, 1995), much debate exists as to what exactly the ‘state’ in the question refers; an altered state of consciousness, of cognitive processing or of attribution? While few investigators would disagree that altered subjective experiences can accompany hypnosis, modern experimental and theoretical developments continue to erode the status of hypnosis as involving *unique* alterations in normal cognitive and social processes. Rather, alternative theories of hypnosis are in broad agreement that hypnotic phenomena should be understood within the bounds of normal psychological functioning (Kirsch and Lynn, 1995). Albeit hypnosis may be a rather extreme example of ‘the normal’, it is not generally viewed as an altered state in any strong sense except, perhaps, by a few theorists (e.g. Woody and Bowers, 1994).

Of course, straightforward empirical refutations of the ‘specialness’ of hypnosis cannot compete with the tenacity of popular culture’s reification of hypnosis as an almost magical phenomenon, no matter how superseded this conceptualization may have become in academic circles. Despite researchers’ general tentativeness about

stating in concrete terms what exactly *is* altered during hypnosis, as is entirely befitting given the complex nature of the area, it is certain that lay people, as well as some of those who should perhaps be better informed (see Yapko, 1994), primarily consider hypnosis as a fundamentally 'different state' of functioning than 'normal'. Hence, the use of the word 'hypnosis' during a procedure, in itself, may be considered a strong suggestive communication (Wagstaff, 1998) evoking lay theories of an 'altered state'.

Fortunately, contemporary psychology offers a functional definition of state that is amenable to empirical investigation. Tulving and Thompson's (1973) influential Encoding Specificity Principle proposes, first, that internal and external cues present during the encoding of material are represented in the resulting memory traces. Second, if such cues are present at the time of testing, they will facilitate retrieval. Support for the Encoding Specificity Principle is provided by studies in which the removal of an encoding context prior to attempted retrieval leads to a reduction in the amount of material retrieved compared with that occurring when the context remains constant. This context-dependent reduction in successful retrieval, or state-dependency effect, has been reported for such diverse contextual manipulations as alcohol administration (Goodwin et al., 1969), environmental change (Godden and Baddeley, 1975) and alteration in mood (Bower, 1981). Because such effects are due to the *relative* utility of congruent contextual information in facilitating retrieval, strong cues, such as recognition cues, remove the advantage conferred by contextual congruence (Eich, 1980). Thus, state-dependent effects are only reliably observed when these strong cues are absent such as when a free-recall procedure is employed (Eich, 1980). Therefore, whether an entity should be considered a 'state' may be functionally determined in terms of its capacity to facilitate free-recall when it is present during both encoding and retrieval.

Unfortunately, very little hypnosis research has been designed in terms of the predictions of the Encoding Specificity Principle, although a few theorists have made implicit reference to it when discussing the possible effect of leaving hypnosis on recall level (e.g. Simon and Salzberg, 1985, p. 49). What research there has been has challenged the historical conception of post-hypnotic amnesia *itself* as an extreme example of state-dependency (e.g. Kihlstrom et al., 1985). There is now strong evidence for rejecting this view. First, post-hypnotic amnesia is rare if it is not explicitly suggested (Hilgard and Cooper, 1965). Second, state-dependent effects are eliminated by recognition cues (Eich, 1980) but these cues may be ineffective in entirely breaching hypnotic amnesia (McConkey and Sheehan, 1981; Bertrand et al., 1990). Third, the amnesia can occur within hypnosis (e.g. Silva and Kirsch, 1987).

As already mentioned, Hilgard and Cooper (1965) found that post-hypnotic amnesia is very rare if it is not explicitly suggested. This finding, although it supports the view that post-hypnotic amnesia is not an extreme state-dependent effect, cannot be taken as strong evidence that hypnosis lacks associated state-cues. This is because this investigation, together with standard scales of hypnotic susceptibility (i.e. The Harvard Group Scale of Hypnotic Susceptibility, HGSHS, Shor and Orne, 1962) and perhaps the majority of studies (e.g. Kihlstrom et al., 1985), employed the *events* occurring during the scale's procedure as the items covered by the amnesia. In the state-dependency literature, however, specific stimuli (such as word-list items) rather than events are largely employed. Given the delicacy of state-dependent effects (Eich, 1980), hypnosis would need to be a strong state indeed for a substantial number of events, rather than stimulus items, to be inaccessible when it is absent at retrieval. In short, the possibility of subtle state-dependent effects following the transition into or out of hypnosis remains largely unexplored (but see Blum, 1967, for an exception) and further research is clearly required. This is particularly true given the interest in

'mood' as a possible mediator of other context-dependent effects (see Eich, 1989).

In apparently the only study aiming to investigate the utility of hypnosis as a retrieval cue during amnesia, Kihlstrom et al. (1985) found that the reinduction of hypnosis failed to facilitate the breaching of post-hypnotic amnesia during a free-recall test compared to a non-reinduction group. This result may suggest that hypnosis does not provide state-cues that facilitate retrieval (Kihlstrom et al., 1985). However, following the second deinduction of hypnosis subjects' recall level *decreased* whereas subjects' recall level in a non-reinduction group increased in line with the standard pattern one would expect with multiple recall trials (e.g. Kihlstrom et al., 1980; Coe and Sluis, 1989). Kihlstrom et al. (1985) suggest that this finding 'poses a puzzle that remains to be solved by future experiments' (p. 270). From a sociocognitive perspective, however, the findings of this study are perhaps less puzzling. As has been reported many times (e.g. Kihlstrom et al., 1980; Coe and Sluis, 1989), nominal differences in the strength of amnesia breaching challenges may engender equivalent increases in recall level. It seems possible that the reinduction of hypnosis coupled with a second recall request is as strong a breaching challenge as this second recall request alone. The decrease in recall level following the second deinduction only seems to be explicable in terms of the presence of a task-demand to exhibit a 'state-dependent effect' on the third recall trial. In order to test this suggestion, the design of the present study seeks to investigate whether 'state incongruence' between encoding and retrieval affects the magnitude of the amnesic deficit.

In the present preliminary study, subjects memorise a word-list to criterion either before (Outside condition) or after (Inside condition) a hypnotic induction. Subjects in the Outside condition receive an amnesia suggestion following the induction and are then asked to recall the word-list before receiving the reversal-of-amnesia-cue and a second recall trial. Subjects in the Inside condition follow the same procedure, with the exception that they receive the learning trial directly after the induction and are then administered a hand-levitation filler item before receiving the amnesia suggestion. The filler item is included in order to equate the time elapsed between the learning trial and the administration of the amnesia suggestion in the two conditions.

A pure state-dependency position predicts that, compared to the Inside group, the Outside group would show lower recall on both the pre-reversal-cue and post-reversal-cue recall trials, as both of these occur during hypnosis whereas the learning trial is before hypnosis. It is worth noting, however, that a state-dependent effect is less likely to be observed when the transition is from a 'normal' to a 'special' state (Eich, 1989), as it is in the present study, than *vice versa* (i.e. a standard post-hypnotic amnesia design). The sociocognitive view that 'state incongruence' confers an additional task-demand for amnesia would also predict that the Outside group would show lower recall level, perhaps quite markedly so, on the pre-reversal-cue trial compared to the Inside group. However, in contrast to a state-dependency view, both groups would be expected to show equivalent recall level on the post-reversal-cue trial as no differential in task-demands would be expected to exist between the two groups regarding the ability of the reversal-cue to remove the amnesia suggestion.

## **Method**

### *Subjects*

The subjects comprised 25 undergraduate or postgraduate psychology students (21 female; mean age = 20.3, sd = 2.6), who had previously been tested on either the HGSHS (Shor and Orne, 1962) or the Creative Imagination Scale (CIS, Wilson and

Barber, 1978). Subjects selected with reference to their HGSHS score ( $n = 7$ ) had successfully passed eight or more items, including the amnesia item, on this pre-test. For those subjects selected with reference to their CIS score ( $n = 18$ ) the inclusion criterion was less stringent: subjects with scores of 22/40 or higher being included in the study. In view of this wider spread of scores, those subjects pre-tested on the CIS were pseudo-randomly assigned to experimental groups: one subject of a matched-pair (with similar CIS scores) being assigned to each condition. Subjects pre-tested on the HGSHS were randomly assigned.

From the initial subject pool ( $n = 25$ ), those who failed to show amnesia, that is whose recall level on the post-reversal-cue trial failed to exceed that on the pre-reversal-cue trial ( $n = 5$ ) or who rated their recall deficit as 'totally voluntary' during debriefing ( $n = 1$ ), were dropped from the analysis. Evaluation of the suggestibility of subjects excluded for failing to show increased recall following the termination of the amnesia suggestion indicated that they were all CIS pre-tested subjects with relatively low scores (22/40, 24/40, 26/40, 31/40, 32/40). No systematic relationship was found for these five subjects between allocated experimental condition and subsequent exclusion (three inside, two outside). The subject excluded on the basis of rating his recall deficit as totally voluntary had been allocated to the outside condition. Statistical analyses reported below were carried out on the remaining 19 subjects (nine inside, 10 outside).

### *Materials and procedure*

The six item word-list was modified from Silva and Kirsch (1987) and consisted of the following items: ruby, orange, knife, pearl, apple, spoon. This presentation order of list items was the same for all subjects.

The hypnotic induction involved suggestions for the relaxation of specific muscle groups, concentration on breathing and a 'deepening of hypnosis' metaphor in which the subject visualized a set of garden steps. The induction was approximately nine minutes long and was pre-recorded on audio-tape together with the amnesia suggestion, the reversal-cue and the 'counting back' deinduction of hypnosis.

The amnesia suggestion was taken directly from Silva and Kirsch (1987) and referred to the subject's memory for the word-list items 'fading' as they became 'unable to recall or remember them in any way'. The arm-levitation filler item presented to subjects in the Inside condition involved the visualization of an inflating balloon attached to the wrist by a string. This item was presented on audio-tape and was of the same duration as the hypnotic induction.

All subjects were told that the study involved the use of an audio-taped hypnotic procedure and that they should be prepared for the audio-tape to stop a number of times in order for the experimenter to ask them questions.

Subjects in the Outside condition were asked to close their eyes and verbally rehearse the word-list twice following two verbal presentations by the experimenter. Those subjects failing to repeat the list in full during the learning trial, or to maintain the correct order of items, were presented with the list again and were asked to repeat it *verbatim*. Employing this method, all subjects learned the word-list to a criterion of two perfect recalls. The hypnotic induction and amnesia suggestion were then administered. Immediately following the amnesia suggestion subjects were verbally presented with the recall request: 'Would you now please try to recall as many of the words that you memorized as possible'. The reversal-cue ('Now you can remember') was then administered. A second recall request was immediately followed by the deinduction of hypnosis and debriefing.

In the Inside condition, subjects received the hypnotic induction prior to learning

the word-list in the same way as described for the outside group. Following this learning trial, the Inside condition subjects were administered the filler item and then the amnesia suggestion, the procedure from this point was the same as that for the outside condition.

During the pre-reversal-cue recall trial, subjects who failed to generate any word-list item in response to the recall request were left in silence for 20 seconds. If after 20 seconds the subject had failed to provide any of the words, they were asked to indicate that they were not able to recall any of the items. Following the generation of an item on either recall trial, subjects were left in silence for 10 seconds before being asked to indicate that they could recall no further items.

Following the deinduction, subjects were asked to respond to a question concerning the subjective experiences accompanying their recall deficit: 'I'd like to ask you how you felt during the time you were having difficulty recalling the word-list . . . Did you feel that the inability to recall was something that was involuntary and beyond your control or was there the feeling that you were actively doing something that prevented your remembering?' Subjects selected a rating on a five-point scale (1-totally involuntary, 2-mostly involuntary, 3-equal, 4-mostly voluntary, 5-totally voluntary) in response to this question.

## Results

The mean number of items recalled by subjects in the inside and outside condition during the pre-reversal-cue and post-reversal-cue trials are presented in Table 1.

Table 1. Mean recall during the pre-reversal-cue and post-reversal-cue trials

|           |         | Recall trial           |                        |
|-----------|---------|------------------------|------------------------|
|           |         | Pre-reversal-cue       | Post-reversal-cue      |
| Condition | Inside  | 2.11 (sd 1.17, n = 9)  | 4.44 (sd 1.01, n = 9)  |
|           | Outside | 1.20 (sd 0.79, n = 10) | 4.40 (sd 0.70, n = 10) |

The initial analysis of recall level in the pre-reversal-cue trial employed an independent t-test and indicated that, as predicted by both state-dependency and sociocognitive views, subjects recalled significantly more items in the Inside condition ( $t(17) = 2.01, p < 0.030$ , one-tailed). Although Levene's test indicated no significant difference between the variances present in the data from this trial, a non-parametric test (Mann-Whitney U) was undertaken due to concerns about small group size. This test, similarly, indicated a significantly greater recall level in the Inside condition during this trial ( $U = 23, p < 0.029$ , one-tailed).

The analysis of recall level during the post-reversal-cue trial indicated no difference between groups ( $t(17) = 0.11, p < 0.912$ , two-tailed, non-significant;  $U = 43, p < 0.860$  two-tailed, non-significant). Given that both groups learned the word-list to criterion, this outcome is consistent with a sociocognitive position rather than a state-dependency view.

## Discussion

The results of this study are interesting in that they enable some conclusions to be drawn on the basis of predictions derived from state-dependency and sociocognitive interpretations of recall level during hypnosis and hypnotic amnesia. As predicted by

both these perspectives, subjects who memorized the word-list before the hypnotic induction recalled fewer items during the pre-reversal-cue (amnesic) recall trial than subjects who memorised it during hypnosis. However, an interpretation of this finding in terms of a state-dependent effect on free recall is not supported by the finding that recall level was equivalent in the two groups following the administration of the reversal-cue and before the deinduction of hypnosis. If the observed difference between groups in amnesic recall level reflected a state-dependent effect it would be expected to be present during both recall trials within hypnosis. As such, this result appears to support the hypothesis that the incongruence of 'state' between learning and the pre-reversal-cue recall trial, may contribute an additional task demand for amnesia and, therefore, confer a 'stronger' amnesia. The fact that an effect was found with a relatively small group size also supports the view of a strong task demand for 'state-dependency' when the experimental design removes the possible confounding influence of equivalent breaching expectancy (i.e. Kihlstrom et al., 1985).

It is interesting to note that Eich (1989) credits the Marquis de Puységur (Chastenet de Puységur, 1809) with having originated the concept of state-dependency to account for the 'spontaneous' and robust amnesia that historically characterized exiting hypnosis (see Bramwell, 1913). As with many other facets of hypnosis, phenomenology appears to be largely determined by historical and cultural conceptions (Spanos, 1994). As discussed elsewhere (Smith, 1997), in a model which is being developed within the Headed Records framework (Morton et al., 1985), the evident contingency between amnesic responding and beliefs need not always be the result of conscious enactment. Rather, what is needed is a model of amnesia in which the 'output inhibition' (Huesmann et al., 1987) of retrieved memories, by which they may be prevented from reaching awareness, is closely related to their incongruence with socially-referenced beliefs.

It is perhaps ironic that while the 'Notes for Contributors' section of this journal rightly categorizes the term 'hypnotic state' as 'question-begging', subjects in the present study, and the public in general, appear to be less questioning. Because subjects may view hypnosis as an 'altered state' (Wagstaff, 1998), and beliefs essentially determine the nature of amnesic performance (e.g. Silva and Kirsch, 1987), subjects may show a 'state-dependency' in their recall level that is contingent upon this belief. It is suggested that it would benefit future research on hypnotic amnesia if procedures were included not only for assessing the beliefs of the subject regarding appropriate amnesic responding, but also for exploring their view of the nature of hypnosis itself.

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