Flashbacks: Understanding Involuntary Memory Patterns

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June 14, 2026

A flashback, or involuntary recurrent memory, is a psychological phenomenon in which an individual has a sudden, usually powerful, re-experiencing of a past experience or elements of a past experience. These experiences can be happy, sad, exciting, or any other emotion one can consider. The term is used particularly when the memory is recalled involuntarily, and/or when it is so intense that the person "relives" the experience, unable to fully recognize it as memory and not something that is happening in "real time".

History

Herman Ebbinghaus (1850-1909)

Flashbacks are the "personal experiences that pop into your awareness, without any conscious, premeditated attempt to search and retrieve this memory" These experiences occasionally have little to no relation to the situation at hand. Flashbacks to those suffering posttraumatic stress disorder can be so disruptive as to seriously affect day-to-day living.

Memory is divided into voluntary (conscious) and involuntary (unconscious) processes that function independently of each other. Theories and research on memory dates back to Herman Ebbinghaus, who began studying nonsense syllables. Ebbinghaus classified three distinct classes of memory: sensory, short term, and long-term memory. Sensory memory is made up of a brief storage of information within a specific medium (the line you see after waving a sparkler in your field of vision is created by sensory memory). Short term memory is made up of the information currently in use to complete the task at hand. Long term memory is composed of the systems used to store memory over long periods. It enables one to remember what happened two days ago at noon, or who called last night.

Miller (1962-1974) declared that studying such fragile things as involuntary memories should not be done. This appears to have been followed since very little research has been done on flashbacks in the cognitive psychology discipline. Flashbacks have been studied within a clinical discipline however, and they have been identified as symptoms for many disorders, including posttraumatic stress disorder.

Theoretical accounts

Due to the elusive nature of involuntary recurrent memories, very little is known about the subjective experience of flashbacks. However, theorists agree that this phenomenon is in part due to the manner in which memories of specific events are initially encoded (or entered) into memory, the way in which the memory is organized, and also the way in which the individual later recalls the event. Overall, theories that attempt to explain the flashback phenomenon can be categorized into one of two viewpoints. The special mechanism view is clinically oriented in that it holds that

involuntary memories are due to traumatic events, and the memories for these events can be attributed to a special memory mechanism. On the other hand, the basic mechanism view is more experimentally oriented in that it is based on memory research. This view holds that traumatic memories are bound by the same parameters as all other every-day memories. Both viewpoints agree that involuntary recurrent memories result from rare events that would not normally occur.

These rare events elicit strong emotional reactions from the individual since it violates normal expectations. According to the special mechanisms view, the event would lead to fragmented voluntary encoding into memory (meaning that only certain isolated parts of the event would be encoded), thus making the conscious subsequent retrieval of the memory much more difficult. On the other hand, involuntary recurrent memories are likely to become more available, and these are more likely to be triggered by external cues. In contrast to this, the basic mechanism view holds that the traumatic event would lead to enhanced and cohesive encoding of the event in memory, and this would make both voluntary and involuntary memories more available for subsequent recall.

What is currently an issue of controversy is the nature of the defining criteria that makes up an involuntary memory. Up until recently, researchers believed that involuntary memories were a result of traumatic incidents that the individual experienced at a specific time and place, but the temporal and spatial features of the event are lost during an involuntary recollection episode. In other words, people who suffer from flashbacks lose all sense of time and place, and they feel as if they are re-experiencing the event instead of just recalling a memory. This is consistent with the special mechanism viewpoint in that the involuntary (unintended) memory is based on a different memory mechanism than its voluntary (intended) counterpart. Furthermore, the initial emotions experienced at the time of encoding are also re-experienced during a flashback episode, and this can be especially distressing when the memory is of a traumatic event. It has also been demonstrated that the nature of the flashbacks experienced by an individual are static in that they retain an identical form upon each intrusion. This occurs even when the individual has learned new information that directly contradicts the information retained in the intrusive memory.

Upon further investigation, it was found that involuntary memories are usually derived from either stimuli (i.e. anything that causes a change in behaviour) that indicated the onset of a traumatic event, or from stimuli that hold intense emotional significance to the individual simply because these stimuli were closely associated with the trauma in terms of timing. These stimuli then become warning signals that if encountered again, serve to trigger a flashback. This has been termed the warning signal hypothesis. For example, a man experiences a flashback upon seeing sun spots on his lawn. This happens because he associates the sun spots with the headlights of the vehicle that he collided with, causing a horrific car accident. According to Ehlers and Clark, traumatic memories are more apt to induce flashbacks simply because of faulty encoding in that the individual fails to take contextual information into account, as well as time and place

information that would usually be associated with every-day memories. These individuals become more sensitized to stimuli that they associate with the traumatic event which then serve as triggers for a flashback (even though the context surrounding the stimulus may be unrelated; such as sun spots being unrelated to headlights). These triggers may have elicited an adaptive response during the time of the traumatic experience, but they soon become maladaptive if the person continues to respond in the same way in situations in which no danger may be present.

The special mechanism viewpoint would add to this further by suggesting that these triggers activate the fragmented memory of the trauma, but protective cognitive mechanisms function to inhibit the recall of the original memory of the traumatic event. Dual representation theory enhances this idea by suggesting two separate mechanisms that account for voluntary and involuntary memories; the first of which is called the verbally accessible memory system and the latter is referred to the situationally accessible memory system.

In contrast to this, theories belonging to the basic mechanism viewpoint hold that there are no separate mechanisms that account for voluntary and involuntary memories. The recall of memories for stressful events do not differ under involuntary and voluntary recall. Instead, it is the retrieval mechanism that is different for each type of recall. In involuntary recall, the external trigger creates an uncontrolled spreading of activation in memory, whereas in voluntary recall, this activation is strictly controlled and is goal-oriented.

Neuroscience

Several brain regions have been implicated in the neurological basis of flashbacks. The medial temporal lobes, the precuneus, the posterior cingulate gyrus and the prefrontal cortex are the most typically referenced with regards to involuntary memories.

The medial temporal lobes are commonly associated with memory. More specifically, the lobes have been linked to episodic/declarative memory and thus damage to these areas of the brain result in disruptions to declarative memory system. The hippocampus, located within the medial temporal regions, has also been highly related to memory processes. There are numerous functions in the hippocampus; these functions also include aspects of memory consolidation. Brain imaging studies have shown flashbacks activate areas associated with memory retrieval. The precuneus, located in the superior parietal lobe and the posterior cingulate gyrus have also been implicated in memory retrieval. In addition, studies have shown activity in areas of the prefrontal cortex to be involved in memory retrieval.

Thus, the medial temporal lobe, precuneus, superior parietal lobe and posterior cingulate gyrus have all been implicated in flashbacks in accordance to their roles on memory retrieval.

Long Term Memory

Memory has typically been divided into sensory, short term, and long term processes. According to Rasmuseen & Berntsen, 2009, "long-term memory processes may form the core of spontaneous thought". Thus the memory process most related to flashbacks is long term memory. As well, studies by Rasmuseen & Berntsen, 2009, have shown that long term memory is also susceptible to extraneous factors such as recency effect, arousal and rehearsal as it pertains to accessibility. Compared to voluntary memories, involuntary memories show shorter retrieval times and little cognitive effort. Finally, involuntary memories arise due to automatic processing, which does not rely on higher-order cognitive monitoring, or executive control processing. Voluntary memory is normally associated with contextual information, which is what allows for correspondence between time and place, this is not true of flashbacks. According to Brewin, Lanius et, al, 2009, flashbacks, are disconnected from contextual information, and as a result are disconnected from time and place.

Clinical investigations

To date, the specific causes of flashbacks have not yet been confirmed. Several studies have proposed various potential factors. Gunasekaran et al., 2009, indicate there may be a link between food deprivation and stress on the occurrence of flashbacks. Neurologists suggest temporal lobe seizures may also have some relation.

On the reverse side, several ideas have been discounted in terms of their causing flashbacks. Tym et al., 2009, suggest this list includes medication or other substances, Charles Bonnet syndrome, delayed palinopsia, hallucinations, dissociative phenomena, and depersonalization syndrome.

A study of the persistence of traumatic memories in World War II prisoners of war investigates through the administration of surveys the extent and severity of flashbacks that occur in prisoners of war. This study concluded that the persistence of severely traumatic autobiographical memories can last upwards of 65 years. Until recently, the study of flashbacks has been limited to participants who already experience flashbacks, such as those suffering from posttraumatic stress disorder, restricting researchers to observational/exploratory rather than experimental studies.

Neuroimaging investigations

Neuroimaging techniques have been applied to the investigation of flashbacks. Using these techniques, researchers attempt to discover the structural and functional differences in the anatomy of the brain in individuals who suffer from flashbacks compared to those who do not. Neuroimaging involves a cluster of techniques, including computerized tomography, positron emission tomography, magnetic resonance imaging (including functional), as well as

magnetoencephalography. Neuroimaging studies investigating flashbacks are based on current psychological theories that are used as the foundation for the research, and one such theory that is consistently investigated is the difference between explicit and implicit memory. This distinction dictates the manner in which memories are later recalled, namely either consciously (voluntarily) or unconsciously (involuntarily).

These methods have largely relied on subtractive reasoning in which the participant voluntarily recalls a memory and then the memory is again recalled, but this time through involuntary means. Involuntary memories (or flashbacks) are elicited in the participant by reading an emotionally-charged script to them that is designed to trigger a flashback in individuals who suffer from post-traumatic stress disorder. The investigators record the regions of the brain that are active during each of these conditions, and then subtract the activity. Whatever is left is assumed to underpin the neurological differences between the conditions.

Relations to mental illness and drug use

Flashbacks are often associated with mental illness as they are a symptom and a feature in diagnostic criteria for posttraumatic stress disorder (PTSD), acute stress disorder, and obsessive-compulsive disorder (OCD). Flashbacks have also been observed in people suffering from manic depression, depression, homesickness, near-death experiences, epileptic seizures, and drug abuse. Some researchers have suggested that the use of some drugs can cause a person to experience flashbacks ; users of lysergic acid diethylamide sometimes report "acid flashbacks". While other studies show that the use of drugs, specifically cannabis, can help reduce the occurrence of flashbacks in people with PTSD.

In popular culture

The psychological phenomenon has frequently been portrayed in film and television. Some of the most accurate media portrayals of flashbacks have been those related to wartime, and the association of flashbacks to Post-traumatic Stress Disorder caused by the traumas and stresses of war. One of the earliest screen portrayals of this is in the 1945 film Mildred Pierce.