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Dissociation, Memory and Trauma Narrative

1. Introduction

Memory has interested both scientific researchers and writers for centuries. The ability to remember things from the past has been viewed not only as a cornerstone for an individual's consistent feeling of trans-temporal identity (at least in highly industrialized and individualized countries), but also for preserving a group's identity and values. (»Je me souviens« – *I remember* – is the official motto of the province Quebec of Canada). While some authors perceive the ability to memorize and recall things as a high virtue, others emphasize that an important ingredient of the well-being of an individual is the optimal balance between remembering and forgetting (Luria 1987; Hacking 1995). In Greek mythology, drinking from the river Lethe leads to forgetfulness, a potential ailment for traumatic experiences. In other mythologies or stories the same happens if people enter valleys or plains of Forgetfulness. New research attempts nowadays to discover drugs that can soothe people who suffer from recurrent disturbing traumatic memories, by weakening their memories via interfering with their consolidation or post-retrieval consolidation (Brunet et al. 2008).

People have been aware for a long time that memory in fact is not reliable, but may be subject to various distortions and biases (Kühnel/Markowitsch 2009). Each act of remembering may be viewed in a way as an act of re-transcription (›Nachträglichkeit‹), re-categorization and to some degree imagination (Modell 2006). Various forms of illnesses accompanied by memory impairments are described in neurology and psychiatry; all of them demonstrate in how many ways remembrances and newly encoded events are modulated and changed by different own previous remembrances as well as by environmental influences. Sigmund Freud was among the most prominent writers on memory distortions, subconscious forms of remembering and trauma-related memory problems (Breuer/Freud 1895). Freud's work also constitutes a good example on how memory is influenced by cultural context and various forms of illnesses, especially psychic ones (Freud 1898; 1899; 1901a; 1901b; 1910; 1921). His case studies of trauma might in fact be seen as precursors of a literature that imposed itself after the second World War and was substantially inspired by the Holocaust experiences – the

JLT 6:1 (2012), 103–130 DOI 10.1515/jlt-2011-0012

literature of testimony. Subsequent events such as the Vietnam War, the Gulf War, the failure of the communist Eastern block or the tragic September 11th event and its aftermath further spurred the awareness for trauma worldwide and inspired a number of autobiographical writings and autobiographical fiction where traumatic experiences are narrated in a variety of styles. These writings are considerably influenced by the cultural context, culturally and personally shaped models of trauma and illness, degree of acculturation (as partly estimated by language proficiency), personal experience and personality characteristics and nonetheless by the personal understanding and knowledge of discoveries in the sciences of memory, which have increasingly been »leaking« into the world through the means of the media (Clark/Chalmers 1998).

2. The Disunity of Memory

Memory was seen as unitary by most psychologists and neuroscientists until about 30 or 40 years ago. At that time Tulving (1983) wrote a very influential book on episodic memory that can be seen as a breakthrough for conceptualizing memories as being classifiable into different systems, which are processed by different brain networks. Nowadays, Tulving breaks down long-term memory in five systems, which are depicted in Figure 1 (Markowitsch/Staniloiu 2011a; 2011b).

These memory systems are considered to have evolved phylogenetically from a simple procedural memory system that does not require conscious reflection (on the left in Figure 1) to a highly complex episodic-autobiographical memory (on the right in Figure 1). The same sequence which can be found phylogenetically is also encountered ontogenetically: Children start with learning certain motor acts and such acts are also learned during later childhood and youth (e. g. , riding a bike, skiing, playing tennis or chess). The next memory system – priming – is devoid of the need for conscious reflection (›anoetic‹) as well. We constantly perceive numerous stimuli and signals from the environment, but do not pay attention to most of them. Nevertheless, many of these stimuli are processed in the brain and stored and if we again perceive these stimuli (or related ones) at a later point in time, we may react more strongly to them than to other stimuli or signals that are seen for the first time. In fact, much of our life may be guided by priming. On the conscious level (›noetic‹), the phylogenetically oldest memory system is perceptual memory that acts on a pre-semantic level and may allow us to identify an apple no matter whether it is yellow, red or green and to distinguish it from other similarly looking fruits such as pears or peaches. Semantic memory – which is also termed ›knowledge system‹ – is context-free and refers to general facts, which we have learned in school or posses as knowledge of the world. It is considered to be noetic as well. The most complex memory system is the episodic-autobiographical memory system, which requires the synchronization of cognition and

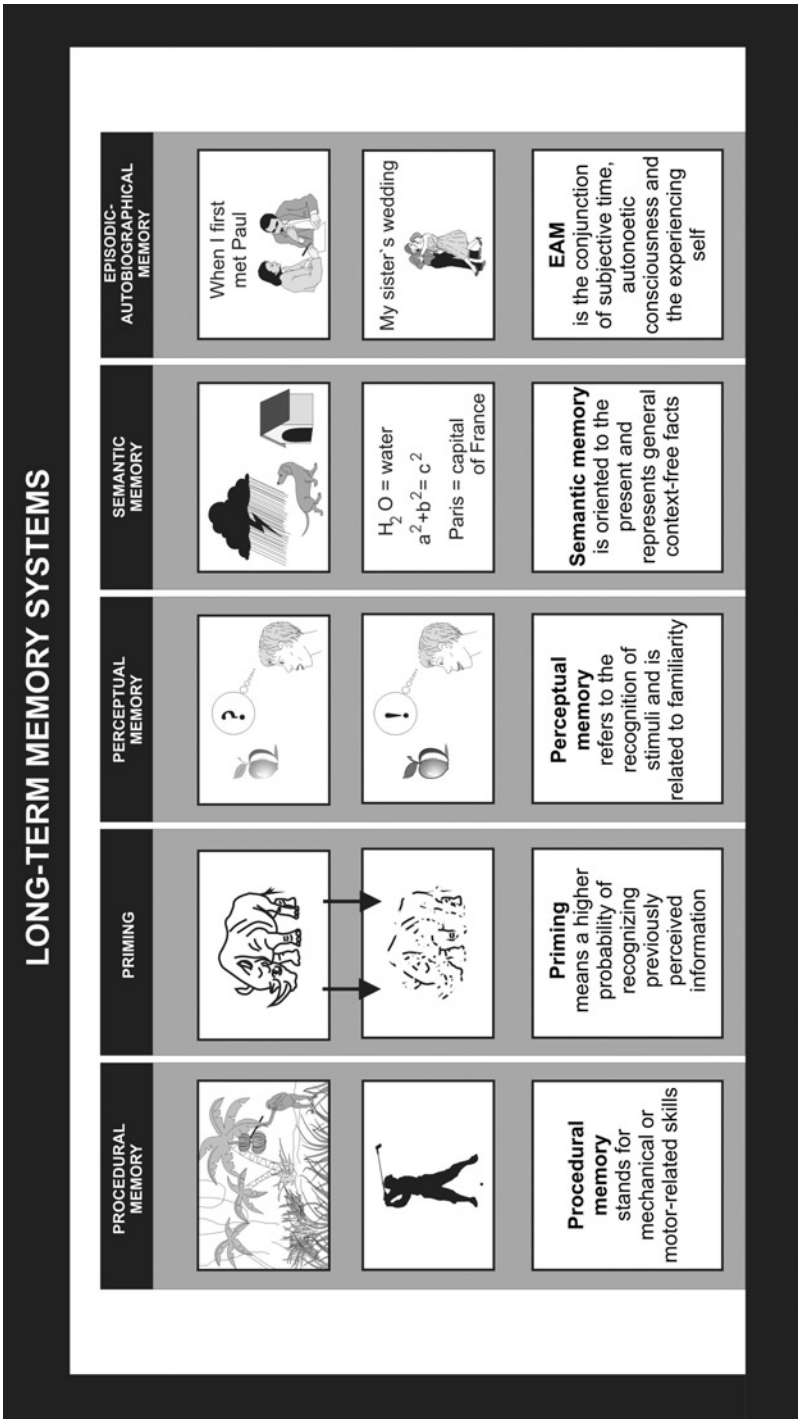

Fig. 1: The five long-term memory systems and their assumed brain bases.

emotion-processing regions in the brain. Currently the episodic-autobiographical memory is viewed as the conjunction of subjective time, autonoetic consciousness and the experiencing self (Tulving, 2005). The terms autonoetic (›self-conscious‹, or ›self-aware‹), noetic (›aware‹) and anoetic (›not-aware‹) were introduced and elaborated on by Tulving (1995). In comparison to noetic consciousness, autonoetic consciousness represents a more highly situated form of consciousness, being construed as the »capacity that allows adult humans to mentally represent and to become aware of their protracted existence across subjective time« (Wheeler/Stuss/Tulving 1997, 335). This is also referred to as chronesthesia »defined as a form of consciousness that allows individuals to think about the subjective time in which they live and that makes it possible for them to mentally travel in such time« (Nyberg/Kim/Habib/Levine/Tulving 2010, 22357).

The episodic-autobiographical memory system is context-specific with respect to time and place. Through the medium of autonoetic consciousness, it enables subjective mental time travel and re-experiencing of a personal event by attaching an emotional flavor to it. Examples of personal events are the last vacation or the dinner of the previous night.

The episodic-autobiographical memory system is acquired the latest during childhood (Nelson/Fivush 2004) and is arguably uniquely human. Piolino, Desgranges, and Eustache (2009) suggest that mental time traveling is one of the last features of the episodic-autobiographical memory system that becomes fully functional, but the first feature that is affected in most amnesic conditions. Within the episodic-autobiographical memory system it is also of importance on which cues a person relies for triggering old events.

Although the designations ›autobiographical‹ and ›episodic‹ are sometimes used interchangeably, not all autobiographical memories are, however, episodic. A distinction is made between autobiographical-episodic and autobiographical-semantic memory. The latter refers to personal knowledge, such as one's name or date of birth and might be preserved, relearned or updated in spite of blocked access to episodic-autobiographical memory (Klein/Gangi 2010).

3. Trauma-Concept and Manifestations

The traditional definition of trauma as described in DSM-IV-TR (2000) has been submitted to criticism for a number of reasons. One reason is that it suggests that traumatic experiences have to be perceived as life threatening. Furthermore, the person's response has to involve fear, helplessness or horror. Many people who experience post-traumatic stress however do not think that their experiences were life threatening and might not label these experiences as being a trauma. These may apply to women who experienced neglect or abuse in childhood or are involved in abusive romantic relationships. It may also apply to people with alexythymic traits,

who lack emotional clarity or awareness, or to migrants who escaped societies where trauma is an integral part of daily living. We (Markowitsch and co-workers) encountered several individuals who developed dissociative amnesia after a seemingly minor stressor; a careful history taking revealed a background of repeated traumatic experiences (cumulative trauma) in these individuals, frequently with onset in early life and at times accompanied by a limited emotional awareness in the face of ongoing stressors. These findings might from a biological perspective be explained by mechanisms of kindling sensitization (Post/Weiss/Smith/Rosen/Frye 1995) or a so-called incubation effect (Lupien/McEwen/Gunnar/Heim 2009). The concept of kindling was introduced in psychiatry from epileptology, where it described the process by which repeated sub-threshold stimulation of a brain area eventually resulted in a seizure. In psychopathology kindling could explain, among other things, the observed inverse relationship between the number of experienced depressive episodes and precipitating life events. The incubation effect means that the effects of adversity, which occur during a window of vulnerability (such as a critical period of synaptic organization), do not become evident at the time of adversity, but later (such as when the synaptic organization has been completed). (Synapses form the connections between nerve cells and thereby transmit information.) Spinelli and coworkers (2009) found that early-life stress induced long-term morphologic changes in the brain of monkeys. These findings are congruent with a number of data obtained in human patients.

Labeling an experience as being a trauma depends on personal and cultural conceptualizations of trauma, including culturally shaped explanatory models of illness. In certain societies abuse and violence, especially towards women, are common and expectable and their developmental, emotional and psychological consequences are unnamed, unspoken or underestimated. In Herta Müller's novel *The Passport* (original title: *Der Mensch ist ein großer Fasan auf der Welt*, 1986) a father who is part of the German minority at the time of communist Romania, orders his daughter Amalie to sleep with the officials (a military man and a priest) in order to obtain the family passports to immigrate to Western Germany, which is imagined to be very beautiful. Amalie follows his instructions dutifully. She knows that the father would have no success in continuing to bribe the officials with sacks of flour, and having sex with the officials is a common pathway to exiting to the West in her village. Wives or daughters of neighbors who immigrated all had to do the same. Furthermore, Amalie is no more a virgin anyway. In the view of the small village community, ›whoring‹ with the officials may therefore be less impactful on her. At no point in the novel does Amalie complain or speak about her experience. After getting her passport, on her way to the new glittering West, she sleeps on the train. What Amalie thinks about these events later, the reader never gets to know. The parents return for a visit to the small village in the next year with Ritter chocolates as small gifts, but Amalie does not seem to accompany them. Does Amalie see her past experiences now through a different cultural lens?

Moving from one culture to another can in fact shape trauma perception and conceptualization. Living in a society that incites awareness of trauma by naming, recognizing and destigmatizing it may help survivors of trauma to understand that seemingly disparate or baffling health problems which they may experience might actually be responses to an event that continues to exert negative effects on affect, cognition and behavior and this event is named trauma. Comprehending that memory lacunae, flashbacks or various somatic (physical) symptoms stem from an event that happened in the past might lead to what Modell (2006) called the re-contextualization of health memory. The event is now evoked, emotionally evaluated and re-encoded in a new context. Furthermore a specific meaning is attached to it and it becomes part of a narrative. That narrative may undergo dynamic changes to match specific goals of the self at specific points in time. It might stay within the private self or may get disclosed and even passed on to new generations, becoming part of a larger narrative. The intergenerational transmission of trauma should however not be simply interpreted as a reflection of passing on a linguistic account of trauma. Research findings convey that its underpinnings go beyond that and may have many layers. Data from Holocaust survivors and even on babies of mothers exposed to the World Trade Center attack suggest that the intergenerational transmission of trauma might be partly underlain by transmittable environmentally-driven changes in gene expression via epigenetic mechanisms, leading to abnormal hormonal stress responses across generations (Yehuda/Bell/Bierer/Schmeidler 2008; Yehuda et al. 2005). These data mirror the ones from animal research (Szyf/Weaver/Champagne/Diario/Meaney 2005; Champagne/Curley 2009; Weaver/Diorio/Meaney 2007).

The understanding of how an experience can be traumatizing has varied in the literature. For Winnicott (1971), for example, trauma was not only the introduction of something negative, but also the failure to sustain (hold) a positive experience that may be essential for normal development (the lack of good enough mothering or holding environment) (Mitchell/Black 1995). Overprotection on the other hand may be as damaging as the occurrence of noxious stimuli as it might hinder the personal growth of the child by not allowing the child to experience developmentally appropriate empathic failures (Mitchell/Black 1995; Knappe/Beesdo-Baum/Wittchen 2010). Interestingly, Winnicott's view of trauma has found support from recent findings from animal research. Abnormal stress responses could accompany not only overtly negative early life experiences, but also what appears to be a just normal variation in maternal behaviors. Adult rat offspring of mothers with decreased rates of licking and grooming showed increased anxiety, abnormal stress responses and reduced expression of glucocorticoid receptors in the hippocampus in comparison to offspring of rat mothers with increased rates of such behaviors (Szyf et al. 2005; Champagne/Curley 2009). (The hippocampus is a central region in the brain for learning and memory.) This reduced expression of the glucocorticoid receptor seems to be mediated by an epigenetic

mechanism (involving a chemical reaction-methylation, see below) that allows the environment (in this case maternal care characterized by decreased rates of licking and grooming of pups) to repress gene expression by increased methylation (chemical modification) of the promoter (regulatory part) of the glucocorticoid receptor gene. These findings have significant implications for the nature-nurture controversy surrounding the causality of trauma that has permeated not only scientific writings, but also depictions of trauma in movies and the autobiographical genre. They offer scientific support from the field of neurobiology, genetic and epigenetic (the field that is concerned with studying the environmentally-steered changes in gene expression that occur in the absence of changes in DNA) in favor of a narrowing of the gap between the two poles of the dialectics. They promote a reframing of the nature vs. nurture debate, by showing that the two (nature, such as genes, and nurture, such as environment) are far from being separable, but rather they are intimately interacting in a complex, often synergistic fashion.

Not all individuals who experience a traumatic event develop psychopathological conditions, however. The underpinnings of the resilience in face of the trauma are far from being fully comprehended and constitute a focus of extensive research nowadays. The psychopathological manifestations of trauma are themselves multifarious, ranging from somatic complaints to major depressive disorder and posttraumatic stress disorder or dissociative disorders (dissociative amnesia or fugue or dissociative identity disorders, i. e. a psychogenic caused loss of personal memories and the own identity). The degree to which chronic repeated stress or massive acute stress may affect an individual's homeostasis and lead to psychiatric and/or non-psychiatric disorders seems to depend on a whole gamut of factors, such as genetic dispositions, type of stress, duration of stress, developmental phase, age, gender, context, prior experiences, premorbid personality characteristics.

4. Trauma and the Fracturing of the Self

»Oh, and in case you were wondering? No, I wasn't always such a bitch.«
(Chevy Stevens, *Still Missing*, 3)

Episodic-autobiographical memory has a close connection to self and self-understanding, which is captured by Endel Tulving's (2005) last definition of (autobiographical-)episodic memory. Another central feature of autobiographical memory is its intimate connection with emotions. Traumatic experiences might not only lead to impairments of episodic-autobiographical memory, in the form of flashbacks or amnesia (Schultz 1924), but also to profound changes in personality and capacity for self-consciousness, self-projection and feeling and being with others. It is therefore not surprising that the idea of a fractured or shattered self after a trauma is a frequent motif encountered in autobiographical fictional writings about

trauma (as illustrated above). Research shows that posttraumatic stress disorder conditions related to early stressful life situations might be accompanied by alterations of the default network between the retrosplenial gyrus/precuneus network and the right amygdala (Bluhm et al. 2009) The default mode network contains several brain areas (especially midline cortex) that display high baseline metabolic activity during rest compared to a large range of tasks. It is ascribed functions in mind-wandering, introspection, prospection and episodic-autobiographical memory processing. Abnormal default mode network activity was reported in posttraumatic stress disorder, amnestic mild cognitive impairment (a possible precursor of Alzheimer's diseases) or early Alzheimer's disease and some cases of amnesia.

For more than a dozen years we (Markowitsch and co-workers) studied patients with a specific psychological stress or trauma-related symptomatology. These patients are nowadays subsumed under the heading of dissociative amnesia or psychogenic amnesia.[1] Before they would have been listed under the diagnostic entity of hysteria, a condition Pierre Janet (1907) referred to as a malady of ›personal synthesis‹ or a ›désagrégation mentale‹. The construct of hysteria had traditionally described the occurrence of various constellations of medical symptoms, without evidence of tissue pathology that could adequately or solely account for the symptom(s). Although not the first one who employed the term dissociation (Moreau de Tours 1845) or advanced the idea of a connection between (early) traumatic experiences and psychiatric symptomatology (van der Kolk/van der Hart 1989; Breuer/Freud 1895), it is Janet (1907) who is credited with viewing dissociation in hysteria as being causally linked to unresolved traumatic memories. Janet conceptualized dissociation as »an inability of the personal self to bind together the various mental components in an integrated whole under its control« (Janet 1907, 23). Echoing Janet's view of hysteria and dissociation, dissociative disorders are nowadays regarded in DSM-IV-TR (2000) as disturbances of the integrated organization of memory, perception, consciousness, identity or emotion, which are etiologically linked to psychological trauma or stress. The ICD-10 (1992) grouping of dissociative and conversion disorders under the same heading reflects an older division into psychoform dissociative symptoms (experienced psychologically) and somatoform dissociative symptoms (experienced in the body). These dissociative symptoms can be ›negative‹, in the sense of a reduction in a function (e. g. numbness or decreased sensation, paralysis, mutism, psychogenic blindness, amnesia) or ›positive‹, in the sense of an increase in a function (e. g. psychogenic non-epileptic seizures, hallucinations, flashbacks, hypermnesia) (Oakley 1999).

[1] See Markowitsch/Calabrese/Fink et al. 1997; Markowitsch/Fink/Thöne et al. 1997; Markowitsch/Kessler/Kalbe et al. 1999; Markowitsch/Kessler/Russ et al. 1999; Markowitsch/Kessler/Van der Ven et al. 1998; Markowitsch/Kessler/Weber-Luxenburger et al. 2000; Markowitsch/Thiel/Kessler et al. 1997.

Among dissociative disorders in DSM-IV-TR (2000), dissociative amnesia has as the central symptom the inability to recall important personal information (see below). As episodic-autobiographical memory binds and integrates personal events and emotions with an autonoetic self, the inability to recollect personal events might significantly and pervasively affect one's individual capacity to be with oneself as well as with others. The binding capacity of memory – that is metaphorically conveyed by the etymology of the word re-collection deriving from ›collection‹ that has similar roots as ›colligation‹, which means binding (Casey 2000) – and its importance for the preservation of self sameness over time were already implied by Ewald Hering, a famous physiologist from around 1900 who proposed a theory of color vision which remained valid over the centuries. In his booklet, originally published in 1870 and translated into English in 1895, Hering wrote: »Memory connects innumerable single phenomena into a whole, and just as the body would be scattered like dust in countless atoms if the attraction of matter did not hold it together so consciousness – without the connecting power of memory – would fall apart in as many fragments as it contains moments« (Hering 1895, 12). These words metaphorically allude to the various functions of autobiographical-episodic memory, such as the self representation function, the ability to use information from the past in order to manage the future successfully (via subjective mental time traveling) and social functions (the ability to relate to and feel and bond with others and access others' inner world). Patients who lose these abilities are particularly helpless in everyday situations and in social communication. This holds true both for patients with various forms of focal brain damage, for patients with age-associated forms of dementia, and for patients with so-called psychogenic (or dissociative) amnesia.

There are two major types of (episodic-autobiographical) amnesia. One constitutes the inability to form new memories long-term. This form is most frequent in patients with focal brain damage and rare in patients with psychogenic forms of amnesia. The second is retrograde amnesia, the inability to consciously retrieve already stored memories. It is assumed that in the great majority of these patients the memories are still laid down in the brain, but the access is blocked. This form of amnesia is most common after stress- and psychic trauma-related conditions and may be short lasting or long lasting, limited to certain events or time epochs. In the present paper we discuss both forms of amnesia, but focus particularly on retrograde amnesia. As the main incapacity of the retrogradely amnesic patients lies in their failure to retrieve old autobiographical memories, one can imagine that they are very unsure on how to socially interact with partners or family members: Did they kiss their partners frequently or rarely, were they laissez-faire or of a strict, authoritarian type when it came to child education? Studies of dissociative (psychogenic) amnesia indeed showed that several patients with psychogenic amnesia encountered difficulties with interpersonal relationships and judging the feelings and intentions of others (Reinhold/Markowitsch 2007) after the onset

of memory ›loss‹, but the neural underpinnings of these changes are still unknown. Severe episodic-autobiographical memory deficits in patients with various neurological conditions were found to affect the updating of moral character judgments and therefore influence the way these patients perceive and behave towards others (Croft et al. 2010). In the context of a blocked access to past events, the patients with psychogenic or organic retrograde amnesia are often unable to plan for their personal future, being imprisoned or trapped in an extended or forever ›noetic‹ present (Suddendorf et al. 2009). Though they might remain able to acquire new episodic-autobiographical memories for long term storage, these memories are often less emotionally tagged and accompanied by a feeling of disconnection. Patients with psychogenic (dissociative) amnesia might frequently show resignation to their present situation and an apparent, striking lack of concern (*la belle indifference*; Janet 1907) about their symptoms (Janet 1907; Reinhold/Markowitsch 2009). Additional personality changes may occur in the form of changes in eating preferences, smoking or drinking habits or other previously rewarding activities (such as car driving) after the onset of psychogenic amnesia, which happen in the absence of evidence of impairments in procedural knowledge (Staniloiu/Markowitsch/Brand 2010). We conjecture that these changes may partly indicate the fact that several brain structures involved in episodic-autobiographical memory processing have also been reported to be engaged in reward-related processing, decision making and future-minded choice behaviour (Staniloiu et al. 2010).

5. Psychogenic Amnesia – Fleeing or Suppressing an Adverse Past or Denying to Deal with an Unfortunate Perspective of the Future

The DSM-IV-TR (2000) implies that dissociative amnesia is underlain by the mechanism of dissociation. Clinical and research experience however shows that dissociation may in fact co-exist in dissociative amnesia with other psychological mechanisms such as deliberate memory suppression or motivated forgetting, cognitive avoidance or psychologically motivated exaggeration of symptoms; this prompted several authors to favor the term psychogenic amnesia over the one of dissociative amnesia. We (Markowitsch and co-workers) have studied about three dozen of patients with psychogenic (dissociative) amnesia, characterized by an inability to retrieve episodic-autobiographical memories, occurring in the absence of significant brain damage as detected by conventional structural brain imaging methods (see Markowitsch 2010 or Markowitsch/Staniloiu 2011a for a discussion of relevant brain damage). In addition – and in opposition to the definition of dissociative amnesia in DSM-IV-TR (2000) – we also identified forms of anterograde amnesia without significant retrograde memory impairments that were

steered by psychogenic (dissociative) mechanisms. As we have pointed out repeatedly over the last 15 years (Markowitsch 1996; Staniloiu et al. 2010), the triggering incidents for these forms of amnesia may seem minor objectively – bumping the head against an object, falling down a staircase or being involved in a minor motor vehicle accident. The upbringing circumstances of the patient, however, usually differ significantly from those of average subjects. These patients usually had a broken childhood or difficult youth, during which they were maltreated or abused (cf. Diski 1997). The seemingly trivial traumatic incident triggering the outbreak of the amnesia may in some cases occur on a forensic background or a background of already existing subclinical or mild clinical depression, emotional blunting or impaired emotional clarity.

A particularly clear example can be found in the documentary movie *Forgetting Dad* (Minnich 2008). Richard, a computer specialist at a bank, has lost his job. He has been divorced and apparently since long dissatisfied with his life. During a car accident with his present wife he seems to have suffered a whiplash injury. Several days later he loses access to his personal past and does no longer recognize his sons or other relatives. When talking to his son Rick, Richard asks him not to call him ›dad‹, but use his first name instead. He divorces his second wife and leaves his home city. He describes his car accident as major, talking about a severe brain injury which would be documented in brain scans, while in fact the brain imaging findings do not support this. He often appears somatically preoccupied and at some point might even suffer from psychogenic blindness (a so-called conversion disorder condition), which then remits on its own. Following the old teaching lore which states that a confrontation with reality might lead to a reinstatement of memories, family members go on the road to confront the forgetting father. They however seem to lose their hopes when they realize the magnitude to which Richard has deteriorated mentally and also physically over the years. All this is documented in Minnich's movie.

The movie is a testimony of a life struggle with dissociative amnesia. It supports recent findings pointing to chronic courses of dissociative amnesia as opposed to old views of dissociative amnesia as being a relatively quickly reversible condition. It furthermore points to a challenge that clinicians face all the time when facing cases of dissociative amnesia. This pertains to accurately differentiating psychogenic (dissociative) amnesia from disorders, which entail intentional production or feigning of symptoms (such as malingering or factious disorders). As opposed to malingering that involves the intentional feigning of symptoms for legal, financial or economic gains, the intentional production of symptoms in factitious disorder is considered to be solely motivated by the wish to assume the sick role. The possibility of the existence of an overlap between ›true‹ amnesia and simulation has been acknowledged for a long time (Lennox 1943; Barbarotto/Laiacona/Cocchini 1996). Especially the psychologically motivated exacerbation of symptoms has been found to accompany a variety of disorders, including dissociative disorders,

depressive disorders, and traumatic brain injury. Our (Markowitsch and co-workers) model for psychogenic (dissociative) amnesia posits that the recollection deficit in psychogenic (dissociative) amnesia primarily reflects a stress hormone-triggered and -mediated memory block, underpinned by a desynchronization during retrieval between a frontal lobe system, important for autonoetic consciousness, and a temporo-amygdalar system, important for emotional processing and flavoring (Markowitsch 2002).

We, however, conjecture that in a subset of patients with psychogenic amnesia – either anterograde or retrograde – there may be an initial preponderance of conscious feigning or exaggeration of symptoms coupled with conscious mechanisms that draw on motivated forgetting or cognitive avoidance (Anderson/Green 2001). With rehearsal and passage of time, a shift may however take place from the conscious use of these mechanisms to the primacy of unconscious or semiconscious behaviors, which work in the favor of safeguarding self deception (Smith et al. 2010). This shift may be mirrored at the brain level in alterations of functions and/or structures (Ganis/Kosslyn/Stose/Thompson/Yurgelun-Todd 2003; Reinhold/Kühnel/Brand/Markowitsch 2006).

Another typical example of a patient with psychogenic amnesia was investigated by us (Markowitsch and co-workers) several years ago both neuropsychologically and with brain imaging. Functional brain imaging revealed a reduced glucose metabolism in memory processing regions which corresponded to similar findings of other patients with psychogenic amnesia that we had studied in former times (Markowitsch 1999a; 1999b; Markowitsch/Kessler/van der Ven et al. 1998; Markowitsch/Kessler/Weber-Luxenburger et al. 2000). The patient, Jonathan Overfeld, was portrayed in a book written by a magazine reporter (Kruse 2010), who carefully had followed many stations of Jonathan's past, by visiting them with him (e.g., his girlfriend from school days, one of his teachers, etc.). This all was done with the intent to bring back some of his memories. Jonathan had been an orphan who was raised in very unfortunate conditions and was allegedly raped by catholic priests while lying ill in bed in a boarding school. After having had decades with more downs than ups, he finally in the sixth decade of his life, developed a variant of psychogenic amnesia, in particular a psychogenic fugue condition. He was found in Hamburg, sitting on a park bench and not knowing who he was or where he came from. Only after introducing him to the media, his identity and his living place (Berlin) were revealed.

These case descriptions can be seen as prototypical for most of our psychogenic amnesic patients.[2]

[2] See e.g., Markowitsch/Calabrese/Fink et al. 1997a; Markowitsch/Fink/Thöne et al. 1997b; Markowitsch/Thiel/Kessler et al. 1997c; Markowitsch/Kessler/Kalbe et al. 1999a; Markowitsch/Kessler/Russ et al. 1999b; Markowitsch/Kessler/van der Ven et al. 1998; Markowitsch/Kessler/Weber-Luxenburger et al. 2000; Fujiwara et al. 2008; Brand et al. 2009.

6. Psychogenic Amnesia and Immigration

A possible connection between immigration and dissociative amnesia was suggested many years ago by several psychoanalysts, who remarked that immigration posed a significant threat to feelings of identity and self-cohesiveness (Grinberg/Grinberg 1989). A higher propensity of certain ethnic groups to react to distress with dissociative symptoms was described (Guarnaccia/Rivera/Franco/Neighbors 1996).This propensity was found to inversely correlate with successful acculturation to a Western society by some authors (Marshall/Orlando 2002).

It has increasingly been acknowledged recently that dissociative disorders (such as dissociative amnesia) are precipitated by psychological stress across a variety of cultures. Stressful life experiences could occur during any of the following stages associated with migration, such as during pre-emigration, migration itself or post-migration (see Herta Müller's 1994 novel *Herztier* for example). Legal status, income, living situations, including ethnic density in the neighborhood or moving from a rural environment to the urban environment of a big city, language proficiency (as a measure of acculturation) and cultural factors modulate the migrants' risk for physical and mental health disorders (Veling et al. 2008, Lederbogen et al. 2011). Leaving the motherland might lead to the loss of the »average expectable environment« (Hartmann 1958) and contextual continuity. In the absence of adequate language proficiency, things get lost in translation. Furthermore, immigrants are often forced to accept jobs below their qualifications, a fact that poses itself a threat to their identity. They consequently might no longer be able to live and sustain a story they used to live by and they might therefore need to imaginatively re-invent themselves. Some might be able to do so, while others might fail and ultimately resort to the ›great escape‹ such as the one offered by the psychogenic memory loss.

Recent findings from our research work suggest indeed the possibility of a special link between psychogenic amnesia (dissociative amnesia) and immigration (Staniloiu et al. 2010). An example was a patient whose life had changed to the worse after Germany's reunification. After emigrating from an Eastern European country to East Germany he had a good position there as long as the communist regime lasted, but after 1989 both he and his wife lost the good working conditions and the perceived social status associated with them. Two almost identical minor physical accidents during working happened to him. After the last one, he became unable to store new memories long-term. This condition remained unchanged for several years. He consequently became helpless and pretty much dependent on his wife (and – to a lesser degree – on his children) (Staniloiu et al. 2010). Michael Kopelman and co-workers (1994) used the metaphorical title ›The Great Escape‹ in describing a related case. Although a biological contribution of the mild physical accident (such as mild traumatic brain injury) in several of these cases cannot be completely ruled out, the emergence of psychiatric

symptoms in these patients after a seemingly minor physical accident might from a psychological perspective be viewed as a legitimate way of exiting a situation that started to be perceived as intolerable and inescapable. Furthermore Kopelman and other authors pointed to the possibility of a co-existence of several psychological devices in cases of psychogenic amnesia, including symptom exaggeration or deliberate feigning (Barbarotto et al. 1996; Smith et al. 2010), as we had already outlined above.

7. Literature, Dissociation and Trauma

Several authors state that Janet perceived dissociation as being innately pathological and causally anchored to traumatic experiences. Other researchers conceptualize dissociative responses as being part of a spectrum that ranges from physiological, adaptive or non-pathological to maladaptive and pathological (Seligman/Kirmayer 2008). Some non-pathological dissociative experiences, such as day dreaming, absorption, reverie may involve positive emotions and/or may enhance performance by focused allocation of cognitive resources (Maldonado/Spiegel 2008). Athletes for example can perform extremely well while focussing on a particular detail of an event and suspending any critical thinking. Compartmentalization in everyday life may allow a healthy subjective distancing from a highly emotionally charged past event. The same might be accomplished via distancing through reappraisal or a switch in the retrieval perspective of an event. Distancing through reappraisal on a biological level involves dampening of the amygdala (a structure that enhances the emotional evaluation of information) through prefrontal-cognitive inhibitory mechanisms. On the other hand, an increase in right amygdala activity during first person retrieval perspective of autobiographical memories was found in comparison to those memories that are retrieved from a third person perspective (Eich/Nelson/Leghari/Handy 2009). It was argued that this finding reflects the higher degree of subjective emotionality associated with the first type of memories in comparison to those that are retrieved from a third person (›theatrical‹) perspective. In pathological cases, such as dissociative amnesia, the retrieval of episodic autobiographical memories is blocked. Past events may be relearned, but their subsequent retrieval occurs in a semantic way, without that feeling of warmth and strong (autonoetic) connection with the self. In dissociative identity disorder or multiple personality disorder[3] one of the advanced models for the amnesia hypothesizes that the autobiographical traumatic information can in fact be accessed, but is discarded, because it is not perceived as belonging to the person's autobiographical experience (Dorahy/Huntjens 2007).

[3] See Dana 1874; Gordon 1903; Prince 1906a; 1906b; Sidis/Goodhart 1905; Weir Mitchell 1834; Glaus, 1953; Hüffer 1911; Menninger-Lerchenthal 1946; Schreiber 1973; Reinders/Nijenhuis/Paans/Korf/Willemsen/den Boer 2003.

The mechanisms of distancing and dissociation in autobiographical writings of trauma are often conveyed through changes and shifts in pronouns or tenses. ›I‹ becomes ›he‹ or ›she‹. A prominent case is Jan Reemtsma who was kidnapped some years ago and wrote a biography about the period of his captivity. Interestingly, he ‹dissociated‹ when describing his situation, being chained in a cellar and being dependent on his torturer (Reemtsma 1997): Instead of writing ›I‹ he wrote ›he‹ when he described his helpless situation. So he changed from first-person to a third-person perspective. These alternations in pronouns are frequently encountered in Herta Müller's novels about the victims of the former communist Romanian regime (Driver Eddy 2000).These mechanisms (Langnickel/Markowitsch 2010) on the one hand might signify the acquirement of the capacity to view things from a distance, in an analytical way. On the other hand, they may just reflect that »das Sein bestimmt das Bewusstsein« (being determines consciousness), as Karl Marx has formulated. This means that the ability to retrieve autobiographical memories is state-dependent: memories are retrieved best when the conditions during encoding (mood, environment, and language) match those during retrieval (Markowitsch 2003). A mismatch between encoding and retrieval conditions may result in a spectrum of memory retrieval disturbances, ranging from tip-of-the-tongue phenomena to complete pathological retrieval blockades, such as in psychogenic (dissociative) amnesia.

Repeatedly different or diverse retrieval conditions may modify and distort the description of an event. This phenomenon may be compared with translating a lyric poem from Eichendorff from German into French and then into Japanese and from that language back to German. The result will certainly be surprisingly different from the original. From a biological perspective, this may be explained by several factors. Recent research points to the fact that after retrieval memories enter a state of lability after which they are re-consolidated. This state of post-retrieval lability may make them vulnerable to weakening or strengthening, distortions or misinformation. Furthermore, memories are dynamic. As both survival and self representations are among the ascribed functions of memory, it is not surprising that during the act of retrieval people might reshape and reconstruct the past to support current aspects of the self and match future goals that are coherent with one individual's goals, self image and system of beliefs (Conway 2009).

A mixture of conditions of state-dependency and minor dissociation may be responsible for memory repressions and may occur in so-called normal subjects (Langnickel/Markowitsch 2006). An example is Günter Grass, who for several decades denied to have had any relationship with the Nazi party. Only very lately in his life he admitted to this. This kind of confession ignited an intense debate in the public of whether he had always been aware of his past, but hid it, or whether it indeed came to his mind only when becoming an elderly man. Interestingly, negative correlations were found between age and dissociation scale scores (Putnam 1997). Furthermore new research data show that mechanisms that capitalize on

memory suppression become more difficult with age (Anderson/Reinholz/Kuhl/Mayr 2011). A hint to the existence of mechanisms of state-dependent retrieval comes from the following letters. The first one was sent by an elderly woman who had listened to a production of a radio station and apparently wrote it spontaneously. The second letter was sent by a retired magazine writer who felt puzzled by her own experience and remembrances.

Dear Professor![4]
I am delighted that finally there was a session about memory in the Radio Health Magazine; its strange action is a riddle to me. I have the following question:
I considered myself to be very forgetful with respect to things of the recent past. Now, at Bismarck's birthday, I became 93 years old. And only during the last two years I start to remember poems which I learned 75 to 80 years ago, and this without gaps, in part long poems such as »Die Bürgschaft« from Schiller or »Des Sängers Fluch« from Uhland. Never in the long time in between had I thought about all that literature from my school time!
I have had a very choppy and diversified life behind me, which is understandable given my old age: examinations for ending school, dance, theater, travels, marriage, two children, moving-around, two wars and hunger periods, my husband four years in the war, at the same time the second child was born, terrible attacks from airplanes with daughter and baby, loss of my living place, eleven years with a too small apartment, then construction of a new house with large garden, helping as school teacher even at the age of 60, death of my husband, here a small apartment, surgery, painful age-related diseases, inability to walk, wheel chair, nice presentations about traveling to foreign countries with my husband.
And now without reason I start to remember too many poems, from 75 to 80 years ago. Can a brain store for such a long time, unconsciously? My people wonder as well that from early childhood on I clearly see in front of my eyes living places and their surroundings, in two places where I had been prior to the sixths year of my life.
Have you encountered such findings as well in your psychological investigations? I would be very interested in that!

Dear Professor Markowitsch,
the SPIEGEL-article »Corporal without a past« brought my attention to you. I am a former journalist of economics and now in my old days I am busy to bring experiences from personal contemporary history into political education. In order to control and document my remembrances, I spend time during the day in archives and libraries. In this backward-oriented life situation the following happened to me:
I stood alone in a room, next to my writing table, and looked in a bright blue summer day out into the green; through the open door of the balcony, the sounds [*Brummbrumm*] of the city Autobahn constantly penetrated my ears. And suddenly summer day and sounds of the city-Autobahn had passed; – I felt a subdued room atmosphere, saw myself in subdued room lights next to a long clubroom table around which American officers were sitting, listened as the officer at the head of the table addressed to me. Later I saw myself standing opposite to exactly this officer in a starry summer night, heard myself asking him something and him responding. Both scenes occurred – as produced from my memory without any conscious trigger – 56 years ago. (When I – a refugee girl – was happy to have gotten a job that allowed me to eat something.)

[4] Both letters were sent to Hans J. Markowitsch. They have been translated from German.

When I saw myself again next to my writing table together with Autobahn-noise, looking outside in the summer day, I had the impression to have passed through something like a journey through time. Recovering from my bewilderment about this eruption of remembrance, I had the idea of having relived those moments during which my reaction for my whole future life course was determined – the life course I would like to document for contemporary history. For sure you will understand that this feeling of remembrance preoccupies me. – I would be thankful, if you could let me know under which keyword (label or category) in the scientific literature I can find such an explanation for such a superimposition, even extinction of the actual perception via moments of remembrance.

I thank you in advance for your efforts.
Sincerely,

These letters show how memories can recover with the passage of time. The first letter suggests that the explanations for such a recovery of memories may be found in the fact that in old age people regress by thinking of their youth and young adulthood more than of the present (Rubin et al. 1998, see Fig. 2) (state-dependency of memories; Markowitsch 2003; Markowitsch/Staniloiu 2011a).

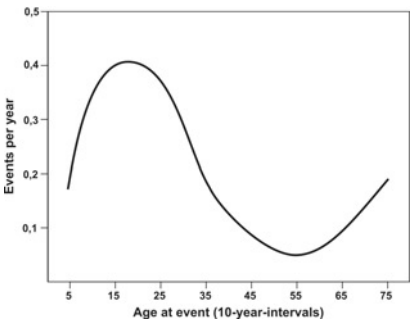

Fig. 2. Relations between the number of events remembered across the life span and age when the event occurred (data after Rubin/Rahhal/Poon 1998 and other sources).

Furthermore, neuroscientific research revealed that we constantly lose nerve cells throughout life. And as it is known that our brain acts more via inhibition than via excitation, the loss of neurons may result in a reduction of inhibition and consequently information that was long inhibited (or repressed) may return into consciousness. The second letter emphasizes again the state-dependency of memory and its survival over decades.

The reverse situation is seen in the following letter which a woman sent after having read a book written by him:

Dear Professor Markowitsch,[5]
I read your book »Das Gedächtnis [Memory]« with interest. In it I found many explanations for understanding my situation.
As I can interpret it, I developed psychogenic amnesia in my earliest childhood – losing nearly all of my episodic-autobiographical memory.
Because of events which acted on me as traumas, my brain was overloaded with processing

[5] This letter has also been translated from German.

emotional events so that the right-sided amygdala became blocked.
If the amygdala is relevant for the processing of emotional events, these were apparently so strong that it came to a suppression of the amygdala. It was pushed into the underground, into passivity und stopped working, as a psychologist described it once.
The consequence for me is that I do not have emotional remembrances from my entire life. I have neither remembrances of my first kiss nor of other experiences. When I look at photos of my children, I know where and when these pictures were taken, however, I have no emotions towards them. Only factual knowledge.
My remembrances of my life are aside from semantic knowledge only a few pictures which appear in my memory, cold and without any emotion.

8. Amnesia, Hypermnesia and the Coherence of Traumatic Memories

As mentioned above, psychological stress or trauma can lead to various psychological manifestations. Both amnesia and hypermnesia to traumatic incidents have been reported. Despite that some authors still debate the legitimacy of dissociative (psychogenic) amnesia claiming that it is a purely culture-bound syndrome that flourished in the 1800's (Pope/Poliakoff/Parker/Boynes/Hudson 2007), there is nowadays increasing evidence from various cultures linking this disorder to psychological stress or trauma. Furthermore, recent data suggest that post-traumatic stress disorder (PTSD) is not a homogenous condition, but can be divided into one type with ›positive‹ dissociative symptoms such as flashbacks and intrusions and another type with ›negative‹ dissociative symptoms such as amnesia and emotional numbing. In a recent review of various imaging studies of PTSD, arguments are made for a mechanism of undermodulation of affect via failure of prefrontal cortex inhibition of limbic brainregions (such as the amygdala) underlying the re-experiencing/hyperarousal PTSD subtype and one of overmodulation of the amygdala responses in the (›negative‹) dissociative PTSD subtype (Lanius et al. 2010). Furthermore, genetic factors may play a role in modulating the ability to remember a highly affectively loaded event (Rasch et al. 2009).

A matter which is still controversially discussed is the degree to which the retrieved traumatic memories are coherent or not. Especially in fiction, emphasis is at times laid on their incoherence and fragmentation (Driver Eddy 2000). And also some researchers are of the same opinion (e. g. van der Kolk/Fisler 1995), while a majority vice versa sees them as sharp, coherent and precise (see the reviews of Giger/Mertens/Merckelbach (forthcoming), and Velbert 2011). From an evolutionary point of view, it makes sense to not forget the essence of a traumatic memory so that the chance of its re-occurrence in a similar way is reduced. Remembering the essence of a traumatic memory may however at times occur with and may even be facilitated by the amnesia for concomitantly occurring neutral events. Hurlemann et al. (2005) for example highlighted that both hypermnesia and peri-emotional amnesia (decreased memory for neutral events during si-

multaneous enhanced encoding of an aversive event) are amygdala-dependent and vary as a function of noradrenergic-glucocorticoid input to the amygdala.

The importance of amygdala in retrieving emotionally charged events is also illustrated by findings from Urbach-Wiethe disease, a genetic disorder accompanied by bilateral depositions of calcium in amygdala. We have studied such patients for nearly two decades (Markowitsch et al. 1994; Siebert/Markowitsch/Bartel 2003). We have found that patients with Urbach-Wiethe disease have major problems in coupling emotions with episodic-autobiographical events. When confronting patients with Urbach-Wiethe disease with an emotional story, they failed to get the gist of the story, such as they could not process and remember the relevant parts of the story (Cahill/Babinsky/Markowitsch/McGaugh 1995). This demonstrates that alterations of the brain can lead to abnormalities in the processing of emotionally colored memories. A sex-related functional asymmetry of the amygdala has been proposed for the processing of emotional memories. In particular, some authors suggested that the right amygdala is involved in this function in men, while the left amygdala preferentially supports these functions in women (Tranel/Bechara 2009). Cahill/Gorski/Belcher/Huynh (2004) provided evidence that sex traits (rather than the actual sex) could influence emotional memory performance, pointing to a larger recall of peripheral information in subjects with increased female-sex traits. A recent study showed that gender differences pertaining to memory retrieval might actually be accounted for by the nature of the retrieval cues the subjects were provided with. It was found that women used both verbal and visual cues, while men preponderantly relied on visual cues (St. Jacques/Conway/Cabeza (forthcoming)). This shows that cognitive strategies differ between men and women and that in addition to brain alterations and genetic dispositions, the gender differentiated usage of retrieval cues might impact on the number and quality of retrieved traumatic memories. The quality of retrieved traumatic memories might be also be modulated by language and cultural scaffolding of the »narrative storylines« (Schafer 1992), as we will illustrate below.

9. Culture, Self, Trauma and Memory

Research on »cultural memory« has increased considerably in the last years (Markowitsch 2008a; 2008b; Erll/Nünning 2008). Due to their tradition and experience, certain cultures – such as the Jewish culture – focus on not forgetting, while in other cultures suppression or cognitive avoidance is more dominant. In contrast to the highly individualized Western countries that tend to view dissociative mechanisms as pathological and a possible threat to personal identity, some cultures encourage dissociation as a way of healing. Examples are the ritual practices of the shamans. The dissociation practices of some eastern Asian cultures may be related to their de-valuation of individuality, which is also reflected in the Buddhist and

Hindu religions. Furthermore, ideologies like communism, down-value the individual and enforce group and community thinking (»The Party is all«). In Herta Müller's novel *The Passport*, children are taught in the school of a former communist Romanian village that they are part of a »big house«. »The towns are the rooms of this big house, our country«, says Amalie. »And just as the mother in the house in which we live is our mother, so Comrade Elena Ceausescu is the mother of our country. Comrade Nicolae Ceausescu is the father of all the children. And Comrade Elena Ceausescu is the mother of all children«, continues Amalie (Müller 2009, 51). Wang (2001) found that adults who had grown up in Chinese culture retrieved their first memories from an older age compared to those grown up in Western culture. In Western culture the unity of the self has been emphasized from the early scientific literature to the present (Markowitsch/Staniloiu 2011b). Gordon had stated in 1906 that »self-consciousness is a *conditio sine qua non* of normal life« (480) and that amnesia is the most typical of all disturbances of consciousness. Zhu and colleagues (2007) found when comparing Western and Chinese subjects, who judged personal trait adjectives regarding themselves, their mother, or a public person, that the medial prefrontal and anterior cingulate cortex were activated strongest during self-related judgment in subjects of both cultures. However, compared to other-judgments, judgments about the mother activated the medial prefrontal cortex in Chinese, but not in Western culture subjects. The authors concluded that Westerners use the medial prefrontal cortex exclusively for representing their own self.

The importance of language or another type of symbolic representation for episodic-autobiographical memory has been subjected to debates. The Australian aborigines, for example, lack formal writing abilities. They however either use drawings on rocks or describe the collective past by so-called song lines (Pritzel 2007) that are songs which provide information about the distant past. A tribe that apparently lacks biographical information at all is the so-called *Pirahã* Indians from the upper Amazon River. These apparently live only in the present; they do not hoard food and do not bury their dead. They do not think of past and future and consequently cannot imagine the life of persons from history or past (Everett 2005; 2009). The language spoken by the Pirahã reportedly only comprises two rudimentary temporal markers (Everett 2005; Suddendorf et al. 2009). These findings are relevant in the light of the proposal of Suddendorf et al. (2009) that language and mental time traveling (an ingredient of episodic-autobiographical memory) might have co-evolved. Language might have been preceded by the mimetic gesture. And mental time traveling might have been rooted in a form of embodied cognition, grounded on species-specific propensities for moving in a particular sense. In keeping with the general idea that episodic memory ›grows out‹ of semantic memory (Tulving 2005), the ability to ›mentally travel in time‹ has been viewed as an extension of ›mental travel in space‹. Although some authors do not view language as being a necessary condition for the emergence of

episodic-autobiographical memory, they still admit that it enriches and supports its development.

Language has been viewed by several writers as a vehicle that allows a life narrative to unfold and be subsequently interpreted and reshaped. Knitting dissociated pieces of traumatic experiences in a narrative has been the aim of several therapists dealing with dissociative disorders, who have seen this as the pathway towards securing psychological healing and freedom (Mitchell/Black 1995). The effectiveness of this method, especially cross-culturally, is however still debated (Seligman/Kirmayer 2008). As Beverley Driver Eddy points out, in Müller's novel *Herztier* »neither testimony nor trauma narrative is able to heal or bring closure to the victims of the Romanian state terror« (2000, 57).

10. Conclusions

Janet regarded dissociation as being »an inability of the personal self to bind together the various mental components in an integrated whole under its control« (1907, 23). Dissociative experiences have been expressed in the literature in the form of changes in tenses and pronouns, which suggest an apparatus of distancing from highly emotionally-charged traumatic events through the separation of own self within itself and from others. This vision of the dissociated self has been metaphorically conveyed by the following description of Jody M. Davies (1996, 197):

> Not an onion, which must be carefully peeled, or an archeological site to be meticulously unearthed and reconstructed in its original form, but a child's kaleidoscope in which each glance through the pinhole of a moment in time provides a unique view; a complex organization in which a fixed set of colored, shaped, and textured components rearrange themselves in unique crystalline structures determined by way of infinite pathways of interconnectedness.

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