HYPNOSIS, DELAYED RECALL, AND THE PRINCIPLES OF MEMORY[1]

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Abstract: This article reviews the seven principles of memory function that set limits on the degree to which any attempt to recover a long-forgotten memory can succeed: encoding, organization, time dependency, cue dependency, encoding specificity, schematic processing, and reconstruction. In the absence of independent corroboration, there is no "litmus test" that can reliably distinguish true from false memories, or memories that are based on perception from those that are based on imagination. Practicing clinicians should exercise great caution when using hypnosis or any other technique to facilitate delayed recall.

Clinical interest in memory processes has been revived by the claim that a whole host of problems, including anxiety, depression, and eating disorders, have their origins in childhood experiences of incest and other sexual trauma, abuse, neglect, and deprivation—memories of which have been repressed by the patient. Therefore, many therapists seek to recover these memories and bring them into conscious awareness so that the patient can deal with them more adaptively. Sometimes, hypnosis plays a role in this process. However, the very nature of memory places strict limitations on the degree to which any attempt to recover memories from the distant past will succeed. In this article, I wish to discuss some of these principles and their clinical implications. For fuller explication of these principles and documentation of their sources in the experimental literature, see Kihlstrom and Barnhardt (1993); for a further discussion of ostensibly repressed memory, see Kihlstrom (1993).

SEVEN PRINCIPLES OF REMEMBERING

In analyzing the causes of remembering and forgetting, it is common to characterize memory processing as consisting of three stages

(Crowder, 1976): *encoding*, the process by which a trace of current experience is laid down in memory; *storage*, the process by which an encoded memory trace remains available over time; and *retrieval*, the process by which information is recovered from storage and used in ongoing cognitive activity. Logically, a memory cannot be retrieved from storage unless it was encoded in the first place, or if it has been lost from storage. But even the encoding of a memory, and its availability in storage, does not guarantee that a veridical memory of the original event will be retrieved. To understand how this is so, it is important to consider the manner in which memory operates.

The encoding of memory appears to be governed by two principles, *elaboration* (Anderson & Reder, 1979; Craik & Tulving, 1975) and *organization* (Bower, 1970; Mandler, 1967):

> The elaboration principle: The memorability of an event increases when that event is related to preexisting knowledge at the time of encoding.
> The organization principle: The memorability of an event increases when that event is related to other events at the time of encoding.

The point here is that events can be remembered to the extent that they were encoded at the time they occurred, and that proper encoding does not occur automatically, but rather requires active, cognitive effort. This fact accounts, in large part, for the familiar phenomena of infantile and childhood amnesia (Howe & Courage, 1993): Most adults remember so little of childhood because children lack both the knowledge base and the information-processing capacity to encode such memories in retrievable form. There are also other factors involved, such as whether the event in question is the topic of conversation between the child and other people (see Fivush & Hudson, 1990; Nelson, 1993); of course, such social interactions are likely to facilitate elaborative and organizational processes. Elaboration and organization are highly relevant in the case of ostensibly repressed memories, most of which appear to be for events occurring in early childhood, and cover events which by their very nature are not shared with other people.

Assuming that a memory has been encoded, it remains available for subsequent retrieval and use—at least in principle. But in practice, memories seem to fade over time, an observation that has been enshrined in another principle (Ebbinghaus, 1885/1913):

> The time-dependency principle: The memorability of an event declines as the length of the storage interval (i.e., between encoding and retrieval) increases.

Of course, there are instances in which knowledge appears to be preserved in rich detail over long periods of time, as in so-called "flashbulb"

memories for emotionally arousing events (Winograd & Neisser, 1992) and the "permastore" of factual knowledge (Bahrick, 1984). But these are the exceptions that test the rule, and, in any event, careful studies have shown that many flashbulb memories are highly inaccurate, and the notion of a permastore generally refers to factual knowledge rather than memory for particular events. Again, the principle of time dependency is clearly relevant when we are talking about the adult recollection of childhood events.

The experimental literature does contain a number of studies of so-called *hypermnesia*, in which memory appears to grow rather than fade with time (Erdelyi, 1984; Kihlstrom & Barnhardt, 1993; Payne, 1987). This phenomenon is potentially relevant to the problem of repressed memories, but it does not contradict the principles governing encoding and storage. Hypermnesia occurs when items are subject to elaborative and organizational activity at the time of encoding, and most hypermnesia is accomplished on the first few attempts at retrieval, relatively soon after encoding has taken place.

The retrieval process itself is governed by a large set of principles. One of these relates to the fact that, by and large, recognition tests produce more memory than recall tests, and cued recall produces more memory than free recall (Tulving, 1974):

The cue-dependency principle: The memorability of an event increases with the amount of information supplied by the retrieval cue.

Remembering usually begins with some kind of cue that provides some information about the event which is to be remembered. Cues that are highly informative are more likely to contact available memory traces than those that are not. In some respects, encoding and retrieval are in a complementary relationship: Access to well-encoded memories generally requires fewer retrieval cues, and rich retrieval cues can gain access even to very poorly encoded memories. But the success of recognition testing comes with a price: false alarms. Subjects may remember more correct information on a recognition test than on a recall test, but they also remember more incorrect information. In the laboratory, we can tell which is which. But in real life, corroborating evidence may be entirely lacking—which is why the problem of false identification in police line-ups is so difficult (Malpass & Devine, 1984).

Cues are important, but they must also supply the right kind of information, not just the right amount (Tulving & Thomson, 1973):

The encoding specificity principle: The memorability of an event increases when the information processed at the time of retrieval was also processed at the time of encoding.

The manner in which an event is encoded—the meaning of the event, how it is perceived and interpreted and categorized— determines which retrieval cues will be successful in gaining access to that event. Encoding specificity appears to underlie the phenomenon of state-dependent memory—whether "state" is defined in physiological, emotional, or environmental terms. It is certainly relevant in the case of ostensibly repressed memories. For example, memories that have been processed during states of high emotional arousal may only be accessible if the same affect is reinstated at the time of retrieval (Bower, 1981; Eich & Metcalfe, 1989).

Moreover, it turns out that memory is determined by the degree to which an event conforms to our expectations and beliefs (Hastie, 1981):

> The schematic processing principle: The memorability of an event increases when that event is relevant to expectations and beliefs about that event.

The general principle is straightforward enough, but the details may be a little surprising. If memory is plotted as a function of the degree to which the target events can be predicted on the basis of preexisting knowledge, represented in the form of organized knowledge structures known as schemata, it turns out that events that are highly congruent with expectations are highly memorable, but events that are highly *in*congruent with active schemata are even more memorable. The U-shaped function apparently reflects the operation of two different principles: Events that are inconsistent with preexisting schemata are surprising and draw more attention, and receive more elaborative and organizational activity at the time of encoding; at the time of retrieval, the schema provides additional cue information that can facilitate access to relevant memories. Events that are irrelevant to the schema get neither advantage, and so are poorly remembered.

The role of cognitive schemata is also underscored by another principle (Bartlett, 1932):

> The reconstruction principle: The memory of an event reflects a blend of information retrieved from specific traces encoded at the time of that event with knowledge, expectations, and beliefs derived from other sources.

In describing how memory works, we often resort to the metaphor of a library: Memory traces are books that must be purchased and catalogued; the prospective user must look up the book in the catalog to know where to find it; and for the search to succeed, the book must not have been eaten by worms, or displaced by a careless user. The library

metaphor will take us a long way, but the notion of memory retrieval obscures the fact that memories can be distorted, biased, and otherwise altered by changes in perspective and other events that occur after the time of encoding. In the final analysis, memory is not so much like *reading* a book as it is like *writing* one from fragmentary notes. The reconstruction principle is of utmost importance in the present context because it means that any particular memory is only partly derived from trace information encoded at the time of the event: In the process of remembering, trace information combines with knowledge, beliefs, and inferences derived from other sources.

VALIDATING MEMORIES

Is there any way in which we can determine the source of the information contained in memory? And, in the absence of independent corroboration, is there any way in which we can determine which memories are valid representations of past experience and which are not? Some data in this respect come from studies on source memory and on reality monitoring. Source memory refers to the person's ability to remember the circumstances under which he or she acquired certain items of information. Anecdotal evidence strongly indicates that source memory is not perfect: We have all wondered whether something really happened, or whether we dreamed or imagined it. We have all confused what we did with what we intended to do or wished we had done. Sometimes we do not know whether we saw a movie in the cinema or on television. And we have all forgotten who told us a particular joke, or let us in on a particularly juicy rumor.

Johnson and her colleagues have studied this problem extensively. In a representative experiment (Johnson & Raye, 1981), subjects viewed a set of words and pictures representing familiar objects. For half the words, the subjects are asked to count the number of vowels; for the other half, they are asked how long it would take to draw a picture of the object represented by the word. Similar questions were asked about the pictures: how long it would take to draw, and how many vowels are in the word corresponding to the picture. Later, the subjects were read the words and asked whether they saw the item as a picture or as a word. Johnson and Raye observed a number of confusions, especially for those words for which the subjects made a visual judgment, and for those pictures for which they made a lexical one.

Do we have any way of telling which memories are products of perception and which are the products of imagination? Johnson and her colleagues have proposed a number of attributes that tend to distinguish between the two types of memories (Johnson, Foley, Suengas, & Raye, 1988). For example, memories of percepts contain more sensory detail, are less complex, more realistic, and more likely to contain information

about the spatial and temporal context in which the remembered event occurred. But it should be understood that these distinctions are entirely probabilistic: That is, the presence of one or more of these attributes only increases the likelihood that the memory is a product of real experience, rather than of imagination. Moreover, the list of attributes distinguishing between memories of perceived and imagined events from childhood is very short. Thus, there is no "litmus test" that is 100% reliable, or even close to it.

In another line of research, Raskin, Steller, and their colleagues have been promoting a technique called *criteria-based statement analysis* (Raskin & Steller, 1989; Steller & Koehnken, 1989), originally developed in Germany by Undeutsch (1984). These investigators have proposed a number of criteria by which the veracity of a witness's statement might be assessed. For example, they assert that factual statements contain a large number of details, especially those that are unusual or superfluous; make reference to unexpected complications; portray the witness's own mental state; and contain spontaneous corrections, admissions of lack of memory, and expressions of self-doubt. Many of these criteria make intuitive sense, and some of them overlap with those developed by Johnson; but it should be said that the empirical basis of these criteria is rather thin at present. Undeutsch and his colleagues have found that attributes such as these make statements appear credible, but their surface credibility is uninformative as to their actual truth value. There is little or no evidence that these characteristics actually distinguish between accurate and inaccurate memories.

In the final analysis, then, there do not appear to be any internal criteria—that is, standards that can be applied to the statements themselves—that can serve to reliably distinguish between accurate recollections and fabrications and confabulations. Nothing substitutes for external criteria—that is, the verification of individual statements by objective evidence. In the absence of such independent corroboration, we have no means of reliably distinguishing between fact and fantasy.

IMPLICATIONS FOR CLINICAL PRACTICE

The success of any attempt to exhume a memory will depend on why that memory was forgotten. Of all the principles of remembering and forgetting summarized above, perhaps the broadest is the encoding specificity principle (Tulving & Thomson, 1973), which may be restated as follows: What is encoded depends on what was perceived, and what is encoded determines what subsequently will be retrieved. A variety of factors may conspire against elaborative and organizational processing, but the consequence is always the same: If an event is poorly encoded in the first instance, the prospects for its subsequent retrieval and conscious recollection, especially after a long retention interval, are very poor as well.

To some extent, an extremely rich retrieval environment may compensate for poor encoding received by a memory. However, there are limits to this compensation: Even recognition testing, in which the person is cued by a copy of the event in question, often fails. Moreover, attempts to enrich the retrieval environment by providing extra cues increase the risk that the subject will incorporate that information into his or her memory, or at least become confused about whether the source of particular details is in the trace or the query. The result may well be a distortion of memory. In the absence of independent corroboration (which is so often the case in delayed recall), such distortions are arguably worse than no memory at all, because neither the subject nor the questioner knows where truth lies.

Nothing about hypnosis changes the rules by which memories are encoded, stored, and retrieved; accordingly, these rules constrain the use of hypnosis (or any other procedure) as a technique for the enhancement of memory. There is no scientific evidence that hypnosis can improve the retrieval of poorly encoded memories, or those that have been degraded by interference accumulated over long retention intervals. It is possible, at least in principle, that hypnosis could be used to provide an extremely rich set of retrieval cues, overcoming encoding and storage conditions. For example, age regression could be used to structure a hallucinated environment that returns the person to the circumstances, both environmental and emotional, of the forgotten episode: If accurate, this would be the richest retrieval cue imaginable.

Unfortunately, the clinical and forensic circumstances in which hypnosis is used to enhance recall are those in which such information is rarely available. In any event, the suggestions used to reconstruct such a mental representation of the past may also promote confabulation, and in such a manner that neither the therapist nor the patient will be able to determine, with confidence, whether the recollection is accurate. For this reason, hypnosis should be used, if indeed it is to be used at all in forensic and therapeutic situations, only in the generation of hypotheses to be corroborated by independent evidence. Hypnotically refreshed memories should never be allowed to stand alone.

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Hypnose, aufgehaltener Rückruf und die Prinzipien des Gedächtnisses

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Abstrakt: Diese Abhandlung befaßt sich mit den sieben Prinzipien der Gedächtnisfunktion, die Grenzen für den Grad setzt, in dem irgendein Versuch, lang vergessene Erinnerungen aufzudecken, erfolgreich sein kann: Verschlüsselung, Organisation, Zeitabhängigkeit, Stichwortabhängigkeit, Spezifität der Verschlüsselung, schematisches Vorgehen und Rekonstruktion. In Abwesenheit von unabhängiger Bestätigung besteht kein "Lackmustest," der verläßlich zwischen wahren oder falschen Erinnerungen unterscheiden kann oder Erinnerungen von solchen, die auf Perzeption beruhen von denen, die auf Imagination beruhen. Praktizierende Kliniker sollten große Vorsicht gebrauchen, wenn sie Hypnose oder irgendeine andere Technik anwenden, um aufgehaltenen Rückruf zu fördern.

Hypnose, rappel différé et les principes de la mémoire

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Résumé: Cet article passe en revue les sept principes du fonctionnement de la mémoire qui imposent des limites au degré de succès de toute tentative de recouvrement des faits anciens: l'encodage, l'organisation, la dépendance temporelle, les indices de récupération, la spécificité de l'encodage, le traitement de l'information et la réorganisation. En l'absence de confirmation indépendante, il n'y a pas de "test de litmus" qui soit assez fiable pour distinguer les mémoires vraies des mémoires fausses ou les mémoires qui sont basées sur la perception de celles qui sont basées sur l'imagination. Les cliniciens devraient donc être prudents lorsqu'ils utilisent l'hypnose ou toute autre technique visant à faciliter un rappel différé.

Hipnosis, recuerdo retardado y los principios de la memoria

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Resumen: Este trabajo revisa los siete principios de la función de la memoria que establece límites en el grado en el que se logra recobrar un dato mnésico por largo tiempo olvidado: codificación, organización, dependencia temporal, dependencia de la señal, especificidad de la codificación, procesamiento esquemático y reconstrucción. En ausencia de corroboración independiente, no existe un "litmus test" que pueda confiablemente distinguir memorias falsas de verdaderas, o memorias que estén basadas en la percepción de aquellas basadas en la imaginación. Los clínicos practicantes debieran ejercer con cautela al usar la hipnosis u otra técnica que facilite el recuerdo retardado.