

## **Autobiographical memory and its meaning in selected mental disorders**

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### **Summary**

This paper presents the general characteristics of the phenomenon of autobiographical memory (AM), the current knowledge of the subject and describes hitherto identified distortions of AM in mental disorders.

AM is the part of memory concerning the personal past of an individual. It includes episodic and semantic memories associated with an identity. It affects an activity and structuring of goals, it is set in human experience and emotions and it helps in creating plans. The evolutionary significance of AM is probably to facilitate short-term goal-oriented behaviors by comparing them with the previous ones. People with AM disorders often have difficulties in social functioning.

The disorders of emotional life and affect, which are present in most psychiatric disorders, deform AM. It was confirmed, inter alia, in post-traumatic stress disorder, depression, autism, schizophrenia, and alcohol dependence syndrome. Overgeneral memories (the inability to recall memories that are fully filled with details) being typical of depression, and flashbacks (the involuntary recall of memories which are highly filled with visual-sensory content) being characteristic of PTSD are considered one of the most studied deficiency of AM.

The study of AM potentially carries many cognitive and clinical implications. It may facilitate the prediction of the onset of a depressive episode in patients at risk; it can also help to develop psychotherapeutic techniques which are helpful in its treatment, which has in part already taken place. Few studies relate to neurofunctional changes in AM and they need a follow-up.

**Key words:** autobiographical memory, depression, psychotic disorder

## Introduction

Autobiographical memory (AM) is the part of the memory concerning the personal history of an individual. It includes episodic and semantic memories associated with an identity. It affects the activity and the construction of goals, it is set in human experience and emotions and it helps in creating plans. It defines “who we are, who we have been, and, importantly, who we can yet become”. It is probably already present in the animal world. According to Conway, the evolutionary significance of AM is probably to facilitate short-term goals oriented behaviors by comparison of them with the previous ones [1, 2]. People with impaired AM (as in presented mental disorders) often have difficulties in social functioning.

The pioneering years of research on AM are the last 2 decades of nineteenth century. Hermann Ebbinghaus examining the memory of meaningless material (sets of 3 syllables) set the curve of forgetting. He has also dealt with a meaningful memory material (fragments of literature), which led him to the conclusion that we get answers “contaminated” with personal memories to such an extent, that there is no way to interpret them. Sir Francis Galton, in turn, applied cue-word technique, discovering the quantitative restriction in the range of recalled memories and the dominant visual character of memories. On the other hand, Theodor Ribot began to explore the distortion of memory in neurological deficits. At the beginning of the twentieth century emerged a new behavioral paradigm of psychology based on the model of the natural sciences, which focused on observable results, not “ephemeral” ones as AM. The rediscovery of AM is the last 30 years [2].

### Concept of autobiographical memory

AM is formed about 24 months of age. According to the concept of Conway and Pleydell-Pearce it consists of autobiographical knowledge base and working Self.

- I. Autobiographical knowledge base contains the information about the self (i.e., the cognitive and affective representation of one’s identity and self as the subject of experience) concerning the past, the present and the future. Its components are: autobiographical knowledge and episodic memories. Episodic memories are characterized by visual nature, despite being a response to various experiences (sensory, perceptual, conceptual and affective ones), and by linkage to currently active goals and thus the latest experience. This latter feature is of particular importance in mental disorders such as PTSD (post-traumatic stress disorder) [1–3].
- II. The working Self consists of: conceptual Self which is the set of beliefs and evaluations about oneself, Self-images which are forming a “working” concepts of the Self. The goals of the working Self are the reduction of discrepancies between an actual Self, an ideal Self (our desires) and an ought Self (moral and behavior standards) through negative feedback loops. In addition, there is goal hierarchy,

which is making the most accessible these aspects of knowledge that relate to them – the relationship between these two systems is mutual [1–3]. In summary, the current life experiences form the content of AM, and the information, which is located in it, affects the understanding and appropriate implementation of plans and activities related to them in the actual reality (Figure 1).

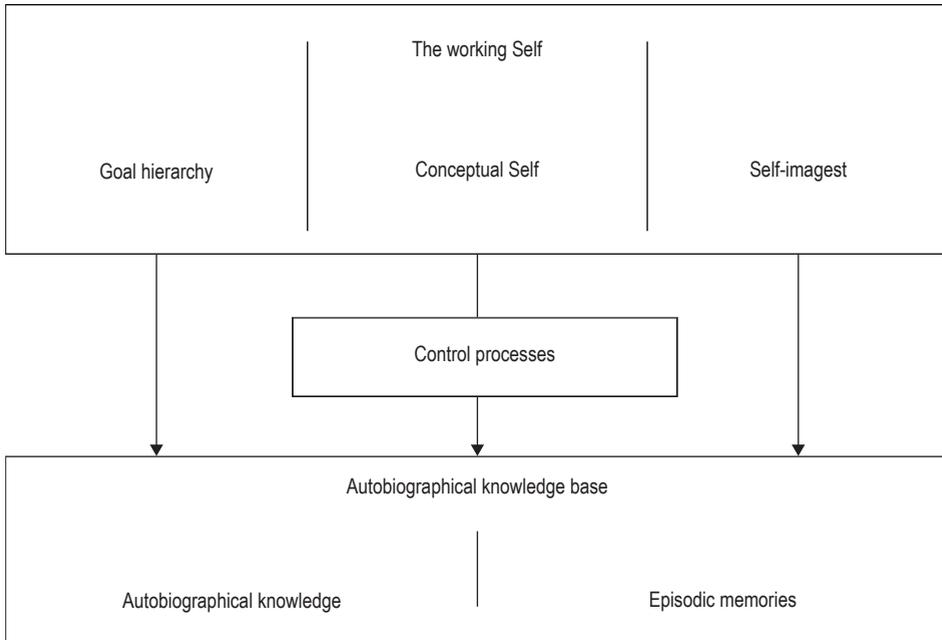


Figure 1. **The relationship between the working Self and the autobiographical knowledge base**

Based on Conway and Williams [2]

The following phenomena are associated with AM:

- childhood amnesia, that is an inability to recall episodic memories from the period of less than 2–4 years of age. It probably results from an ongoing and unfinished process of development of frontal lobes and the absence of cognitive representation of the Self which is allowing to encode experience [1];
- reminiscence bump, that is the greatest availability of memories from the period between 10 and 30 years of age, which can be observed in people over 35 years old. It is distinct in the case of memories which are positive and important for an individual, less – in the case of difficult and traumatic memories [4, 5]. This asymmetry of memories is explained by the interaction of two factors – a greater

decrease in a negative affect over time and a facilitated access to more intense emotional events, which results in a more frequent recall of situations featured with positive affect. Gabriel Garcia Marquez aptly described it: “the heart’s memory eliminates the bad and magnifies the good, (...) and thanks to this artifice we manage to endure the burden of the past” [6];

- recency, that is the easiest access to the memories of events that took place in the last 24 months [1]. This availability is related to the degree of relationship between these memories and the goals. Memories of these events that are currently highly available in the working Self are recalled the easiest.

Emotions play important role in AM by monitoring the mechanisms of goals and plans formation [1]. There is a tendency against recalling memories of the excessively intense and negative emotional load. A memory material which is particularly highly filled with an affect disrupts the current goal structure, so the Working Self moderates an access to the Knowledge Base – it facilitates or inhibits it – and thus prevents from too emotional memories.

In turn, according to the Bower’s network theory, events are represented as the configuration forming the network of nodes in a cognitive system, which are interconnected by various relationships and activated by stimuli associated with them, such as verbal, visual and – what becomes important in psychopathology – emotional, often even only the mood of a patient. These elements which affective content is consistent with a current emotional state are easier to evoke, which for example can cause the recall of negative events in depression, creating a vicious circle maintaining the negative perception of reality. There is a tendency for easier activation by emotionally positive events in healthy individuals. Routtenberg even suggests that the threshold for activation of negative memories under physiological conditions is higher, due to the connections of the limbic system and reticular formation. The arousal also plays an important role in memorizing the information – a mild stress and the secretion of corticosteroids associated with it facilitates remembering, however, strong stress impairs this process [7–10].

The presented concepts of AM are temporary and likely to be changed or specified. Nevertheless, there is some evidence for their emplacement in neuroanatomy. For example, the neurological data suggest that an autobiographical knowledge and episodic memories are not merely theoretical constructs. They are located in different places of a brain, for the loss of memories with the maintenance of the basic foundations of autobiographical knowledge is possible in many conditions (e.g., after stroke) [3].

So far, AM studies in Poland were conducted on healthy subjects. Rybak has shown that memories were localized asymmetrically on a timeline. Happy and important events were placed early in life; the memories of sad experiences were placed in an assorted way. This was marked most in the oldest age group [5]. Fijałkowski

and Gruszczyńska, i.a. confirmed the hypothesis of the easier activation of memories with positive cues [11]. The positivity effect is further demonstrated in studies of Gawinecka et al., where the change in emotional intensity of memory material in time concerned mainly negative memories – it decreased at first and then increased. This may indicate the reduction in an emotional control or so-called ironic effects of a control, i.e., the greater availability of a content that one is consciously trying to suppress [12]. In turn, Rzepa showed, i.a. that memories occurring the most frequently are characterized by clarity and an unambiguous emotional load [13], and Rzepa and Leoński indicated an emotional intensity as an element enhancing memory accuracy [14]. The study of Ziółkowska, concerning the flash memory, i.e., memories which are vivid, sensory, persistent and important to the individual, also pointed to the distinctive level of emotional intensity and the personal meaning attributed to them [15].

#### Autobiographical memory phenomenon in selected mental disorders

In the light of information presented in the introduction it is apparent that the abnormalities of emotional life and affect, which are present in most psychiatric disorders, will deform AM. It was confirmed i.a. in post-traumatic stress disorder, depression, autism, schizophrenia or alcohol dependence syndrome. It is also important to distinguish the dysfunction of AM in the course of mental disorders, which are the subject of this article, from disorders of general memory processes such as focal brain damage, brain injuries or degenerative changes [16].

Autobiographical memories associated with clinical disorders often take an extreme intensity. Both, the excessive emotional intensity and the distinctiveness of memories (e.g., in PTSD) as well as their depletion (e.g., in depression) have a maladaptive impact on the functioning of an individual [1]. Moreover, these de facto opposite phenomena may be present simultaneously. PTSD beyond intrusive, that is recurrent and unwanted memories associated with trauma, is accompanied by the decrease in the specificity of other memories. Whereas in depression, in which overgeneralization of memories is typical, there may be distinct memories of intrusive and ruminative nature.

#### Mood disorders

In the case of depressive disorders overgeneral memories (OGM) are observed, which are more frequently considered as the risk factor and the marker of the disease at the same time [17]. Depressed people are not able to recall fully detailed memories, though they generate so-called categorical memories much easier [1, 18]. These are not filled with the details to the extent that it occurs in a “complete” memory – they have a more semantic character. Their incomplete nature is caused by the tendency to

ruminate, associated with the activation of generalized Self schemes, reduced executive resources and the mechanism of excessive inhibitory control over the construction of memories, aimed to protect an individual from the access to the knowledge which can lower mood and disturb the current structure of goals [19]. They are also explained by strategies of dealing with emotions that in people with depression are largely based on avoidance and suppression [20]. It causes the limited processing of memory data by cognitive processes and its worse integration in cognitive schemes. The memory material itself is encoded in a less detailed way and with less number of sensory details [21]. OGM are also associated with poor functioning in other areas: reduced ability to solve problems, difficulties in creating detailed representations of future situations and longer recovery from episodes of mood disorders [19].

It happens that intrusive memories co-occur in people with depressive disorders. It can be associated with the failure of inhibitory control system after contact with a highly specific stimulus that can suddenly cause a specific memory. Such a stimulus is strongly associated with a situation from the past or it concerns currently relevant issues and it is directly related to goals in the working memory. Then additional resources may be necessary to inhibit the construction process of memory, which are diminished in depression. Lack of effective inhibition results in intrusive memories [1].

The study of Raes et al. leads to the conclusion about the relationship of OGM and the functioning of cognitive processes in depressive disorders. It proved the positive correlation of memories' specificity with the performance in tasks testing working memory, central executive functioning and source memory that is the context of acquired information. It was not, however, associated with tasks related to semantic and episodic memory. Thus OGM are dependent on other cognitive processes, but should not be considered only as the reflection of more general memory deficits present in depression [22].

OGM occur not only in patients with a full depressive episode, but also in people with a dysphoric mood, high levels of stress and neuroticism, which are often risk factors for depressive episode. Kuyken and Dalgleish showed that in the group of adolescents (14–18 years) with elevated level of neuroticism. The level of neuroticism correlated with OGM formed on the basis of negative cues, but not of positive cues, while depressive symptoms were mediator of this relationship. This may be due to the above-described strategies of coping with negative emotions by their avoidance and suppression [23]. Data on this issue is also provided by Sumner et al. study on adolescents who had experienced depressive episode (16–18 years). It indicates that OGM in interaction with chronic interpersonal stress is the predictor of depression recurrence. Fewer specific memories along with high levels of stress were associated with the onset of a depressive episode during the 16 months after the study. Interestingly, the level of stress itself was not a predictor of depression –

it was important only in the interaction with OGM. In addition, the most important was the impact of chronic stress associated with interpersonal relations (e.g., lack of social support, neglectful parents) and not with other areas of functioning, such as academic performance [24].

People with dysphoria have also an unusual memory affective fading bias. Negative memories fade slower, while the positive memories – faster, which is the reversal of what takes place in general population [25, 26]. Thus, dysphoric people better remember negative memories due to the fact that they remain emotionally distinctive, and worse – positive ones, which affective intensity decreases. Due to this cognitive pattern, they have a distorted image of their own past, in which negative events often seem to dominate.

Deviations in the AM sphere are also present in people with suicidal tendencies. Williams and Broadbent compared patients after suicidal drug overdose to people hospitalized due to physical ailments and those not remaining in a hospital. Various aspects of their emotional state were inspected – people in the group after suicide attempt were much more emotionally loaded – they described occurrence of fatigue, tension, anger, depression, confusion, worrying, rumination and reduced energy in themselves. There were people of different diagnosis in this group, but the mental state before the suicide attempt was assessed as meeting the criteria for a depressive episode in the case of most of them. They recalled memories in response to positive word stimuli more slowly than respondents from the two control groups, but slightly faster than in the case of negative stimuli. Also the proportion of OGM in their case was higher than in control groups (both for positive and negative cues), and more non-specific memories occurred in response to positive stimuli. Thus, in subjects after a suicide attempt, which are experiencing various types of emotional disorders, also AM distortions associated with its lower specificity are present [18].

### Posttraumatic Stress Disorder

One of the major symptoms of PTSD – included in the diagnostic criteria – is the phenomenon of repeated involuntary recall of memories, highly filled with visual-sensory content, called flashbacks. Memories are of fragmented and disorganized character. Their sensory and separated from emotions nature causes that they do not form a verbal narrative included in autobiographical knowledge [27, 28]. However, in PTSD OGM also occur. Robinson and Jobson study has shown that older people after trauma experience undergo significant difficulties and discomfort associated with the remembrance of stressor and avoiding the circumstances reminding of it. They were also less able to recall any specific memories compared with the control group [29].

Brewin et al. suggest that the emotional processing of traumatic events memories can lead to their integration in the cognitive system of a sufferer. It is the most adap-

tive solution to the problem. However, it occurs only in favorable circumstances, such as the relatively little discrepancy between the information that was associated with a traumatic event and the earlier vision of the world, the adequate cognitive development of an individual (lowered IQ and previous head injury are risk factors), a sufficient social support and the ability to tolerate the intrusive sensory memories reaching consciousness by an individual [30]. In less favorable conditions it may lead to either chronic emotional trauma processing, when the complete integration of memories of traumatic events is not possible to achieve, or to the premature inhibition of memories' processing. This inhibition is the result of repeated efforts to avoid recalling unpleasant memories, which after some time becomes automatic. In this case, even though a person may give the impression that he or she has dealt with trauma, unprocessed memories are susceptible to reactivation, later in life when an individual finds themselves in a similar situation or emotional state resembling the traumatic event [31].

#### Autism spectrum disorder

Although the diagnostic criterion for autism spectrum disorder (ASD) does not include memory impairment, studies show that its occurrence is quite common in these patients. Episodic autobiographical memory distortions and reduced self-reference effect, which is a better memory of information about oneself compared to the neutral material, can be observed. These phenomena are explained by reduced psychological knowledge about oneself in individuals with ASD [32].

The study of Crane et al. also revealed the decrease in specificity of memories in people with ASD and a slowdown in their recall. Their results suggest a quantitative difference – when people with ASD were able to recall memories, they did so in a manner qualitatively similar to those in the control group [33].

#### Schizophrenia

Also in the case of schizophrenia distortions of AM, associated with the abnormal sense of identity and its formation, were found. Reduced memory specificity and, especially in the case of the onset of clinical symptoms, deficits in episodic and semantic memory associated with the personal past of an individual, were noted. Less frequent recall of personal memories comparing to those related to public events is also indicated [34]. There is also the earlier period of reminiscence bump compared with the control group [35].

### Alcohol dependence syndrome

The issue of AM in alcohol dependence syndrome should be looked at from two perspectives: 1. specific psychological disorders accompanying it (the lack of insight into the essence of the disease and the denial of its existence); 2. one of the major complications of the illness – amnesic syndrome, this means Korsakoff's syndrome.

In the latter it comes to the inability to save fresh memory traces, which automatically “amputates” the nearest events in time from AM. Indeed, in the studies of currently abstinent alcoholics distant past is remembered better than more recent one and the recall of memories from adolescence is increased. Some of the participants of Fitzgerald and Shifley-Grove's study did not have the memories of the last 15 months, which – as mentioned – should be the most accessible ones. The memory functioning of alcoholics can be located on a continuum with people suffering from Korsakoff's amnesic syndrome. In alcoholics without Korsakoff's syndrome this tendency is not so extreme, but the availability of current events is reduced – the correlation between the percentage of memories from last year and years of alcohol abuse after eliminating the effect of age in that study was – 0.36 [36]. Additionally the lack of consistency between the frequency of experiences and recall speed of this type of memories was discovered. Respondents were asked to assess the frequency with which they experience various positive, negative and neutral emotional states. In the case of alcoholics – in contrast to a control group – the assessed frequency of events was not correlated with the availability (recall rate) of particular memories. This suggests the deficit in the encoding of event frequency in alcoholics, impairing the formation of the adequate picture of reality. This deficit and the construction of Self-image and one's own life on the basis of an experience from an early adulthood may partially explain the difficulty of alcoholics in functioning in social environment [36]. Attention should be also paid to the different course of memory processes, associated with the phenomenon of reward-associated learning [37]. The occurrence of different types of neuroadaptation to psychoactive substance (like alcohol) is the basis of changes in long-term associative memory and production of implicit drug-associated memories. This can affect the development and maintenance of addiction, and the stimulus associated with the psychoactive substance can cause a relapse after many years of abstinence. This phenomenon was described in 1973 by Abraham Wikler in relation to opiate addicts as so-called conditional abstinence when only the memories of the situation concerning the period of intoxication cause an abstinence syndrome after many years [38].

OGM were reported in the development and sustaining of alcohol dependence syndrome similar to that found in depression [39]. Study of D'Argembeau et al. indicates that it is mainly due to the hindered access to specific memories, but not the overly general content of memory material itself, which may result from changes in the functioning of frontal lobes. They direct the access to specific memories located in posterior regions of temporal and occipital lobes through more abstract memory mate-

rial situated in the anterior fronto-temporal regions. Their damage may be associated with the termination of the retrieval of information at an earlier stage, i.e., on more general memories. Alcoholics compared with control group recalled specific memories less frequently, general memories – more often. However, once they have managed to elicit specific memories, they were equally distinctive, i.e., filled with sensory and contextual details as in the control group [1, 40].

Table 1 presents the distortions of AM in selected mental disorders.

Table 1. **The distortions of autobiographical memory in selected mental disorders**

Mental disorders	AM distortions
Mood disorders	overgeneral memories intrusive memories atypical fading affect bias of memories
Posttraumatic Stress Disorder	overgeneral memories flashbacks (intrusive memories of trauma) chronic emotional trauma processing premature inhibition of memories' processing
Childhood autism	overgeneral memories reduced self-reference effect reduced rate of memory recall
Schizophrenia	overgeneral memories deficits in episodic and semantic memory increased ratio of public events' memories to personal memories earlier reminiscence bump
Alcohol dependence syndrome	overgeneral memories increased reminiscence effect deficit in event frequency encoding implicit drug-associated memories hindered access to specific memories

### Clinical implications and directions for further research

Treating OGM as the marker of depressive episode appears to be justified because they undergo a reduction during its treatment. In the study of McBride et al. the proportions of specific and categorical memories in people suffering from depression, which were then subject to cognitive-behavioral therapy or pharmacotherapy, were tested. In both treatment groups the number of specific memories increased and the number categorical memories was reduced, a greater effect being observed after cognitive-behavioral therapy [41].

The method of improving the specificity of autobiographical memory, so-called MEST (Memory Specificity Training), which combines the psycho-education about changes in memory functioning in depression with exercises improving the recall of more specific, filled with sensory details and vivid memories, was established. In the study of Ranjbarkohan et al. women with depressive symptoms were subjected to 10 weekly sessions of cognitive-behavioral therapy or 6 sessions of MEST. In both groups the memory specificity increased, but the effects were greater in the case of applying MEST [42]. In the study of Neshat-Doost et al. some adolescents with depressive episode were subjected to 5 weekly group MEST sessions. Eventually, they have obtained the higher rate of specific memories and lower levels of depressive symptoms compared with the control group [43].

The pathophysiology of AM phenomenon was initially studied with electroencephalography and functional neuroimaging techniques. At the beginning, during the early phase of the memory retrieval, an extensive activation was observed in a left frontal lobe, an anterior temporal lobe and to a lesser extent in right frontal sites. At the time of memory retrieval an increased bilateral activation in the posterior part of temporal lobes and occipital lobes occurred. It was particularly noticeable in the case of distinct, important and vivid memories and most marked in the right hemisphere. Then there was activation in a right frontal lobe, the back of a right temporal lobe and an occipital lobe on both sides, when the memory was kept in mind. During the removing of a memory (forgetting) there was a large and comparatively lengthy P300 with a growth of positivity in central-parietal regions of a brain and the areas of the right hemisphere [1, 44]. Neuroimaging techniques illustrate also the dual representation of memories, which is present in the symptomatology of PTSD [31]. The verbally available parts of the memory are encoded in the left hemisphere, while the right hemisphere is responsible for memories that can be experienced affectively or visually. Areas of right temporal pole also play an important role in the processing of memories, mediating the construction of memories and keeping destabilizing knowledge away from the consciousness, for example the memory of traumatic events [1]. Summarizing, the areas responsible for AM are the functional rather than anatomical structures – they are located in various areas of the brain.

AM is associated as much with a cognitive as with an emotional aspect of human functioning. In the light of the current data, the knowledge about both content and processual aspects of AM seems to be a valuable source of information supporting the process of diagnosis and treatment of people with mental disorders.

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