13 Memory pathways: Involuntary and voluntary processes in retrieving personal memories

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THE PATHWAY METAPHOR

How do memories emerge into consciousness? How are they searched for and recovered? How are retrieved memories validated and how are they "reported" to oneself or to others? In this chapter we shall use a pathway metaphor to address these questions, focusing on the retrieval of episodic memories of a personal nature.

The pathway metaphor assumes that the remember stands at the crossroad between two paths, one leading *to* memory and the other leading *from* memory. The path leading *to* memory brings the individual into his or her memory system, like a pathway taken when a person arrives either by chance or as a result of a premeditated excursion into a garden with familiar flowers and animals. The pathway metaphor also implies that if we want to access a particular memory, we have to reach out for it; we have to submit a description to our memory that specifies what we are looking for (Norman & Bobrow, 1979) and try to locate something that roughly meets that description. Thus, we have to specify a path *to* the intended memory.

On the other hand, making use of the retrieved memory, integrating the information retrieved, reporting it privately to oneself (e.g., thinking, feeling) or publicly (e.g., in words or in actions) is like specifying a path leading *from* memory. It is like bringing back from the garden some of the flowers we collected there.

Thus, to retrieve memories is to travel mentally along two paths. When retrieving memories, one can be said to find oneself at the crossroads where paths *to* and *from* memories intersect. In a sense one must negotiate with one's memory, conducting a transaction that involves both taking and giving.

Certainly, there are many memory paths. We shall contrast two paths *to* episodic memories; voluntary and involuntary. These two paths are typically, although not exclusively, associated with two different modes, respectively – re-experiencing and factual recollection. The two paths *from* episodic memories are also associated with two modes; editing versus not editing. The editing of one's memories reflects a process that takes place in making use of one's memories, that is, in specifying a path *from* one's own memories. Unedited

memories are used as they are, whereas edited memories are scrutinized before use.

The combination of the two paths may be understood in terms of the degree to which the paths *to* and *from* memory are controlled by the person. Typically, controlled access to one's memories, that is, deliberately searching for specific events or episodes, is associated with the exercise of deliberate editing processes in reporting these memories to oneself or to others. On the other hand, involuntarily retrieved memories, which emerge in the absence of an intention to remember, are typically experienced and reported with only a moderate degree of controlled metacognitive editing. However, instances in which involuntary memories are edited and others in which voluntary memories are transmitted with little editing are not uncommon.

In this chapter we discuss the retrieval of episodic memories in an everyday perspective using the pathway metaphor, in which the rememberer is seen to stand between the paths that lead to one's memories and those that lead from them.

INVOLUNTARY AND VOLUNTARY MEMORIES

Much of the experimental study of memory has focused on controlled, voluntary memory retrieval. When participants are first presented with some material and are later asked to recall it, they typically engage in a controlled, deliberate search for he material. Furthermore, they know that their performance will be scored in terms of certain criteria, so their search is guided by the attempt to satisfy these criteria. Such is the case, for example, in university examinations. A student who is asked to answer test questions or to pick the correct answer from among several alternatives would typically struggle to probe his or her memory for the correct answer.

In everyday life, in contrast, there are many cases in which memories come to us, so to speak, without any deliberate effort being made by us. Such memories are generally referred to as involuntary memories (or "mind popping", "thoughts that come unbidden", "involuntary remembering", etc.). Consider the following personal example concerning the retrieval of a memory episode.

Last January, when leaving Norway, two of us had a series of highly activated memories of past episodes and scenes (e.g., the visit to the Vigeland chapel, the snow at the top of a nearby hill, the fireworks at a friend's home, the meeting with an industrial psychologist on a dark terrace, having lunch at the Centre for Advanced Studies, and Norwegian folk music). These experienced episodes popped one after the other into our minds as we talked, without any logical sequence. The recency of these events may have made their memories more accessible than other events. However, when we arrived back home and were questioned by our relatives, we engaged in a more controlled, voluntary survey of our memories, guided by the specific questions

posed: What exactly had we eaten at the home of our friends? What was the name of the hill? The products of the controlled memory search tended to be more logically organized than the products of our involuntary remembering.

We may liken the experience associated with involuntary memory to that of a fisherman standing on the bank of a river, waiting passively for a fish to catch itself on the hook. In contrast, the experience associated with voluntary memories may be likened to that of a hunter who is out there actively searching for an animal, systematically exploring the terrain, taking advantage of various clues that may lead him to his prey.

Obviously, the distinction between voluntary and involuntary memories is not sharp. Memory processes typically involve a mixture of the two modes of retrieval. Even when a controlled inspection of our memory is initiated in response to a query by an acquaintance ("What did you do when you were in Norway?" "What did you do on the last evening before your return home?"), certain aspects of the stored episodes may suggest themselves more readily than others, and new memory associations open up. Thus, the controlled travel through one's memories may be diverted by involuntary memories despite our attempt to stay on the same memory path. Of course, the controlled search may also be guided by general knowledge of the event (e.g., that it used to get dark early; that we were with our friends) and also by abstract semantic knowledge (we know that the end of the year is at midnight, we know that snow is common in the Scandinavian winter, etc.). Controlled, voluntary memories are generally submitted to an editing process in order to ensure that they satisfy certain criteria such as accuracy. The editing process becomes more stringent when a public report is involved. Involuntary memories, in contrast, jump into our minds as "unedited" raw data. Of course, some editing is likely to take place when we recount them.

The distinction between voluntary and involuntary memory was made, in fact, by Ebbinghaus (1885/1964; see Berntsen, 1998). He made a distinction between memories that occur "with apparent spontaneity and without any act of the will" and memories that are called back "into consciousness by an exertion of the will" (pp. 1–2). Thus, involuntary memories are those that emerge spontaneously, sometimes unexpectedly, without any intent to conjure them up. Voluntary memories, in contrast, emerge in response to a controlled, goal-directed search, typically prompted by some requirement, and guided by the need to satisfy some general criterion.

THE STUDY OF INVOLUNTARY MEMORY

Despite the prevalence of experiences of involuntary memory in everyday life, little systematic research has been carried out on the memories that emerge into consciousness without any intention to remember. The reasons, perhaps, lie in the difficulty of applying traditional experimental methods to this area of investigation. Nevertheless a few studies have borrowed methods from

autobiographical memory research to investigate several aspects of involuntary memories. For example, Berntsen (1996) used a diary method to study involuntary autobiographical memories in their everyday context. She asked participants to record at most two involuntary memories each day (participants were free to choose which; prior tests had indicated that participants typically report five or six occurrences daily on average when they are not restricted to reporting only two). Later on, Berntsen (1998) used cue words or short sentences (e.g., "riding a bike") that had been found to elicit involuntary memories in her diary study as prompts for eliciting voluntary memories in another group of participants. This allowed her to compare voluntary and involuntary autobiographical memories.

While Berntsen (1996, 1998) focused on autobiographical memory, Kvavilashvili and Mandler (2004) focused on the involuntary retrieval of semantic memory, such as the spontaneous emergence into memory of a word or a tune, unaccompanied by additional contextual information. Their method was based on diaries and questionnaires that examined the nature and frequency of such memories. They found that these memories often occur without any apparent cue while people are engaged in relatively automatic activities. One interesting observation was that even a brief encounter with new words or names was sufficient to produce an involuntary memory at a later point, sometimes with no conscious recollection of having encountered these words or names before. Thus, reading someone's name in a newspaper was sufficient for that name to pop up.

The studies of Berntsen and of Kvavilashvili and Mandler confirm that memories often pop up without intention during our everyday activities. The involuntary memories reported are usually very short-lived. A question of interest is whether more extended episodes can also emerge into consciousness without active, deliberate search and maintenance. Some negative memories have a relatively long duration in time and recur in spite of the person's effort to avoid them (Spence, 1988). However, involuntary memories with more pleasant overtones that have relatively long durations may also occur. Such memories have been reported to be a source of pleasure and personal value (Salaman, 1982).

DISTINCTIVE CHARACTERISTICS OF INVOLUNTARY MEMORIES

What are the distinctive characteristics of involuntary memories? As mentioned above, Berntsen (1998) compared the involuntary memories reported by one group with the voluntary memories produced by another group of participants in response to cue words derived from the involuntary memories reported by the first group. She found several systematic differences. Some differences can also be gleaned from other studies. First, a notable feature of involuntary memories is their personal content. Berntsen observed that

involuntary memories were more frequently related to specific episodes than were voluntary memories (89% versus 63%, respectively), suggesting that involuntary memories do not simply capture schematic knowledge. Rather they often concern events or episodes from one's personal life. However, impersonal semantic knowledge also sometimes emerges involuntarily. Thus, as Kvavilashvili and Mandler (2004) noted, sometimes words, melodies or names pop up without intention in the course of our daily activities: We suddenly "hear" a song playing in our ear. Similarly, a name that we have been struggling to recall may suddenly pop into our head as if from nowhere. However, it is quite unlikely that we would spontaneously remember that "canaries are birds" or that "a sofa is a piece of furniture".

Involuntary memories are typically associated with certain phenomenological properties: a richer preservation of the original emotional and sensory features, a strong perception of vividness of the event and a feeling of "re-experiencing" the event. The memory sometimes has a perceptual quality. We re-experience an event or episode rather than retrieve its verbal content or its gist. Thus, spontaneous retrieval may produce memories more closely corresponding to the original experience. This is unlike voluntary memories, which tend to be more selective and more focused.

Another distinctive feature concerns the retention interval: Berntsen found that involuntary memories tend to be more recent than voluntary memories. Most of the involuntary memories reported were about events that had taken place during the previous year (and at most during the past 3 years), whereas most of the voluntary memories referred to events that had happened over the past 4 years.

Involuntary memories also seem to differ from voluntary memories in their organization: When an event or episode come spontaneously to mind, its emergence into consciousness does not usually follow a logical, sequential organization. Rather, different facets of the event may pop up associatively into memory, without any clear order. One image may trigger another. The emergence of involuntary memories is relatively rapid, as though different features of an episode were being accessed in parallel. This is in contrast to voluntary memories, whose retrieval tends to be slow, sequential and laborious. Because voluntary memories are self-initiated, their retrieval is often guided by top-down programmes that constrain the sequence in which they are conjured up.

We might have expected involuntary memories to concern events that had been frequently retrieved. Surprisingly, the available evidence suggests that involuntary memories generally concern events that had hardly been recollected previously, including some that perhaps could not have been accessed voluntarily. Thus, Berntsen (1998) observed that in approximately 45% of involuntary memories, people reported that they had "never talked or thought about them before" whereas this only happened with less than 10% of voluntary memories. Thus, the memories that occur spontaneously are not necessarily the most activated, nor those that have been recently refreshed.

Indeed, Proust (1919) also noted that sometimes involuntary retrieval captures memories that otherwise would never come to mind.

THE ACTIVATION OF INVOLUNTARY MEMORIES

In the previous section we discussed the distinctive features of involuntary memories that occur spontaneously without deliberate memory search and retrieval. It is natural to ask what the precipitating conditions that bring memories *to* us without any intention on our part to recall them are.

As noted by Kvavilashvili and Mandler (2004), involuntary memories are more likely to occur when we are not engaged in intentional cognitive activities. Such memories would seem to emerge when we are in a relaxed state, in which attention is diffuse rather than focused. Involuntary memories also occur when controlled processes are mostly aimed at eliminating disturbing thoughts (see Berntsen, 1998).

With regard to the precipitating cues, these cues are frequently internal, emotional and/or sensory rather than verbal. Environmental context, mood and smell can prime involuntary memories (see, e.g., Chapters 3 and 4). The relationship between the cue and the memory is often complex and indirect. In many cases, however, we are completely unaware of any precipitating cue.

Presumably the pathways to involuntary memories are associative in nature. This may explain why some basic factors such as body posture and mental state (a reclining posture, fatigue, drugs) may precipitate such memories. The occurrence of spontaneous memories is quite frequent in clinical situations such as psychoanalytic psychotherapy. The attempt to report what comes to mind first in response to a cue word often produces involuntary memories. People under the effects of hallucinogenic drugs also often report having vivid involuntary re-experiences of past events. These drugs seem to be optimal for the emergence of involuntary memories as they reduce controlled, rational thinking and suspend editing operations, thereby enhancing the effects of internal cues. In some sense, dreams also represent the emergence of fragmented involuntary memories and are illustrative of a re-experiencing process that occurs with little editing. When suddenly awakened, the person still has in mind some of these non-edited fragments. However, when asked later to report the dream, he or she may engage in an editing process, putting together the dream fragments and trying to build a coherent story. Similarly, people under the effects of alcohol are more inclined to have involuntary memories. However, in that case social aspects become more dominant in the production of these memories.

We sometimes react with surprise to the unexpected emergence into consciousness of clear events and images from the past. This reaction may be due not only to the fact that such memories are unexpected, but also to our failure to trace the path that led us to them. Sometimes the spontaneous emergence of unexpected memories may evoke an unpleasant feeling because it occurs

outside of our control. The psychoanalytic assumption of psychological determinism has led theoreticians ever since Freud to assume that many behaviours that appear to us to be random occurrences (such as slips of the tongue) actually derive from processes of which we are not aware. Freud (1920/1975) put special emphasis on the defensive, unconscious origin of involuntary behaviours, and promoted the view that such behaviours reflect intentions and desires that the person would rather deny. He described the processes whereby mental elements are associated and then emerge into consciousness in a disguised form. In particular, he stressed the idea that the processes that are outside our awareness and control tend to follow associative and illogical rules, such as when such processes take off from the sound of a word rather than from its meaning. However, as Berntsen (1998) reported, this does not seem to be the general rule, because involuntary memories are not associated with more negative emotions than are involuntary memories.

However, with regard to the precipitation of involuntary memories, an important class of such memories that deserves particular attention is that of post-traumatic memories, in which the memory of traumatic events keeps popping out not only in the absence of any intention to retrieve the events but also against the person's will. Such painful memories tend to impose themselves repeatedly. This recurrence against the will reflects a failure of control, because the person generally fails to avoid these memories or stop them when they start flowing into consciousness. Such unpleasant re-experiences may also contain a great deal of detail, so that one might feel flooded by the re-experiencing of the event, which takes over cognitive control.

Presumably, because traumatic memories are emotionally charged, they may be primed even by weak cues. It is also possible that the repeated re-experience of painful memories produces a spread of activation that increases the number of elements that can prime these memories.

In explaining the recurrent emergence into consciousness of painful thoughts and memories, Freud (1905/1953) emphasized the nature of these thoughts and memories as ones that the person is struggling to expel from consciousness. In contrast, recent research by Wegner and his associates (e.g., Wegner, Schneider, Carter, & White, 1987; Wenzlaff & Wegner, 2000) focused on the process of thought suppression itself as a source of recurrences of ruminative thoughts and traumatic memories. That body of research suggested that, in general, thought suppression is counterproductive, reinforcing the state of mind that one is trying to avoid. Perhaps, then, it is the struggle to avoid thinking about a painful event that makes the memory of that event come to mind. As we have seen, however, involuntary remembering is not confined to negative events (Berntsen, 1998).

INVOLUNTARY MEMORIES AND REMEMBERING BY RE-EXPERIENCING

The discussion of involuntary memory brings to the fore an important distinction between two modes of remembering: re-experiencing and factual recollection. In the "re-experiencing" mode, the phenomenological quality of memory is such that the person feels as if he or she is experiencing the event again in the same manner "as if he/she were still there". This is what Tulving (2002) referred to as "travel back in time", when the person remembers past happenings by mentally travelling back into the past. This type of remembering was assumed by Tulving to be specifically linked to the episodic memory system as this system is understood today. For example, the patient KC studied by Tulving is assumed to have lost his episodic memory as a result of brain injury. However, KC can still report information about the past in a factual, declarative way, without the phenomenological experience of travelling back in time. It is his "autonoetic" consciousness, his memory of personal episodes, that is impaired.

Thus, the re-experiencing mode is associated with a reinstatement of many contextual aspects of the event, including its "when" and "where" as well as its personal and emotional significance. The event is sometimes "seen" from the same perspective as that which the person occupied when witnessing the event. One remembers oneself as the observer rather than as part of the observed event (Nigro & Neisser, 1983). Unlike this mode, the declarative, "noetic" mode involves recollecting the factual content without an impression of experiencing the event. For example, we may recall that we spent last Christmas in Oslo without recollecting any specific contextual information associated with that memory.

Very often, involuntary memories are re-experiences, and may involve various degrees of detail and precision. However, they need not always be so. As noted earlier, involuntary recall may involve specific elements of our life such as a song or a name, which come to mind without being associated with a well-defined episode, or without a feeling of re-experiencing. However, the re-experience mode seems to be characteristic of many involuntary memories, for example when we are in a certain place and, without any intention, an episode associated with that place pops into our mind in a very vivid, emotionally intense way, and we have the impression that the episode is still continuing.

Although re-experiencing is more dominant in involuntary memories it also characterizes many acts of controlled, voluntary remembering, such as when several family members try to actively recall a family event. In a non-social context, too, re-experiences can be voluntary. One may actively provide oneself with triggering cues in order to recreate a certain past experience. Some controlled retrieval strategies actually involve the attempt to voluntarily reinstate the original context and to try to feel the same way one felt when experiencing the episode (Fisher & Geiselman, 1992; Smith, 1979). It is

unclear whether one must suspend voluntary control in order to have the feeling of re-experiencing the episode.

In everyday life we enjoy reactivating pleasant experiences. Although it is difficult to re-experience on demand, there are various ways to increase the likelihood of inducing re-experiences. We may mentally or physically try to reinstate previous "stimulus conditions" (the encoding specificity principle or state-dependent memory, Tulving & Thomson, 1973; Bower, 1981), consult diaries or old photos, or get together with old friends to share a shared past (see Chapter 8). Thus, there exist methods of controlling or influencing the occurrence of re-experiencing. However, once re-experiencing takes place, it will tend to unfold "automatically".

Re-experiences can take all gradations of positive and negative emotional shades. The positive ones are particularly satisfying because they reinstate pleasures, rather than merely reminding one of them. Nostalgia may have an overtone of indulgence, but is widely recognized as an attractive memory condition.

CONTROLLED, VOLUNTARILY RETRIEVED MEMORIES

Most "formal" situations in which memory is involved entail voluntary, controlled retrieval. The best examples are achievement tests, in which students must probe their memories for a solicited piece of information. In fact, most laboratory studies on memory, like those involving free recall tasks, paired associates tasks and general information questions, attempt to tap voluntary retrieval. In terms of the pathway metaphor, voluntary memories involve building a path *to* our memories. In everyday life too, controlled recall is common, but it may also be private, as when one thinks back on previous experiences without intending to give a memory report. One example is when one is walking alone, or reflecting about one's past before going to sleep.

Each recollection is presumably coloured by previous recollections, and affects subsequent recollections. Important episodes are certainly recollected several times. Frequently recollected episodes become schematized. Schematization presumably implies a dilution of the distinction between experienced and inferred information (Bartlett, 1932; Neisser, 1967).

As will be discussed later, voluntary retrieval involves a variety of metacognitive processes that monitor and control the course of remembering, assessing the truth value of the retrieved information, regulating recall, filling up the gaps and engaging in reconstructive processes.

Voluntary retrieval generally serves some function. Obviously, in achievement tests the goal of the person is to provide the *correct* answer. The same is true of many TV games. Personal, private search of one's memory is also often driven by the desire to ascertain what "really" happened. And most clearly, accuracy is perhaps the most important criterion in court, when juries

must evaluate the reliability of eyewitness testimony. Thus, in many real-life situations the focus is on veridicality or accuracy (Koriat & Goldsmith, 1996).

However, as Neisser aptly argued:

> It is not the case that all memory-based behaviors focus on accurate reproduction; other dimensions of the performance may be much more important. The aim of telling a joke, for example, is to tell it *effectively*; whether you tell it just as you heard it is of no consequence at all. A singer of epic tales "repeats" a familiar story, but not with a view to reproducing some prior performance; rather, his intent is to impress and entertain his present audience (Lord, 1960; Rubin, 1995). Actors do indeed memorize their lines, but getting the words right is the least, most insignificant part of their task. Experimental subjects tend to focus on accuracy when they recall a story for the benefit of the experimenter, but other dimensions become more important when they discuss the same story with a peer (Hyman, 1994).
>
> (Neisser, 1996, p. 204)

Thus, controlled recollections have some function, and that function generally dictates what the person focuses on, what perspective one adopts in "scanning" one's memory and reporting it, how much detail one communicates, etc. (Goldsmith & Koriat, 1999). Little such selection is assumed to take place in involuntary memory.

Because controlled retrieval of episodic events is carried out with some goal in mind, there is greater pressure on producing as consistent and complete an account as possible. This is particularly so when a public report is required. Thus, the quest for coherence and completeness is characteristic of voluntary memories, whereas involuntary memories can be quite fragmentary. When remembering is controlled, there is a desire to fill in the gaps and to tell oneself and others a coherent story.

In sum, intentional recall is top-down, active and goal-directed. It often involves processes of problem solving, similar to those that take place in solving a riddle (Koriat, 2000).

INTERACTIONS BETWEEN CONTROLLED AND AUTOMATIC PROCESSES IN REMEMBERING

The example we used at the beginning of the chapter shows how the typical process of retrieval of episodic personal memories may involve not only deliberate, goal-directed retrieval processes, but also a series of memories that pop up involuntarily. Sometimes memories appear in unexpected ways and we follow the lead of these memories to engage in controlled retrieval processes. Once a memory episode involuntarily comes to mind, we try to verify

it complete it and monitor its source, and this, of course, entails controlled operations.

Sometimes people have a specific goal that directs the search in memory, but then memory starts to wander and to be guided by its own products in a data-driven fashion. For example, Palladino and De Beni (2003) asked people of different ages to create a mental image of an autobiographical memory in response to a cue word. They found that the image created was progressively enriched, especially in the case of the elderly, by further autobiographical elements that were not strictly associated with the cue word.

It is very likely that all controlled remembering also entails automatic processes. As we search our memory, there are "suggestions from below" that we decide to follow or ignore (Koriat, 2000). Because there is no simple algorithm for retrieving the correct episode, we must reconstruct it from various elements of it that are suggested to us by our memory. Automatically activated features and elements can facilitate controlled retrieval but can also block it and divert it from its course. It has been proposed, for example, that some of the difficulties that we encounter in reaching for a word that is on the "tip of our tongue" derive in part from the interfering effects of "blockers" or "interlopers" that come to mind during the search for the elusive word (Burke, MacKay, Worthley, & Wade, 1991; Jones, 1989).

THE ROLE OF INVOLUNTARY MEMORIES
IN EVERYDAY LIFE

In everyday life, memory, in both its intentional and unintentional aspects, serves different functions (Glenberg, 1997; Neisser, 1976, 1978). One remembers in order to solve various tasks, e.g., to answer questions, find one one's way to desired goals, write a story, etc. Sometimes we have the phenomenological experience of remembering, as in cases of episodic memory, when we have the experience of travelling back in time. At other times we may not be conscious that we are solving a problem by memory support, or are relying on our memory while travelling through the town. When paths to memory are open and used, we are not always fully conscious of using these paths. It has been observed (Antrobus, Singer, & Greenberg, 1966) that free thoughts and daydreaming, which involve involuntarily retrieved material from memory, represent a large portion of our everyday time.

Remembering in everyday life generally occurs in the context of many other processes such as perceiving, planning, thinking, deciding and acting. Very rarely does it occur in isolation. Hence the paths to one's past will normally be opened while one is travelling concurrently along other mental paths leading to other goals.

We venture the hypothesis that many artistic products draw their psychological importance from their re-experiential function. The most valued musical works evoke re-experiencing. Not only biographies and

autobiographies purport to recreate the past; novels are also indirect narratives of the past. Novels and biographies present the reader with the past seen from the author's perspective, but they also allow the reader to re-experience his or her own past through identification with the story characters. References are often made to Proust's reconstruction of his past, the loss of which is threatened. Proust's aim was to overcome time in the sense of bringing back at least some psychologically important experiences as they were originally experienced.

Re-experiences are functionally important because they provide an opportunity for reconsidering our past, for better understanding of what happened, including our own thoughts and actions, and for re-evaluating that past. Re-experiences may bring forward information that was previously not much reflected on. On re-inspection of re-experienced information, problems may be solved, a process that may also affect creative mental imagery (Finke & Slayton, 1988). Re-experiencing may also produce insights regarding old information, in the same way that perceptual reorganizations may create insights concerning novel information.

In concluding this section we wish to point out the relevance of re-experience in the context of forensic psychology. Re-experiences and involuntary memories may provide memory information that is difficult to retrieve by deliberate search. When remembering is not under deliberate strategic control, it must be induced indirectly. The evidence suggests that the chances of involuntary memories emerging are greater under relaxed and unfocused conditions. It also appears that there is an intimate link between the precipitating cues that elicit an involuntary memory and the content of that memory. Eyewitnesses might succeed in recovering relevant information when successfully induced to re-experience the event involved. This may be the dynamics behind successful "hypnosis", drug-induced relaxations or techniques inducing context reinstatement (e.g., cognitive interviews, Fisher & Geiselman, 1992). However, there is no guarantee that re-experiences are completely veridical. One's perceptions may sometimes be mistaken and the same is true with regard to re-experienced memories.

VOLUNTARY MEMORIES IN EVERYDAY LIFE

Intentional remembering may sometimes be an effortful and laborious process. Fortunately, there are pieces of information that we can access almost without effort, particularly when the information has been well rehearsed. In that case the phenomenological experience is similar to that of directly accessing the solicited information. Such direct accessing is an economic and efficient way of retrieving memories. Quickly accessed information is also quite likely to be correct (Robinson, Johnson, & Herndon, 1997).

Sometimes direct access may fail. A good example is the "tip-of-the-tongue" state, when we are convinced that we know a name but cannot recall

it. We are all familiar with the frustration and irritation that accompanies such blocked retrievals, when controlled efforts to find the elusive name are unsuccessful.

Retrieving episodes and events from the distant past is sometimes very laborious. Unfortunately, not much is known about the retrieval of complex, real-life events because much of the laboratory research on memory has focused on relatively simple tasks (Koriat, 2000). In attempting to retrieve a personal episode from the distant past, a person typically retrieves fragments of the episode and scenes one after the other and tries to use them as cues for additional details. Very often the process looks like that of solving a puzzle when too many pieces are missing. In such cases, a serious problem facing the rememberer is that of source and reality monitoring (Mitchell & Johnson, 2000): Does this fragment belong to this event or does it belong to another event? Did this segment of the event really take place? The problem is thus that of linking the pieces that belong to the same past event and reconstructing a sensible story.

Several techniques have been described for probing one's own memory. However, most of these techniques can help retrieval when they are used during encoding. They are based on associating the to-be-remembered information with specific cues, which can later be used to support memory retrieval. A good example is the method of loci (see Cornoldi & De Beni, 1985). Other techniques apply to retrieval, such as the alphabetical cueing procedure for recalling names or words. However, more intricate search and retrieval strategies have been described (see Koriat, 2000). Some of these techniques have been incorporated into the cognitive interview (Fisher & Geiselman, 1992).

When it comes to the recollection of personal autobiographical events, such recollection is often carried out within a social (e.g., family) setting. In such cases, support obtained from others who have witnessed the event may help not only in cueing one's memory for more details, but also in validating one's own memories.

In sum, intentional remembering is quite prevalent in everyday life. We can generally access episodic memories, particularly when they are integrated into personal schemata. Search processes can be used to recover temporarily blocked episodic memories. Effortful retrieval generally requires laborious monitoring and control processes.

PATHWAYS FROM MEMORY: HOW THE RETRIEVED EPISODE IS VALIDATED AND EVENTUALLY COMMUNICATED

In our pathway metaphor, the processes by which retrieved memories can be brought to consciousness and/or expressed can be described as pathways *from* memory. So far we have discussed the paths *to* memory. We discuss now

the paths *from* memory. In general, a retrieved memory episode may be communicated directly in a largely unedited form, or it may be "edited" according to our personal interests or according to the goals of communication.

Non-edited paths from memory

Many retrieved pieces of information that we report, mostly from semantic memory, are largely unedited. Answers to everyday memory questions may usually be based on information directly accessed, for example, when we state our name, and give our address or telephone number. Episodic facts may also be reported unedited. Editing requires time, so that pressure of time may not allow sufficient opportunities for editing. This is part of the rationale behind lie-detection methods. So far research has not detected reliable verbal or nonverbal cues to deception (Vrij, 2000; Vrij & Mann, 2004). However, it has been argued, for instance by psychoanalytic theory, that bodily gestures and reactions ("body language") may open doors to memories and motivations of which the clients themselves are unaware.

Edited paths from memory

Memory editing is almost always the rule even when we are not aware of it. For example, consider the simple laboratory task of free recall. We generally assume that in this task the participant reports all the words that he or she can recall from a previously presented list of words. However, research has shown that some editing goes on even in this simple task (Koriat & Goldsmith, 1996). First, participants operate under the assumption that there is no point reporting again a word that has already been reported. Therefore, for each word that comes to mind they must presumably monitor whether they have already produced that word before, and only then decide whether to report it. When output monitoring is rendered difficult (e.g., by asking participants to report the items verbally rather than write them down), the proportion of report repetitions increases (Gardiner, Passmore, Herriot, & Klee, 1977). Koriat, Ben-Zur, and Sheffer (1988) observed that elderly people are deficient in output monitoring (remembering what they said or did), which is responsible, perhaps, for their greater tendency to tell the same story over again or to take a medicine more often than needed. In a free-recall task, the elderly group was found to recall about half of the words the younger group remembered, but their probability of repeating some of these words was double that of the younger group.

A second type of evidence for the occurrence of editing in free recall comes from the proportion of errors of commission made. Even when there are no explicit instructions about guessing, participants assume that they are expected not only to reproduce a large proportion of the studied words but also to be accurate. Indeed, when participants are specifically instructed to be less "inhibited" they report more words, but the majority of these are errors

of commission (Bousfield & Rosner, 1970). Koriat and Goldsmith (1996) showed that the accuracy of free-recall reports is delicately tuned to the accuracy incentives used: Participants were quite accurate (making few false recalls) when they expected to win one Israeli *shekel* for each correct answer but lose the same amount for each wrong answer. However, they were more conservative in their reporting, and also more accurate, when the penalty for incorrect reports increased. Thus, control processes operate even in simple laboratory tasks.

Of course, when it comes to memory in real life, there is greater need to edit one's memories during reporting. First, the amount of information involved is usually extremely large, and one must be very selective, attempting to squeeze the information into some sort of manageable description. In addition, some structuring and organization needs to be imposed on the data.

Second, and no less importantly, memory reporting, as indicated earlier, generally has a goal and a function, and these typically guide the editing and constructive process. We must take into account the expectations and knowledge of the receiver of the communication, must chose where to start, what features to emphasize and what to ignore, what level of detail to supply, etc.

In addition to a general "editorial" policy, specific decisions must be made with regard to each item that comes to mind, whether to report it or not, and how to report it. In the case of a person on a witness stand, the "official" criteria are generally clear: i.e., "to tell the truth, the whole truth and nothing but the truth". This is a heavy requirement, because as Koriat and Goldsmith (1996) demonstrated, people can rarely meet all three requirements and must generally sacrifice some correct answers for the sake of enhancing the overall accuracy of what they do report (the quantity–accuracy trade-off). One compromise that people sometimes use is to report an uncertain piece of information at a level of generality at which the report is less likely to be wrong (control over the "grain size of the report"; Goldsmith, Koriat, & Weinberg-Eliezer, 2002). At any rate, eyewitnesses must monitor on-line the accuracy of what comes to mind in order to decide whether to include it in the report or omit it (see Chapter 11).

Of course, other types of editing may take place, involving slight or more serious modifications. The report may be embellished or improved in order to make it appear more convincing. It may be attenuated and diluted when the person is uncertain. Some of the editing may actually take place unwittingly and unconsciously. This might result, for example, in a tendency to focus more on pleasant than unpleasant aspects of autobiographical memories (see Chapter 18).

THE INTERACTION BETWEEN PATHS TO MEMORY AND PATHS FROM MEMORY

The distinction between edited and non-edited memories can be considered in conjunction with the distinction between involuntary and voluntary retrieval processes, thus offering a more complete description of how the memory of a personal episode finally turns out. As noted earlier, involuntary memories are typically not edited. Such non-editing may be against the remembering person's will or intention, as has been shown to be the case for involuntary traumatic memories, but it need not always be so (Berntsen, 1996, 1998). The existence of non-edited memories is well known in folk psychology, and is often utilized in works of art. Descriptions of the stream of consciousness that break grammatical rules may sometimes signal a more personal protagonist level than descriptions that follow ordinary rules (cf. Joyce's description of Bloom's thoughts; Joyce, 1922/1960). When composers include unexpected natural sounds into their compositions, this technique may be intended to suggest different levels of musical interpretation. The techniques of Impressionism serve a similar function, for example, to indicate a "truer", more direct depiction than that conveyed by a photograph-like painting.

Memory editing has been well documented in everyday experience. Such editing is partly regulated by conversational conventions à la Grice (1967, 1975). It is also regulated by metacognitive beliefs and knowledge about memory and by social norms (Austin, 1962; Yzerbyt, Lories, & Dardenne, 1998). For instance, there is a vast difference between telling memories to superiors (bosses) and to inferiors (employees, pupils). Memories are reported differently in unconventional and conventional settings (in a bar or a party compared to the court or a school classroom).

In novels, we may contrast the style of the author when an event is neutrally described as an "objective" event, with when that event is described as seen from the hero's point of view. A comparison of news reporting, gossiping and story-telling reveals different editorial practices. We make daily use of similar rules or "mechanisms" when reporting episodic memories. One reason might be that such editorial practices are socially based (Middleton & Edwards, 1990). We have learned how to remember. In school we are instructed how to tell a story – how to report memorized information. Young children probably start with what we have referred to as direct access, i.e., unedited memory reporting, but they gradually learn how to edit their memory reports (cf. Stein, Ornstein, Tversky, & Brainerd, 1997).

To be "impulsive" and report "the first thing that comes to mind" is not generally regarded as the most intelligent or proper way of behaving. We expect the memory report to be organized enough to be comprehensible to oneself or to others. Memory editing is a decision-making process (Hastie & Dawes, 2001). It is no coincidence that signal-detection methods are so suitable for memory analysis. In fact, these methods take into account the fact,

noted earlier, that people not only have different abilities to recognize old information but also different criteria for deciding when to give a positive response. Memories are also rejected or accepted in terms of how they fit with an overarching report schema (Alba & Hasher, 1983).

The literature on human memory abounds with illustrations of organizational principles. Chunks are created to help encoding and rehearsal. Irrelevant information is filtered out. New information is stored in familiar categories. Memories are reported in clusters, and so on (Tulving & Donaldson, 1972). Our reference to memory editing is thus only a reminder of a basic memory principle that may also be of interest during encoding (e.g., Koriat & Pearlman-Avnion, 2003). Memories tend to be encoded and subsequently reported in edited versions.

As we noted, memory editing is usually intentional, and is recognized to be so by the remembering person and by those who eventually receive the memory report. Metamemory research has stressed conscious and deliberate monitoring and control processes (Nelson, 1996; Nelson & Narens, 1990). However, some researchers also stress the idea that metacognitive processes can occur without the person's conscious control (Reder, 1988; see also Chapter 11).

Table 13.1 summarizes the four possible combinations of the different paths *to* and *from* memory. All four combinations are possible. The fact that some combinations are more likely than others is a result of the features of the different paths as described earlier. Category A represents spontaneous pop-out memories that are often manifested in behavioural indices. Metacognitive operations are minimal. Category B represents situations with a goal-directed memory search that is not directed towards memorial report, and hence incorporate little editing. This is, perhaps, the least frequent category because voluntary memories are typically edited. However, voluntary rapid retrieval may also occur with little editing. In consequence, people sometimes report something that they later regret having reported. This occurs in mental states when metacognitive processes are suspended or relaxed, or, perhaps, under pressure of time.

The C category includes verbally reported involuntary memories, reflections on spontaneous memories and other cases in which the remembering persons reorganize their involuntary memories. Small talk and confidential talk represent social situations in which one exchanges "memorial opinions".

Table 13.1 Combinations of pathways *to* and *from* memory

Pathways from memory	*Pathways to memory*	
	Involuntary	*Voluntary*
Non-edited	A	B
Edited	C	D

Biographical memory contributions, such as Proust's literary project or autobiographical descriptions, tend to fall into this memory class.

The pathway combination in the D category represents the typical memory situation. This category is representative not only of typical laboratory memory experiments but also of "everyday memory" in folk parlance. Here the memory report is intended to answer specific search questions. The memories are voluntary by intention.

For each of the four cells in Table 13.1 there should be separate entries for intrapersonal and interpersonal memory situations. Here we merely offer some brief comments. The A category probably is most frequent and typical of intrapersonal than of interpersonal memory situations. The opposite probably applies to category D.

To a large extent, interactions between pathways to and from memory will reflect personal choices. We shall comment upon some of these. A person might experience satisfaction and pleasure when involuntary episodic memories pop into his or her mind. Enjoying this process, he or she might want to prolong the re-experience and prefer not to intervene. That person might let the retrieval process flow unedited and try not to focus attention on potentially disturbing situational factors. In this case the triggering of the re-experience may have started off involuntarily, but the person intentionally tries to prolong the unedited memory flow. Unpleasant re-experiences, on the other hand, may result in the person being overwhelmed by traumatic feelings that make active strategic intervention difficult. Sometimes the person may be able to intervene and stop the re-experiencing process by diverting attention to other situational aspects, by efforts to re-edit the re-experiences, or by shifting to remembering by recollection.

A person engaged in edited voluntary retrieval may produce some useful cues that trigger unedited re-experiences. Here an initial controlled process leads to non-strategic processing. On the other hand, when thinking back on certain life episodes or reporting these to another person (e.g., a therapist), a person may come to realize that edited reporting may be a more suitable alternative (e.g., child to parents, witness in court).

These are only some of the many interactive possibilities between pathways *to* and *from* memory. In terms of metacognitive functions, the person serves as a kind of shunt between the retrieval pathways to episodic memories. In everyday situations one often starts with specific intentions about how and what one wishes to report, only to realize that what one comes up with is quite different. A musician may play a piece from memory but at the same time try to convey a personal interpretation based on involuntary memories. Sudden impulses that are triggered by re-experience are controlled by a kind of edited memory processing.

PATHWAY COMBINATIONS AND METACOGNITION

The coordination and control of our memorial pathways corresponds to what is currently referred to as "metamemory" or "metacognition". These terms are commonly employed to refer to the processes involved in monitoring and regulating one's own cognitive processes (Cornoldi, 1995, 1998; Koriat & Goldsmith, 1996; Nelson, 1996; Nelson & Narens, 1990). Current discussions of metacognition generally assume that people have some control over cognitive processes and can regulate learning and remembering in accordance with various goals (see Chapter 11; Helstrup, 2002, 2005a,b). Nelson and Narens (1990; see also Nelson, 1996) proposed a framework that postulates a feedback loop between metacognitive monitoring and metacognitive control: Metacognitive monitoring is used to oversee the operation of basic information-processing operations and to monitor their results and success, whereas metacognitive control is used to regulate these processes in a top-down fashion.

The metacognitive perspective assumes that there is some degree of self-control over the processes of learning and remembering. In terms of the pathway metaphor, this implies that pathway selection and pathway combinations are partly under personal control. It is recognized, however, that some of the processes can occur automatically and can be controlled by unconscious cognitive mechanisms. Thus, remembering can sometimes occur automatically, as is illustrated by the occurrence of involuntary memory, but recollection and editing normally entail self-regulation. However, it is sometimes possible to self-cue one's own re-experiences. For instance we may pay visits, mentally or physically, to old locations with the result that the re-visit triggers a re-experience. This is a form of controlled re-experience. Re-experiences may then undergo editing, but they also may be left unedited.

Metacognition also involves knowledge and beliefs about one's own memory as well as about memory in general. This knowledge is useful not only for the regulation of one's own cognitive processes but also for guiding communication with other people. Communication generally implies a great deal of shared knowledge and beliefs. For instance, rules like those described by Grice (1967, 1975), as well as other rules, govern the way in which we report our memories.

Everyday memory should thus not be seen exclusively as a private mental phenomenon. We share our past, just as we share our present, with others. Remembering everyday episodes has an important social function, and many of these episodes also have a social content. Because much of our metacognitive knowledge is shared, memory control is also performed through social channels. Control factors are especially important when it comes to understanding reports of mental events such as experiences or memories.

An important issue in everyday memory is how to understand the extent to which social and emotional factors affect memory processes. Emotional factors at the reporting stage are perhaps among the most influential factors

affecting metacognitive control. Our emotional attitude to the recipient of a message should greatly influence our report procedures. Emotions may influence the pathways both to and from memory. From the perspective of the recipient of a memory report, the emotional state of the reporter will influence the degree of confidence that recipient will have in that report. Emotions thus seem to play a central role in everyday memory, far more so than in the memory tasks studied under standard laboratory conditions.

INVOLUNTARY MEMORY AND VOLUNTARY FORGETTING

As we have seen, evidence at hand unambiguously supports the idea that memories at times pop up without warning or deliberate search (Berntsen, 1996, 1998; Spence, 1988). Two practical questions naturally arise. How can we avoid unwanted memories and how can we obtain the desired ones?

Some psychotherapeutic techniques incorporate tools devoted not only to the facilitation of memory re-experiences but also to overcoming unwanted re-experiences that can be highly debilitating. It would seem that re-experiences are difficult to probe directly. However, they can be induced indirectly by reinstating some of the triggering cues.

Apparently, one way of reducing the impact of involuntary memories is by attempting to "erase" them. Several authors have stressed that forgetting should be critical for adaptation to a changing world. People must be able to discard out-of-date information in order to avoid errors and interference, and in order to update the contents of their memories (E.L. Bjork, Bjork, & Anderson, 1998; Hasher, Tonev, Lustig, & Zacks, 2001; Wessel & Wright, 2004; Wright, Loftus, & Hall, 2001; Wright, Mathews, & Skagerberg, 2005). How efficient are people at deliberately forgetting a specific piece of consciously registered information? Research indicates that when people are instructed to forget a previously learned piece of information, they are often successful in reducing or eliminating the interference of that information with the subsequent retrieval of to-be-remembered information. The underlying mechanism seems to involve inhibiting the retrieval of the to-be-forgotten information.

There are indications, however, that the information that was to be forgotten remains in memory: When memory is tested through recognition or relearning, or when it is tested through indirect measures of memory such as priming, performance on the to-be-forgotten items is typically comparable to that of to-be-remembered items (Basden, Basden, & Gargano, 1993; E.L. Bjork & Bjork, 1996). In fact, recent evidence suggests that although the retrieval of to-be-forgotten information is inhibited, the indirect influence of that information may actually be greater in certain situations than those of intentionally remembered information. This occurs because the failure to recollect the forgotten information prevents the rememberer from mitigating the undesirable indirect influences of the forgotten information (E.L. Bjork

& Bjork, 2003). The implication of this line of research, then, is that involuntary memories cannot be warded off completely through directed forgetting.

Of course, there are other methods of avoiding involuntary memories: For example, re-experiencing may be stopped by diverting one's attention away from the original experience, but because this does not erase the underlying memory, it may emerge spontaneously at some later time. Alternatively, involuntary memories can be prevented by redirecting one's recollection, as when we call forth new search cues that may induce us to conceive of the recollected episode in a different way.

Another means would be to avoid unedited direct access to memories, trying instead to re-edit the recollected episodes. Social feedback on re-edited memory reports will help to build up new memory schemata.

In sum, voluntary forgetting is an important tool that is used in everyday life to avoid the emergence of unwanted memories. However, directed forgetting does not erase the underlying memory but only inhibits its expression. Other strategies may be used to protect against the spontaneous emergence of undesired memories. Such strategies may entail a reconstruction and re-evaluation of the original episode.

CONCLUSIONS

The pathway metaphor was intended as a way to provide a tool for thinking about the retrieval of episodic memories. However, it can be argued that retrieval is also a metaphor in its own right (see Chapter 1). The notion of retrieval seems to build on a memory trace concept: "Something" is retrieved that corresponds to the trace. Our double-path metaphor (to and from memory) suggests that memories must first be re-established and developed before they can be called forth. Conceptualized in this way, retrieval is a two-stage finding-and-reporting process in which finding and reporting interact. Memories are not traces, but are more like mental products or achievements.

The interaction is performed by the remembering person. Although memory retrieval can occur privately, it often takes place in a social context. Episodic memories are typically reported in a social context, and practical memory applications must take this fact into account.

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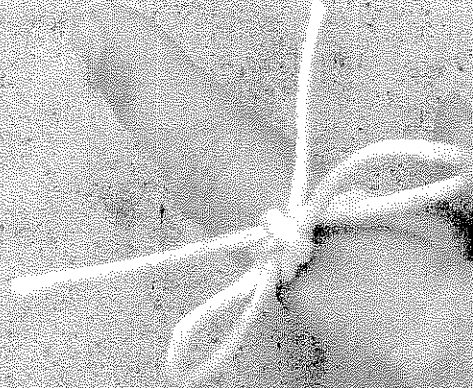
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