

# **Amnesia**

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Amnesia is defined as the total or partial loss of memory. There is considerable heterogeneity regarding amnesic syndromes. Reports of several types of amnesia can be found in the literature to this date and there is also great diversity in the neuropsychopathology of amnesia. Amnesic syndrome can be observed in several pathologies and its onset is progressive or sudden, transient or permanent. In short, it is important to consider the etiological, organic, progressive and clinical criteria in amnesia classification.

## **Semiology**

### **Anterograde Amnesia**

Anterograde amnesia refers to a deficit in encoding new information subsequent to a given and specific event in time, for instance trauma due to an accident or the onset of brain damage. Consequently, new information cannot be or is partially retained by the individual, which leads to a learning disorder. This type of amnesia can be partial (some of the information is forgotten), and often underlies the individual's subjective complaints; or total, and is therefore characterized by the individual's inability to recall daily life activities or progressive loss of information. The assessment of anterograde amnesia is performed via an interview, by asking questions on recent events or by formally testing the delayed recall of stories, words, objects or drawings. The individual is most likely to forget in conditions of interference.

### **Retrograde Amnesia**

Retrograde amnesia refers to the loss of information preceding a specific event in time or the onset of brain damage. Consequently, the individual is unable to get his/her memories back or recall past events. This type of amnesia can manifest itself in an acute or progressive fashion, affecting the memories of events that had occurred a few minutes, days, months, or years prior to the sudden or progressive onset of brain damage. A temporal gradient can be observed in memory recall, which is characterized by a higher resistance to the oldest memories. This type of temporally graded recall is found, for instance, in aging disorders. It is more common to observe anterograde amnesia in the absence of retrograde amnesia, or with short-term retrograde amnesia, ranging from a few minutes to a few hours. It is, however, rare to clinically observe retrograde amnesia in the absence of anterograde amnesia. Anterograde amnesia affects personal and contextual memories (episodic memory), and rarely general knowledge and automatic learning (procedural learning). The interview with patients, assisted by a significant other, allows

tracking back memories and information they can recall about them. Considering its autobiographical nature, this type of issue is hardly objectifiable.

## **Clinical Diversity**

As previously mentioned, several causes may explain memory disorders. Amnesia is often associated with bilateral dysfunctions in the medial temporal and diencephalic regions. The clinical dissociations between retrograde and anterograde amnesia highlighted distinct anatomical patterns in the structures involved in the recall of old events and learning of new information. Damage to hippocampal structures show evidence of anterograde memory disorders while lesions in the diencephalic structures (mamillary bodies and/or thalamus) lead to difficulties in retrograde memory recall (Warrington and McCarthy 1988). Various pathologies are causing deficits in retrograde or anterograde memory, including anoxia, aneurism, strokes, brain tumours, herpes simplex, head injuries, dementia, Korsakoff's syndrome, and progressive amnesia associated with dementia. Amnesia can also occur after an epileptic disorder or a surgical intervention involving diencephalic regions.

### **Post-Traumatic Amnesia**

Post-traumatic amnesia refers to the loss of memory of the traumatic event or the accident, and events subsequent to the trauma. Consequently, the patient is unable to recall the accidental fact, shows retrograde amnesia of variable duration, and sometimes short-lasting retrograde amnesia (a few minutes to a few hours). Retrograde amnesia may last longer according to the severity of head injury. The persons in a state of post-traumatic amnesia looks confused, disoriented at the spatio-temporal level, and sometimes even agitated. They are unable to encode new information and present severe attention deficits, as well as significant impairments of judgment and introspection. Individuals with post-traumatic amnesia occasionally report some memory pockets. The intensity of head injuries is often correlated with the duration of the post-traumatic amnesia. In the worst cases, post-traumatic amnesia may last several days, even weeks. Many studies have shown evidence of the prognostic characteristics of duration in post-traumatic amnesia; amnesia of longer duration would be the predictor of a less favourable outcome in persons with head injuries (Zafonte et al. 1997; de Guise et al. 2005). The period of post-traumatic amnesia ends when the individual is capable of expressing temporal continuity. The duration of post-traumatic amnesia can be assessed through a standardized tool, such as the Galveston Orientation and Amnesia Test, which involves asking several questions to the patients, such as their name, the current date, day, year, location, etc. (Levin et al. 1979).

### **Transient Global Amnesia**

This type of amnesia is characterized by an isolated disorder in the short-term memory or by total anterograde amnesia and short-duration retrograde amnesia going back a few hours before the onset of the disorder. Retrograde amnesia may also affect older isolated biographical memories. The patients are temporally disoriented but do not show any sign of behavioural or intellectual disorder. However, they will forget events that were just encoded or learned (anterograde amnesia). The patient becomes brutally amnesic and

confused, obsessed, anxious and often shows physical symptoms, such as headaches, nausea, and sometimes vomiting. These memory disorders completely disappear, are rarely recurrent and their causes are diverse, sometimes hardly identifiable (sudden changes in temperature, intense physical activity, emotion). Finally, following this episode, the individual is unable to recover the events associated with this period and stays in an amnesic state, which may last a few minutes up to a few hours.

### **Isolated Retrograde Amnesia (Psychogenic Amnesia)**

This type of amnesia is linked to the inability to recall unpleasant or traumatizing facts tinged with emotional overload, such as the loss of a loved one. This is due to the opposition of an unconscious mechanism to the recovery of specific memories. In the worst and rare cases, total retrograde amnesia is reported without sign of a significant disorder in the anterograde memory. Individuals are unable to recover their past, even their identity in some cases. This type of amnesia is most frequently observed in individuals with psychiatric disabilities.

## **Amnesia Rehabilitation**

Many rehabilitation techniques are actually used to treat amnesic individuals, especially those who suffer from anterograde amnesia. Interventions may focus on the use of compensatory techniques, such as computers, beepers, written notes, diaries or through intensive training programs involving the active participation of the individual, as well as his/her family and friend circle. In this perspective, environmental adaptation techniques are used, such as the compensatory technique education to training (exercise), organizational strategies, visual imagery and verbal labelling. In addition, other techniques are also used in rehabilitation, such as implicit tasks, speech, and mnemotechnic methods (Cicerone et al. 2000). So far, it has been proven that education techniques of compensatory strategies for memory disorders are effective in individuals with minor traumatic brain injuries (Gordon et al. 2006). In moderately or severely injured individuals, the most effective interventions are those appealing to external aids, such as reminders in order to facilitate particular knowledge or skill acquisition. The purpose of these external aids is to enhance the individual's functional level rather than the memory function per se (Cicerone et al. 2000). Reality orientation techniques are also considered in confused individuals with deficits in the retrograde and anterograde memory, as well as spatio-temporal disorientation. Their purpose is to enhance orientation using stimulation and repetition of the basic orientation information (Corrigan et al. 1985). These techniques are applied on an individual (informal approach) or a group basis (formal approach) and have been used in populations of patients primarily presenting with dementia and head-injured patients (Zencius et al. 1998; de Guise et al. 2005).

## **Conclusion**

Clinically, amnesia is seldom an isolated neuropsychological disorder. It is clinically observed in conjunction with other symptoms. For example, confabulations (fabulations) are observed in amnesic individuals as an attempt to fill the gaps or oversights with more or less realistic reconstitutions of old or recent memories, which is often the case in

individuals with Korsakoff's syndrome. Moreover, amnesia can be accompanied by unawareness of one's own impairments (anosognosia), in which persons are unable to realize the existence of their memory disorder or the impact it has on their daily living. Also as previously mentioned, there may be a period of spatio-temporal disorientation and confusion added to amnesia. In short, amnesia is rarely observed in an isolated fashion and several neuropsychological disorders are most likely to manifest themselves simultaneously, making the clinical presentation even more complex. It is critical to perform a formal and exhaustive assessment to have a good understanding of memory disorders and patients' subjective complaints in order to provide interventions tailored to address their needs.

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