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TRAUMA-RELATED STRUCTURAL DISSOCIATION OF THE PERSONALITY

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Abstract

Many traumatized individuals alternate between re-experiencing their trauma and being detached from, or even relatively unaware of the trauma and its effects. At first sight one may be inclined to conceptualize detachment from trauma and re-experiencing of trauma as mental states. However, on closer scrutiny it becomes apparent that in both cases a range or cluster of states rather than a singular state is involved. For example, being detached from trauma does not itself exclude being joyful, ashamed, sexually aroused, or curious at times, and re-experiencing trauma can encompass states such as fleeing, freezing, and being in pain or being analgesic. In this paper we relate detachment from trauma and re-experiencing trauma to emotional operating systems (Panksepp, 1998) and functional systems (Fanselow & Lester, 1988), briefly addressed as action systems. Action systems control a range of functions, but some are more complex than others. Reexperiencing trauma will be associated with the inborn and evolutionary derived defensive system that is evoked by severe threat, in particular threat to the integrity of the body. As a complex system, it encompasses various subsystems, such as flight, freeze, and fight. Detachment from trauma, in our view, is associated with several action systems (Panksepp, 1998), i.e., the ones that control functions in daily life (e.g., exploration of the environment, energy control), and the ones that are dedicated to survival of the species (e.g., reproduction, attachment to and care for offspring).
In this context we will maintain that severe threat may provoke a structural dissociation of the premorbid personality (Van der Hart, 2000). In its primary form this dissociation is between the defensive system on one hand, and the systems that involve managing daily life and survival of the species on the other hand. To summarize the essence of the theory of structural dissociation of the personality, we argue (1) that traumatic experiences, especially when they occur early in life and involve severe threat to the integrity of the body, may activate psychobiological action systems that have been developed by evolution, and (2) that due to extreme stress levels and classical as well as evaluative conditioning to traumatic memories these systems may remain unintegrated to varying degrees.

Key words: Trauma; Dissociation; Somatoform Dissociation; Structural Dissociation

"Now and again there occur alterations of the 'emotional' and the 'apparently normal' personalities, the return of the former often heralded by severe headache, dizziness or by a hysterical convulsion. On its return, the 'apparently normal' personality may recall, as in a dream, the distressing experiences revived during the temporary intrusion of the 'emotional' personality."
-- Myers (1940, p 34)

INTRODUCTION

Many traumatized individuals alternate between re-experiencing their trauma and being detached from, or even relatively unaware of the trauma and its effects (APA, 1994; Nijenhuis & Van der Hart, 1999). This alternating pattern has been noted for more than a century by students of psychotraumatology (Janet, 1889, 1904; Kardiner, 1941; Horowitz, 1976), who have observed that it can ensue after different degrees and kinds of traumatization. It is characteristic of posttraumatic stress disorder (PTSD; APA, 1994), disorder of extreme stress (DES; Pelcovitz et al., 1997), and many cases of trauma-related dissociative disorders (Nijenhuis & Van der Hart, 1999). With delayed PTSD, the pattern starts after an extended period of relatively well functioning. A few traumatized individuals develop dissociative amnesia as a disorder which involves reported gaps in re-

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call related to the trauma, additional aspects of their prior life, or even all of it (Markowitsch, 1999; Van der Hart, Brown, & Graafland, 1999; Van der Hart & Nijenhuis, 2001). These patients remain amnesic for an extended period of time. Eventual retrieval of the trauma can resolve the disorder, but in some cases a pattern of alternation between amnesia and re-experience of trauma develops (for a review, see Van der Hart et al., 2000).

At first sight one may be inclined to conceptualize detachment from trauma and re-experiencing of trauma as mental states. However, on closer scrutiny it becomes apparent that in both cases a range or cluster of states rather than a singular state is involved. For example, being detached from trauma does not itself exclude being joyful, ashamed, sexually aroused, or curious at times, and re-experiencing trauma can encompass states such as fleeing, freezing, and being in pain or being analgesic. In this paper we relate detachment from trauma and re-experiencing trauma to emotional operating systems (Panksepp, 1998) and functional systems (Fanselow & Lester, 1988), briefly addressed as action systems. Action systems control a range of functions, but some are more complex than others. Reexperiencing trauma will be associated with the inborn and evolutionary derived defensive system that is evoked by severe threat, in particular threat to the integrity of the body. As a complex system, it encompasses various subsystems, such as flight, freeze, and fight. Detachment from trauma, in our view, is associated with several action systems (Panksepp, 1998), i.e., the ones that control functions in daily life (e.g., exploration of the environment, energy control), and the ones that are dedicated to survival of the species (e.g., reproduction, attachment to and care for offspring).

In this context we will maintain that severe threat may provoke a structural dissociation of the premorbid personality (Van der Hart, 2000). In its primary form this dissociation is between the defensive system on one hand, and the systems that involve managing daily life and survival of the species on the other hand. In a little known but important work, Myers (1940) described this primary structural dissociation in terms of dividedness between the "apparently normal" personality and the "emotional" personality. Studying acutely traumatized World War I combat soldiers, Myers observed that the "emotional" personality (EP) recurrently suffers vivid sensorimotor experiences charged with painful affects which, at least subjectively, closely match the original trauma. Thus the EP is stuck in the traumatic experience that persistently fails to become a narrative memory of the trauma. The "apparently normal" personality (ANP), on the other hand, is associated with avoidance of the traumatic memories, detachment, numbing, and partial or complete amnesia. As will be detailed in this paper, both ANP and EP in fact involve differences with respect to a wide range of psychobiological variables. For example, clinical observations indicate that they are both associated with a differential sense of self, and findings from experimental research into DID suggest that they display differential psychobiological responses to trauma memories, including a different sense of self (Nijenhuis, Quak et al., 1999; Reinders et al., 2003), as well as to preconsciously processed threatening stimuli (Van Honk, Nijenhuis & Van der Hart, 1999).

One may object to labeling structurally dissociated mental systems as "personalities." In fact, for this reason, the DSM-IV (APA, 1994) converted the label "multiple personality disorder" into "dissociative identity disorder." Nevertheless, it is important to appreciate that both ANP and EP display "enduring patterns of perceiving, relating to, and thinking about the environment and [them]selves." In the case of ANPs these patterns "are exhibited in a wide range of social and personal contexts" and that in the case of EPs -- which do not tend to appear in a wide range of contexts -- are exhibited consistently upon their reactivation. The quotes concern the DSM-IV description of personality traits (APA, 1994, p.630). Myers' terms can be adopted with the understanding that the term personality in ANP and EP denotes dissociative part of the patient's personality at large.

In this paper we thus explore the evolutionary and trauma-related origins of the structural dissociation between ANP and EP (Van der Hart, 2000) as involving action systems, as well as the factors that maintain this dividedness. In this context we will also address the increasing complexity of structural dissociation into secondary and tertiary forms that may ensue when trauma involves chronic interpersonal violence and neglect, in particular when children are the victims and caretakers are the perpetrators.

THE FAILURE OF INTEGRATIVE CAPACITIES IN THE FACE OF THREAT

Integration

Pierre Janet (1889) and Hughlings Jackson (1931-1932; for a review, Meares, 1999) have characterized mental health in terms of the capacity for differentiation and integration. Janet held that integration involves the continuing execution of a series of mental actions. The first step is the synthesis of elementary internal and external phenomena within a given moment into meaningful new mental structures, and the second step, synthesis of experiences, knowledge and functions across time (Braude, 1995). Contemporary authors have labeled these mental actions synchronic and diachronic synthesis, respectively (Ciompi, 1991; Siegel, 1999). Thus, according to these views, creation of meaningful combinations of sensations, affects, motor behaviors, and perceptions of the environment within a given moment and across time is essential to engaging in adaptive be-

havior. For example, individuals who were confronted with a threatening event have been able to succeed in synthesizing the experience when they have created a coherent mental structure that involves and organizes representations of the salient external and internal events (e.g., sensory perceptions, affective and behavioral reactions to these perceptions).

An essential component of integration is personification. Personification denotes the mental actions that range from relating synthesized material to one's general sense of self, which thus should become regularly adapted through synthetic actions, to becoming consciously aware of the implications of a personal experience for one's whole life, giving one's history and sense of self continuity (Janet, 1928). To follow up the example, in the act of personification, traumatized individuals become consciously aware that the threat strikes them personally. The result is a sense of ownership of personal experience and events ("I am threatened"). Personification is a specific form of realization, i.e., becoming aware of the implications of events. In our example: "I was severely threatened, and the event has had, and still will have, major consequences for me and my loved ones." Thus personification allows for a vision of one's self as a future personal and social existence.

As countless clinical observations suggest, and as recent studies have documented (for a review, see Marmar, Weiss, & Metzler, 1998), overwhelming events can interfere with these integrative mental actions. When personification fails, conscious awareness of the synthesized event will remain factual knowledge that does not seem to pertain to one's self. In the terms of Wheeler, Stuss, and Tulving (1997), the synthesized material will be noetic (personal experiences that seem unrelated to self), not autonoetic (personal experiences that are integrated with awareness of self as part of the experience). Thus a traumatized individual may say: "I know my life was threatened, but it feels as if it happened to somebody else." As a result, the corresponding memory will be of the semantic, not the episodic type (Tulving, 1972). Semantic memory, which pertains to words and to knowledge of the world, lacks a self-reflective aspect: one knows something to be a fact, but one does not link a personal episode to this knowledge. In contrast, episodic memory concerns memories of events that we recall in an almost scenic or cinematic way. It involves a double awareness, in that apart from a memory of facts, there is also the knowledge that this experience comes from one's past. Within far wider windows of time and events, personification yields an integrated, thus relatively context-independent sense of self. When personification fails, the development of a coherent sense of personal existence in a framework of the past, the present, and the future is compromised. In order to act adaptively in the present, it is necessary for personification of current experience to be based on the integration of one's (entire) past history.

Integrating experiences similar to those already known to the individual, and that do not involve extreme emotion, generally requires a lower level of mental functioning and less mental effort than synthesizing and personifying new and highly emotional experiences. Successful integration of certain prior experiences provides templates that promote integration of later, similar experiences. Exposure to stressful events can raise one's mental level of functioning, but when threat becomes massive and overwhelming, this level drops.

Sensory events that are not traumatic or excessively stressful are usually automatically and preconsciously synthesized into symbolic form. However, traumatic experiences in patients with PTSD and dissociative disorders seem to be encoded as more or less complex sensorimotor and affective experiences which remain relatively unintegrated and thus unavailable for the normal information processing that leads to episodic memory (Van der Kolk & Van der Hart, 1991). The reduced integrative capacity leaves the individual with an immediate deficit in the ability to adapt to the trauma, and it inhibits additional attempts to cope following the traumatic experience (Janet, 1919/25).

Some neurobiological factors affecting integrative mental functions

The difficulty that individuals may have with synthesizing and personifying terrifying experiences seems related to biological reactions to severe threat. There is mounting evidence that the brain and body do not just respond to threat, but are also bound to change by traumatic experiences (Perry, 1999; Van der Kolk, 1994). Thus, at the neurobiological level, threat-related integrative failure may be mediated by excessive release of stress hormones and by stress-related alterations in brain regions that serve major integrative functions.

Several studies have documented that neurochemicals released during stress are highly concentrated in brain regions that are related to the execution of integrative mental actions, such as the hippocampus and the prefrontal cortex, and can thus interfere with the integration of experiences. These substances, which include norepinephrine, epinephrine, glucocorticoids, endogenous opiates, and several others (for a review, see McGaugh, 1990), may lower the individual's level of mental functioning, i.e., his integrative capacity. For example, retention of recently learned material is enhanced when moderate doses of epinephrine are administered after training, but impaired at high doses (McGaugh, 1990).

Acute stress results in an increased release of norepinephrine in the hippocampus and other brain regions. Vietnam veterans with chronic PTSD experienced flashbacks when given an intravenous administration of

yohimbine, an a2 antagonist that stimulates norepinephrine release (Southwick et al., 1993). A similar effect was provoked by intravenous administration of metachlorophenylpiperazine (m-CPP; Southwick et al., 1991). In psychological terms, these substances reactivated responses of the EP. Both animal and human studies have shown that high levels of norepinephrine release are associated with a decrease in metabolism in the cerebral cortex. Thus, following administration of yohimbine, PTSD patients had a tendency toward decreased brain metabolism in hippocampal, orbitofrontal, temporal, parietal, and prefrontal cortex areas, whereas healthy controls had a tendency toward increased metabolism in these regions (Bremner, Innis et al., 1997). This decrease could reflect the traumatized individual's lack of integrative mental activity. Indeed, norepinephrine affects memory encoding, storage, and retrieval in the hippocampus, a brain structure implicated in the synthesis of experiences and memory encoding. Another substance that is involved in the modulation of memory functions and the stress response is the neuropeptide corticotropin releasing factor (CRF). Bremner, Lichio et al. (1997) found an increase of CRF in PTSD patients, implying that memory function may be impaired in PTSD.

Some other data suggest that artificial stimulation of integrative brain structures, notably the hippocampus, can mediate dissociative symptoms. For example, electrical stimulation of the hippocampus and adjacent cortex resulted in dissociation-like phenomena (Halgren, Walter, Cherlow, & Crandall, 1978). Also, the administration of ketamine induced a wide range of phenomena that resemble dissociative symptoms in healthy individuals (Krystal et al., 1994). This receptor is highly concentrated in the hippocampus, and is involved in long term potentiation, a process that relates to memory formation.

The integrative failure that is characteristic of traumatized individuals may also relate to structural brain changes, notably in the hippocampus. Animal studies have shown that direct glucocorticoid exposure results in a loss of pyramidal neurons and dendritic branching in the hippocampus, meaning that the organic structure of this brain area was affected by this hormone, likely resulting in a decrease neuronal synapses that would facilitate integration. Some evidence suggests that glucocorticoids may have similar effects on the human hippocampus. Compared with healthy controls, the hippocampal volume in PTSD patients (Bremner et al., 1995), adults reporting childhood physical and sexual abuse (Bremner, Randall et al., 1997), and a patient with DID (Tsai, Condie, Wu, & Chang, 1999) were decreased. Preliminary findings of Ehling, Nijenhuis and Krikke (2001) are that compared to healthy controls, female patients with DID had approximately 25% less hippocampal volume in either hemisphere. Women with DDNOS had approximately 15% less hippocampal volume compared to controls (Ehling et al., 2003). Women who fully recovered from DID had more hippocampal volume compared to women with DID. It is currently not known whether smaller hippocampi constitute a premorbid risk factor for PTSD and dissociative disorders, or are a consequence of chronic stress exposure. Abnormal structural features of the hippocampus may also represent still another phenomenon, in that several other mental disorders not characterized by posttraumatic stress and dissociative symptoms are also associated with decreased hippocampal volume. Still, hippocampal volume, reported chronic childhood abuse, psychoform dissociation, somatoform dissociation and posttraumatic stress symptoms were strong phenomena in these studies.

Moreover, some studies suggest that trauma treatment can be associated with a gain in hippocampal volume. Vermetten et al. (2003) found that treatment of PTSD with paroxetine resulted in a decrease of PTSD symptoms, significant improvements in verbal declarative memory, and a 4.6% increase in mean hippocampal volume. A preliminary single case finding - that obviously requires replication - suggests that phase-oriented treatment of DID can be associated with a very substantial gain in bilateral hippocampal volume (Ehling, Nijenhuis, & Krikke, 2003). This gain of volume did not exist for the volume of the parahippocampal gyrus. Women with florid and recovered DID, and women with DDNOS had approximately 20% less volume of the parahippocampal gyrus (Ehling et al., 2003).

While these and related data contribute to understanding integrative failure during and after exposure to severe threat, it is important to appreciate that the study of the neurobiological correlates of trauma-related dissociative phenomena is still in its infancy (Krystal, Bremner, Southwick, & Charney, 1998). An elaborate review of the emerging psychobiology of trauma related dissociation is (Nijenhuis, Van der Hart & Steele, 2002). We will discuss the findings of a PET study of DID (Reinders et al., 2003) below.

Peritraumatic dissociation

The individual's failure to synthesize and personify current severely threatening events manifests in a range of phenomena that are known as peritraumatic dissociation (Marmar, Weiss, & Metzler, 1998). It involves both psychoform and somatoform phenomena (Nijenhuis, Van Engen, Kusters, & Van der Hart, 2001), such as profound feelings of unreality, out-of-body experiences, disconnection from oneis body, tunnel vision, lack of pain perception (analgesia) and motor inhibitions. Peritraumatic dissociation also manifests in a lack of personification. As we said before, this failure can be mani-

fested as a sense that the registered event is not happening to one personally.

Models proposing that trauma can evoke dissociative phenomena have been strongly supported by a range of retrospective and prospective studies (e.g., Koopman, Classen, & Spiegel, 1994, 1996; Nijenhuis, Van Engen et al., 2001; Shalev, Peri, Canetti, & Schreiber, 1996; Tichenor, Marmar, Weiss, Metzler, & Ronfeldt, 1996; Weiss, Marmar, Metzler, & Ronfeldt, 1995). Janet (1909) postulated that trauma produces its disintegrating effects in proportion to its severity as expressed in terms of intensity, duration, and repetition. More recently, it has been additionally hypothesized that young children are particularly prone to peritraumatic dissociation and other trauma-related psychopathology (e.g., Kluft, 1991; Putnam, 1989; 1997). Several studies with dissociative disorder patients (Draijer & Boon, 1993; Nijenhuis, Spinhoven, Van Dyck, Van der Hart, & Vanderlinden, 1998; Ogawa, Sroufe, Weinfeld, Carlson, & Egeland, 1997) have provided supportive evidence for these hypotheses.

In an important longitudinal study, Ogawa et al. (1997) found that among a sample of children at particular risk for traumatization, dissociative symptoms in early childhood were associated with the severity of trauma and so-called disorganized attachment; these factors predicted dissociative symptoms up to two decades later. Other studies have indicated that peritraumatic dissociation is predictive of subsequent posttraumatic stress disorder (PTSD; e.g., Marmar et al., 1994; Shalev, Peri, Caneti, & Schreiber, 1996), dissociative disorders, and somatoform disorders (Darves-Bornoz, 1997). Harvey and Bryant (1999), on the other hand, found that dissociative symptoms of patients with acute stress disorder did not predict PTSD well, whereas reexperiencing trauma was highly predictive. Consistent with the DSM-IV (APA, 1994), Harvey and Bryant (1999) did not conceptualize reexperiencing trauma as a dissociative symptom. However, this phenomenon involves an experience that neither has been satisfactorily integrated, nor will be automatically integrated upon its reactivation. In our view, reexperiencing trauma qualifies as a major current positive dissociative symptom.

We concur with Myers (1940) that the failure to integrate traumatic experiences basically yields a structural dissociation of the premorbid personality into two mental systems (Van der Hart, 2000). This primary structural dissociation involves the EP that is essentially associated with re-experiencing the trauma, and the ANP that has failed to integrate the traumatic experience, and that engages in matters of daily life. (As we will discuss below, in more complex cases, the structural dissociation can be of a secondary or even a tertiary type.) In sum, peritraumatic dissociation is a manifestation of acute integrative failure, and sets the stage for the chronic failure to synthesize and personify the trauma.

THE THEORY OF STRUCTURAL DISSOCIATION OF THE PERSONALITY

The "emotional" part of the personality

The EP is a manifestation of a more or less complex mental system that essentially involves traumatic memories. When traumatized individuals remain as EP, these memories are autonoetic for the EP, but not for the ANP. The memories can represent [pathogenic] kernel aspects of the trauma (Van der Hart & Op den Velde, 1995), a complete overwhelming event, or series of such events, and are usually associated with a different image of the body and a rudimentary or more evolved separate sense of self (McDougall, 1926). Thus the EP range in forms from reexperiencing unintegrated (aspects of) trauma in cases of acute and posttraumatic stress disorder (PTSD), to traumatized dissociative parts of the personality in dissociative identity disorder (DID; APA, 1994).

It is important to note that traumatic memories manifested in the EP are very different from processed narratives of trauma (Janet, 1889, 1904, 1919/25, 1928; Van der Kolk & Van der Hart, 1991). Normal memories convey a narrative to the listener, stories told and retold, changeable over time, and adapted to an audience. While narrative memories are verbal, time-condensed, social and reconstructive in nature, traumatic memories are often experienced as if the once overwhelming event were happening here and now. These hallucinatory, solitary, and involuntary experiences consist of visual images, sensations, and motor actions, which engross the entire perceptual field. They are at least subjectively characterized by a sense of timelessness and immutability (Modell, 1990; Spiegel, Frischholz, & Spira, 1993; Van der Hart & Steele, 1997), and they have no social function (Janet, 1928). Although the EP's traumatic memories include reproductive elements, they are not exact replications of overwhelming events. Apart from the individual's experience of the event, they may include his or her fantasy and misperceptions at the time, and exclude parts of the experience. For example, the traumatic memory of Charcot's patient LeLog included the idea that he had been run over by a wagon (Charcot, 1889). In fact, before losing consciousness, he had seen the wheels approaching him, which impressed upon him the idea of being run over, though he was actually never hit. Also, elements of other (traumatic) experiences may become associated with the traumatic memory, and thus confound it.

Another distinctive feature of traumatic memories is that upon their reactivation, access to many other memories is more or less obstructed. Thus, when the EP is activated, the patient in that state tends to lose access to a range of memories that are readily available for the ANP. The lost memories typically involve episodic memories (personified memories of personal experiences), but may also include semantic memories (fac-

tual knowledge) and even procedural memories (e.g., memories for skills and specific kinds of associations among various stimuli as a result of classical conditioning) (Van der Hart & Nijenhuis, 2001). Myers (1940, p. 46) gives an example of the alteration between the EP, stuck in combat trauma, and the ANP in a World War I soldier (cf. Van der Hart, Van Dijke, Van Son, & Steele, 2000). After being subjected to heavy bombardment, during which a shell burst close to him, this man was brought into the Aid Post because he could not be restrained from rushing over the parapet with bombs in broad daylight. At the Aid Post he could not give his name or regiment, and was only induced to go down to the Field Ambulance by a ruse. In bed, he developed complete mutism and an extremely restless condition, from time to time turning his eyes and head as if following an imaginary object, after which he would withdraw his head beneath the bed clothes in abject horror. Later, when out of bed, he began to have dissociative convulsions, during which he would undoubtedly have hurt himself unless restrained, and following which he evidently visualized his terrifying experiences in the trenches. He called out during these attacks, but afterwards, returned from the EP into the ANP, he had no recollection of his attacks and his mutism persisted. Between attacks he seemed otherwise normal.

As illustrated in this example, the EP typically displays defensive motor behaviors, in particular in response to "triggers" i.e. classically conditioned, trauma-related stimuli. For example, in this condition, the patient may curl up in her chair, and remain largely immobile and silent. She may also hide behind a chair or in a corner. However, when feeling relatively safe, she may be more verbal and mobile. Thus in cases of childhood abuse, the EP with the identity of a child can occasionally display behaviors such as childlike playfulness (e.g. Putnam, 1997; Van der Hart & Nijenhuis, 1998).

Research and clinical observations support the hypothesis that traumatic memories strongly involve sensorimotor features. For example, Van der Kolk and Fisler (1995) found that traumatic memories of subjects with PTSD were retrieved, at least initially, in the form of dissociated mental imprints of sensory and affective elements of the traumatic experience with little or no linguistic component. Sexually abused children also "remembered" their traumas in the form of sensory perceptions, and behavioral responses (Burgess, Hartman, & Baker, 1995), as did women reporting childhood sexual abuse (Nijenhuis, Van Engen et al., 2001) and trauma-reporting EPs of patients with DID (Nijenhuis, Quak et al., 1999).

The field of consciousness of the EP tends to be highly restricted to the trauma as such and to trauma-related affairs. When EPs have evolved, as happens in DID, they may additionally be focused on matters of the current world that fit their experience and identity. In these cases, their procedural, semantic, and episodic memories have been extended to some degree. However, while the EP has synthesized and personified (aspects of) the trauma into its limited range of memories, thus into the part of the personality it represents, it has failed to integrate current reality to a sufficient extent. This leaves the EP ultimately unable to adapt to present reality.

The "apparently normal" part of the personality

Traumatized individuals fail to sufficiently integrate current reality -- normal life -- as EP. As ANP they have failed to integrate the trauma, either partially or fully, and tend to be more or less engaged in normal life. The ANP is predominantly marked by a range of losses or so-called negative dissociative symptoms (Nijenhuis, Spinhoven, Van Dyck, Van der Hart, & Vanderlinden, 1996), such as a degree of amnesia for the trauma and anesthesia of various sensory modalities. The ANP is also characterized by a lack of personification, both with respect to the traumatic memory and with the EP. That is, the ANP has integrated neither the traumatic memory, nor the mental system that is associated with this memory. To the extent that the patient as ANP is informed about the trauma and about the EP, this knowledge remains noetic, and the relevant memories semantic, i.e., lacking personification.

The degree to which the ANP appears normal varies widely. Some PTSD patients succeed in functioning in a rather normal fashion for years. Even some patients with DID may, as ANP, function at a high level of adaptation, e.g., they may be successful professionals (Horevitz & Loewenstein, 1994; Kluft, 1986). However, other patients may have developed extensive and disabling amnesia as ANP (Van der Hart & Nijenhuis, 2001), or may have reached an advanced stage of posttraumatic decline (Tichener,1986). As Janet noted, many traumatized "... patients seem to have had the evolution of their lives checked; they are attached to an insurmountable obstacle" [i.e. the trauma] (Janet 1919/25, p. 660), and lose their "capacity to assimilate new experiences as well as if their personality has definitely stopped at a certain point, and cannot enlarge any more by the addition or assimilation of new elements"(Janet 1911, p. 532). They are condemned to live life "on the surface of consciousness" (Appelfeld, 1994, p. 18).

Intrusions of the EP, especially the traumatic memory that is associated with this part of the personality, interfere with apparent normality. When in a dispositional state, traumatic memories and other trauma-related mental phenomena are usually not a hindrance (Van der Hart, Steele, Boon et al., 1993). However, when fully reactivated, they, like harmful "parasites of the mind," may overgrow consciousness (Charcot, 1889; Janet, 1894). These intrusive, hence positive, dissociative symptoms may consume a considerable amount of time

and energy, partly reproducing the time-line of the overwhelming event. The re-experiencing usually follows a fixed course of events and responses, and cannot be interrupted, or only with excessive effort. The ANP can also be intruded by complete traumatic memories or by aspects of them, such as a particular sensation or motor response. The ANP may ultimately become deactivated upon the activation of the EP, a phenomenon that results in the ANP's amnesia for the episode.

Apart from traumatic memories, other features of the EP can intrude the ANP as well. Examples include hearing the voice of the EP and being subjected to intentional physical movements of the EP. The ANP often fears these symptoms due to a range of variables such as a lack of insight into the nature of the phenomena, a lack of control over them, their association with traumatic memories, and their specific qualities such as a crying or angry voice, and the nature of the messages of the voice.

Although we have identified intrusions as positive symptoms, the content of the intrusions may also involve losses. Thus negative symptoms, such as inhibited movements, and positive symptoms, such as pain, or both, may be present. The complete deactivation of the ANP upon reactivation of the EP can also be described as a combination of two extreme negative (deactivation of ANP) and positive symptoms (activation of EP), respectively.

ANP and EP as mediated by action systems

Although the personality can become dissociated in countless ways, some forms of trauma-related structural dissociation seem far more likely than others. In our view, the EP and ANP are essentially mediated by psychobiological systems. However, what systems are they? The psychobiological systems that dissociative parts of the personality rely on should meet a range of criteria. To name what seem to be the most important ones, first, in order to control functioning for a period of time, these systems must be self-organizing and self stabilizing within windows of homeostasis, time and context. Second, because dissociative disorders can already manifest early in life, the relevant mental systems should be available early in life. Third, since ANP and EP are associated with invariant features, but also display features that depend on the individual case, the mental systems of which dissociative personalities are manifestations should essentially involve stable characteristics, but allow for considerable case-dependent variation as well. According to clinical observations, ANP typically avoids traumatic memories and engages in matters of daily life such as reproduction, attachment to and caretaking of offspring, and social interaction. In contrast, EP is engaged in traumatic memories, in which context it primarily displays defensive and emotional reactions to the threat involved in the trauma and on which they seem to be fixated. Apart from these invariants, the features of ANP and EP also seem to depend on the individual's life history and probably on his or her innate psychobiological characteristics as well. Fourth, EP and ANP seem to exert particular invariant survival functions: EP serves survival interests of the individual in the face of threat, and ANP centers on survival of daily life and survival of the species. Hence, the mental systems that ANP and EP rely on should be functional systems that have been developed in the course of evolution, and they should be rather similar to analogous animal systems. Fifth, because ANP and EP seem to involve rather coherent complexes of sensation, perception, cognition, behavior, and probably (neuro) physiology as well, the mental systems that we are looking for should control and integrate all of these psychobiological phenomena within the confines of the functions they exert. Sixth, because (as we are to suggest below) EP and ANP strongly respond to threat and cues that reactivate traumatic memories -- that is, unconditioned and conditioned stimuli -- the mental systems that drive these dissociative personalities should be very open to classical conditioning.

In all species, threat automatically and unconditionally evokes defense, which is best seen as a complex functional system that has been developed in the course of evolution (Fanselow & Lester, 1988). Panksepp (1998) describes emotional operating systems of fear and rage. Other examples of emotional operating systems include those that control attachment of offspring to parents, parental attachment to and care for offspring, exploration, and play. Some are available in the early stages of development, in particular defense to threat and attachment to caretakers, while others develop in time (e.g., reproduction). It seems that these action systems very closely meet the six criteria that we have described. Panksepp (1998) argued that the emotional operating systems are inborn, self-organizing, and self-stabilizing within the limits of time and homeostatic processes. In his words: "Many of the ancient, evolutionary derived brain systems all mammals share still serve as the foundations for the deeply experienced affective proclivities of the human mind." (p. 4) A major premise of affective neuroscience is that there are various neural systems that lead to a limited set of discrete emotional tendencies. That is, basic emotional processes arise from distinct neurobiological systems that reflect coherent integrative processes of the nervous system.

Emotional operating systems can be seen as evolutionary operants, developed to produce certain effects. According to Panksepp (1998), these systems have widespread effects on the rest of the nervous system: "They change sensory, perceptual and cognitive processing, and initiate a host of physiological changes that are naturally synchronized with the aroused behavioral tendencies characteristic of emotional expe-

rience" (p. 49). The emotional operating systems have superordinate roles in a flow of neural controls that are arranged in a hierarchy. For example, at a simple level they integrate unconditional inputs (unconditioned stimuli) and generate instinctual output patterns (unconditional response patterns). At more evolved integrative levels, central executive components of emotional operating systems, such as the ones for freezing or fight, can synchronize the whole system into a coherent form of emotional responsivity. Thus, they integrate -- that is, coordinate and synchronize -- the operation of several emotional subsystems, and they control both higher cortical functions and lower brain functions. In Panksepp's view, the affective essence of emotionality is organized on subcortical and precognitive levels, and each of the emotional operating systems (e.g., fear, rage, caring for offspring, reproduction, exploration, play, and energy management) involves specific patterns of activation of neural networks and associated neurochemical activity in the brain.

While nature provides a variety of intrinsic potentials of the brain, including the action systems, nurture provides opportunities for these potentials to be manifested in diverse and creative ways in real life. Thus everything we see is epigenetic, a mixture of nature and nurture. Brain tissues create the potential for having certain types of experiences and emitting certain behaviors, but experiences, especially early ones, can change the fine details of the brain forever.

The emotional operating systems (Panksepp, 1998) and functional systems (Fanselow & Lester, 1988), or action systems, as we prefer to call them, because they essentially involve expressive actions -- are functional in that they activate various types of affective feelings which help animals and humans to identify events in the world that are either biologically useful or harmful, and to generate adaptive responses to many life-challenging circumstances. Thus, the basic behavioral patterns involved in action systems are approach and avoidance. Although the resulting behavior is unconditionally summoned by the appropriate cues, approach and avoidance are adaptable to prevailing environmental conditions within limits, rather than being mere inflexible responses. For example, flight involves not just running away from threat, but running that is adapted to the current situation in form, direction, and duration.

The action systems manifest as patterns of activation involving variables such as sensory awareness, perceptual bias, emotional tone and regulation, memory processes, mental models, behavioral response patterns (Siegel, 1999), and in humans (and perhaps in some primates), a sense of self. Thus, threat as an unconditional stimulus does not evoke a single "unconditional" response, but, at least within the confines of the defensive system, integrated series of psychobiological responses. Furthermore, defense consists of subsystems, each of which controls a pattern of psychobiological reactions that is adapted to meet a particular degree of threat imminence (Fanselow & Lester, 1988). This degree can be expressed in terms of the time and space that separate the subject from the threat (i.e., the distance between predator and prey), as well as in terms of an evaluation of the defensive abilities of the subject (e.g., the subject's psychosocial influence and physical force).

Pre-encounter defense involves an apprehensive state with increased arousal, interruption of nonaversively motivated, "normal life," behaviors, and retraction of the field of consciousness to focus nearly exclusively on the potential threat. Post-encounter defense includes several subsystems: (1) flight and (2) the circa-strike subsystem freeze with associated analgesia and anesthesia, (3) potentiated startle response, and (4) fight. Post-strike defense involves total submission. Upon survival, a recuperative subsystem is activated. This subsystem allows for a return of affective awareness and body sensations (pain, among others), which motivate wound care and seeking rest through social isolation, and sleep. Upon recovery, there will be a reactivation of (sub)systems that control "normal daily life" life interests such as consumption of food, reproduction and taking care of offspring.

The EP is dedicated to the survival of "predatory" threat

In our analysis, EPs essentially are manifestations of action systems: primarly the one that controls defense in the face of threat -- foremost threat to the integrity of the body by a person -- and potentially also the one that controls attachment to caretakers. Both systems serve survival interests and strongly influence what the patient remaining as EP is likely to sense, perceive, feel, think, recall, and do. While EPs essentially rely on genetic potentials, their manifest form will also be shaped by environmental conditions, foremost traumatic experiences, in particular those that occurred in early childhood, and subsequent external and internal contextual conditions (e.g., the degree and quality of social support in the aftermath of trauma, repetition of trauma, the degree of dissociation between EP and ANP).

In cases of primary structural dissociation, which is characteristic of acute stress disorder and simple PTSD, the EP includes all defensive subsystems. The EP can also be further structurally dissociated within itself, as evident in complex PTSD (or disorders of extreme stress: DESNOS; Pelcovitz et al., 1997), and dissociative disorder, not otherwise specified (DDNOS; APA, 1994). We have labeled this phenomenon secondary structural dissociation (Nijenhuis & Van der Hart, 1999; Van der Hart, 2000). In the current analysis, this condition is a manifestation of a smaller or wider range of defensive subsystems that have not, or not sufficiently,

been integrated among each other. The attachment to caretakers can also have become associated with one or more secondarily dissociated EPs. The integrative failure is mediated by a degree of traumatization that is more severe than the kinds of trauma that are associated with simple PTSD. For example, our clinical observations suggest that some childlike EPs typically display freezing and are analgesic, that others are inclined to physically resist threat and experience anger, and that still others totally submit to threat while being severely anesthetic. This threat consists in re-experiencing (traumatic) memories of severe and chronic childhood abuse and neglect, or in responding to cues that are salient reminders of these recalled events. Thus the EP may become divided into several EPs that serve different defensive functions and that rely on defensive subsystems. Because these subsystems tend to be evoked in succession across time and progression of imminence, we propose to label this phenomenon sequential secondary structural dissociation, or briefly, sequential dissociation. Dividedness may also be within a single moment of time between an observing EP and an experiencing EP, which can be referred to as parallel secondary structural dissociation, or parallel dissociation. In this instance, the observing EP is subjectively out-of-body and looks upon the experiencing EP from a distance. To complicate matters even further, in complex dissociative disorders some EPs may represent combinations of sequential and parallel dissociation.

The ANP is dedicated to managing daily life and to survival of the species

Clinical observations suggest that while EPs are essentially dedicated to functions that serve the survival of the individual when exposed to major threat, the functions of the ANP are to perform daily tasks necessary to living, as well as tasks that serve the survival of the species. Like defensive functions, managing daily life and functions associated with the survival of the species are also controlled by specific emotional operating systems (Panksepp, 1998). These systems include exploration of the environment, managing energy levels through rest, sleep, eating, and drinking, interpersonal cooperation, and reproduction and caretaking.

Survival of the species involves a range of functions, one of them being attachment to, and caretaking of, offspring. As ANP, some patients execute this function with passion, but others may also fail to personify the experience of being a parent to a significant extent, or may be out of contact with their bodies, or experience emotional numbing. As a result, some traumatized patients, who as ANP experience moderate to severe depersonalization, execute child rearing tasks rather "technically." For example, as the ANP that regarded itself as the mother of her child, a DID patient had generalized bodily anesthesia. Because of the lack of bodily feedback, she touched her child too harshly when drying the child after a bath, or during dressing , etc. Emotional numbing in the ANP also may lead to technically adequate physical care, but without the emotional attachment so necessary for the normal development of the child.

Both the ANP and EP may be attached to the parents of origin or substitute caretakers. Human-induced trauma, especially caretaker-induced trauma, severely effect attachment patterns. When trauma generated by caretakers begins early in the life of the child, a particular style of attachment often develops, termed disorganized/disoriented (Liotti, 1992; 1995; 1999a, b; Main, 1991; Main & Hesse, 1990; Main & Morgan, 1996). In normal, middle class families, about 15% of the infants develop this attachment style, but in cases of maltreatment its prevalence may become up to three times higher (Van IJzendoorn, Schuengel, & Bakermans-Kranenburg, 1999). Frightened or frightening parental behavior also predicted infant disorganized attachment (Schuengel, Bakermans-Kranenburg, & Van IJzendoorn, 1999). Furthermore, prospective, longitudinal research has demonstrated that disorganized and avoidant attachment in early childhood, as well as age of onset, chronicity, and the severity of abuse all predicted dissociation in various developmental stages, up to late adolescence (Ogawa et al., 1997).

In our view, disorganized attachment may be not actually disorganized, nor does it necessarily involve disorientation. Instead it involves concurrent or rapid successive activation of the attachment system and the defense system. Especially when primary attachment figures are the source of threat, a devilish dilemma is created for traumatized children: the individuals from whom they would seek protection under threat, are, in fact, the source of threat. When removed from the attachment figures, the innate attachment system evokes mental and behavioral approach to the caregiver. However, approaching the attachment figure that is also neglectful, abusive, or otherwise frightening, yields an increasing degree of imminence of threat, and therefore evokes a succession of defensive subsystems (flight, freeze, fight, submission).

The conflict between approach and avoidance that cannot be resolved by the child promotes a structural dissociation of the attachment system and the defensive system. In cases of primary structural dissociation, the ANP can be attached to the perpetrating or neglectful caretaker(s), while being more or less dissociated from, and otherwise avoidant of the EP that represents the defensive system and that encompasses traumatic memories of abuse and neglect. The ANP may also display avoidant attachment, and the EP can be secondarily dissociated into an additional EP that represents the attachment system (i.e., the childlike part of the

Table 1. Structural dissociation of the personality.

(Relatively) integrated action systems	The personality at large					
Primary structural dissociation: Simple PTSD	Emotional Part of the Personality					Apparently Normal Part of the Personality
Action systems	The system dedicated to survival of the severely threatened individual: the defensive system					Systems dedicated to survival of the species & to managing daily life
Secondary structural dissociation: Complex PTSD, Disorders of Extreme Stress, DDNOS	Dividedness of the Emotional Part of the Personality					
Action systems: sequential dissociation*	Apprehension	Flight	Freeze; Analgesia	Fight	Total submission Anesthesia	Recuperation Return of pain sensitivity
Action systems: parallel dissociation*	Observing part of the personality					
	Experiencing part of the personality					

*(1) Combinations of sequential and parallel secondary structural dissociation may occur; (2) Sequential dissociation may also include an EP that remains attached, in a regressive way, to abusive and/or neglectful caretakers. This may be a separate EP or an EP that also has a defensive function. One or more ANPs may also remain attached to these perpetrators.

personality that loves the perpetrating parent; the part of the personality that desires attachment to a "stronger and wiser" therapist, etc.), and an EP that represents the defensive system. The dissociative parts of the personality that avoid awareness of attachment needs display phobia of attachment, resulting in avoidance of contact, pseudo-independence, and disconnection from basic self needs. Parts of the personality that are dedicated to fulfilling attachment needs display phobia of emotional loss, manifesting in fears of abandonment, clinging behaviors, intolerance of aloneness, and regressive dependency.

Like differentiation of the EP, division of the ANP may occur as well, which we have called tertiary structural dissociation (Nijenhuis & Van der Hart, 1999; Van der Hart, Van der Kolk, & Boon, 1998). Tertiary structural dissociation, which characterizes DID, does not occur during trauma, but rather emerges when certain inescapable aspects of daily life become associated with past trauma, i.e., have become conditioned stimuli that tend to reactivate traumatic memories. An example is provided by a DID patient with a history of childhood sexual abuse. When she became pregnant and needed prenatal examinations by an obstetrician, she developed a new ANP which was able to tolerate the physical examinations without intrusion of traumatic memories. Stimulus generalization from past trauma also may make daily life increasingly difficult, and constant triggering may further lower mental levels, so that some DID patients produce ANP is to deal with the slightest conflicted, unpleasant, or new task. This is the exception to the rule, however.

Integrating ANP and EP when threat has subsided

The individual can probably integrate some action systems more readily than others. As Panksepp (1998) argues, multiple feedbacks within and across action systems promote synthesis of components of a system (e.g., perceptions, behaviors, sense of self) and integration across action systems. However, integrating action systems that involve quite different functions, and that are rather mutually exclusive, may be a far more de-

manding mental act than integrating components of a particular action system and integrating functionally related systems. According to this hypothesis, following traumatic stress, the integration of systems dedicated to normal life and survival of the species (ANP), and to survival of the individual in the face of that threat (EP), will fail more readily than integration across subsystems of these two complex systems, or components of these (sub)systems. From this point of view, structural dissociation between the ANP and the EP will be the basic type of integrative failure when trauma strikes. Indeed, primary structural dissociation characterizes the most simple trauma-related mental disorder known, i.e., simple PTSD.

When stress levels rise, integration of subsystems of defense may be compromised as well, yielding secondary structural dissociation, i.e., division of the EP. We hypothesize that this condition marks complex PTSD or DESNOS (Herman, 1992; Pelcovitz et al, 1997), and DDNOS (APA, 1994). In cases of extreme traumatization, even the integration of systems dedicated to managing daily life and to survival of the species may be beyond reach, yielding tertiary structural dissociation. Table 1 summarizes the forms of structural dissociation that trauma may provoke.

Similarities between the human and animal defensive system

The theory of structural dissociation of the personality may serve an important heuristic function as it is open to empirical and experimental tests. At a general level, Nijenhuis, Vanderlinden, and Spinhoven (1998) drew a parallel between the animal defensive, and recuperative, systems and characteristic somatoform dissociative responses of trauma-reporting patients with dissociative disorders. Their review of empirical data and clinical observations suggested that there are similarities between animal and human disturbances of normal eating-patterns and other normal behavioral patterns in the face of diffuse threat; freezing and stilling when serious threat materializes; analgesia and anesthesia when strike is about to occur; and acute pain when threat has subsided and recuperation is at stake.

Nijenhuis, Spinhoven, Vanderlinden, Van Dyck, and Van der Hart (1998) performed a first empirical test of the hypothesized similarity between animal defensive reactions and certain somatoform dissociative symptoms of trauma-reporting dissociative disorder patients. Twelve somatoform symptom clusters consisting of clinically observed somatoform dissociative phenomena were constructed. All clusters discriminated between patients with dissociative disorders and patients with other psychiatric diagnoses. Those expressive of the hypothesized similarity -- freezing, anesthesia-analgesia, and disturbed eating -- belonged to the five most characteristic symptoms of dissociative disorder patients. Anesthesia-analgesia, urogenital pain and freezing symptom clusters independently contributed to predicted caseness of dissociative disorder. Using an independent sample, it appeared that anesthesia-analgesia best predicted caseness after controlling for symptom severity. The indicated symptom clusters correctly classified 94% of cases that constituted the original sample, and 96% of the independent second sample. These results were largely consistent with the hypothesized similarity to animal defense systems.

Among Dutch and Flemish dissociative disorders patients the severity of somatoform dissociation -- as measured by the Somatoform Dissociation Questionnaire (SDQ-20; Nijenhuis, et al., 1996, Nijenhuis, Van Dyck et al., 1999) -- was best predicted by threat to the integrity of the body in the form of childhood physical abuse and childhood sexual trauma (Nijenhuis, Spinhoven, Van Dyck, Van der Hart, & Vanderlinden, 1998). The particularly strong association between the SDQ-20 -- which includes many items that assess anesthesia, analgesia, and motor inhibitions -- and physical abuse has also been found in a range of other populations: normal subjects (Waller et al., 2000), gynecology patients with chronic pelvic pain (Nijenhuis et al., 2002), women reporting childhood sexual abuse (Nijenhuis, Van Engen et al., 2001), psychiatric outpatients (Nijenhuis, Van der Hart, Kruger, & Steele (2004), North American dissociative disorder patients (Dell, 1997), and Ugandan dissociative disorder patients (Nijenhuis & Van Duyl, 2001).

Far more specific tests of the current theory are obviously necessary. Below we will discuss recent experimental research suggesting (1) that animal defense-like reactions particularly characterize the EP (with EPs being fixed on threat cues, and ANPs being avoidant of these cues) and (2) that EPs and ANPs have different psychobiological stress responses to unconditional and conditional threat-related stimuli, even if these stimuli are presented precognitively. Future research into secondary structural dissociation will -- besides answering other questions -- have to decipher whether the various EP-subtypes have similar features of animal defensive subsystems.

MAINTENANCE OF STRUCTURAL DISSOCIATION

Persistence of structural dissociation is an essential feature of trauma-related disorders that range from PTSD to DID. Since living organisms have a natural tendency toward differentiation and integration (Siegel, 1999), we must ask what maintains dissociation when trauma has ceased. In our theoretical view, integrative failure in the aftermath of trauma partly involves effects of Pavlovian, or classical, conditioning, a hypothesis we have begun to explore in quasi-experimental research.

Traumatization and classical conditioning

Exposure to severe threat can yield classical conditioning effects. That is, the traumatized individual can learn to associate previously neutral external and internal stimuli that saliently preceded or accompanied the threat with a representation of the inherently aversive, hence "unconditioned," event. Such idiosyncratic stimuli resulting from this type of associative learning signal that threat is about to happen once more, and are called sequential conditioned stimuli (CS). Stimuli that have come to refer to the trauma directly are known as referential CS. Both sequential and referential CS can reactivate the memory representation of the trauma, and with it the dissociated mental system that has encoded and stored this representation: the EP.

As ANP, the patient can be intruded upon by a reactivated traumatic memory. Theoretically, this intrusion constitutes a classical conditioning process since it exposes the ANP to a traumatic memory that involves inherently aversive knowledge, sensations, affects, etc. Thus, traumatic memories constitute aversive unconditioned stimuli. As a result, stimuli that saliently preceded or refer to the intrusion can become conditioned stimuli for the ANP. The consequence of these types of associative learning is that CS which signaled the reactivation of the traumatic memory, or that refer to it, will tend to re-evoke the traumatic memory, as well as responses that are similar to the ones that the original trauma elicited. These "conditioned" reactions include integrative failure as manifested in (peritraumatic) dissociation. This failed integration is due to a mental escape response to avoid inherently aversive stimulation. When the patient as ANP has learned these associations, he or she will try to avoid, or escape from, the CS that reactivate the traumatic memory and the EP that is involved. In a word, the ANP is prone to develop phobia of traumatic memory (Janet, 1904, 1919). This phobia involves a range of the avoidance and escape reactions that preclude integration of the trauma. Thus, phobia of traumatic memory maintains the structural dissociation of the ANP and EP.

Since dissociation is less than perfect in most cases, the ANP does not succeed in avoiding traumatic memories completely. Especially when dissociation and retraction of the field of consciousness are prominent, the ANP is relatively unaware of stimuli that reactivate the EP. Such reactivations will then be experienced as uncontrollable and unpredictable. In this context, the ANP becomes ever more sensitized to the EP and ever more stimuli will become associated with the EP. Moreover, due to generalization learning, ever more stimuli will become associated with stimuli that have already gained a CS status. As a result, the ANP will start avoiding a wide range of inner and outer events. This avoidance may become a chronic adaptation, taking the form of phobia of normal life (Nijenhuis & Van der Hart, 1999; Van der Hart & Steele, 1999). As a result of expanding fears and phobias, even individuals who functioned at a high level prior to trauma, or who in the initial aftermath of trauma functioned rather well, may get caught in a spiral of posttraumatic decline (Janet, 1909; Tichener, 1986) in which ever less of "apparent normality" remains.

Apart from phobia of traumatic memory, the ANP may also develop phobia of EP, which is a specific form of phobia of dissociative parts of the personality (Nijenhuis, 1994). Some EPs encompass one or more traumatic memories, and little or nothing else. In these cases, phobia of traumatic memory equals phobia of EP. However, evolved EPs may have certain needs and wishes as well. For example, clinical observation suggests that an EP can involve, apart from defensive subsystems, the action systems of attachment or play, which provide it with a tendency to act in the external and internal world. When this happens, the EP acquires some life history that exceeds trauma per se. Its life history will also extend when the EP is repeatedly activated by trauma-related stimuli to which it has become tied through associative learning. In other words, the EP may emancipate (Janet, 1907), i.e., it may develop a set of episodic memories, not all traumatic. The EP may also develop a more or less elaborate sense of self that is fueled by the basic characteristics of the emotional system it represents. As these mental actions occur secondarily to the activation of the defensive and recuperative system, we have labeled it secondary elaboration (Nijenhuis, Spinhoven et al., 1998).

The ANP is likely to learn that even interacting with an emancipated EP whose traumatic memories remain latent can be threatening because these memories can be reactivated at any moment by CS. To the extent that the ANP is unaware of these stimuli, it cannot predict, let alone control, this reactivation. In this context as well, the ANP may acquire phobia of EP.

The ANP that is phobic of traumatic memories and phobic of emotional loss, will fear and avoid the defensive EP that remains attached to the abusive caretaker. Phobia of traumatic memory is also related to phobia of attachment in that the re-experience of trauma often implies re-experience of the painful absence of need-mediating action during and after the trauma.

When the EP has a life over and above the traumatic memories as such, the EP will also try to avoid conditioned stimuli that reactivate its traumatic memories: EPs are equally aversive to the re-experience of trauma as ANPs. However, the EP, by its very nature, cannot escape from reactivated traumatic memories, unlike the ANP. As we have detailed, these memories are inseparable from the action system they include. ANPs can, with variable degrees of success, apply avoidance reactions that include dissociative symptoms such as depersonalization or a complete temporary deactivation of

consciousness. Evolved EPs are generally unable to prevent re-experiencing the trauma once the process is set in motion.

To be complete, we add that in cases of secondary structural dissociation EPs may become phobic of each other. For example, the EP that represents freezing as a post-encounter defensive subsystem may learn to fear and avoid the EP that represents fight as a circa-strike defensive subsystem. In cases of tertiary structural dissociation even ANPs may become phobic, or at least avoidant, of each other. Their unilateral or bilateral avoidance may be based on trauma-related issues and conflicts. Thus one ANP of a DID patient regarded herself as the mother of her child that was produced from an incestuous event with her stepfather. The patient also had another ANP that fiercely denied having a child. This ANP was like an adolescent that enjoyed parties, and that did not want to be bothered by a needy child. Apart from moments of bitter conflict, both ANPs avoided each other.

Conditioned avoidance and escape reactions

The ANP is phobic avoidance of, and escape from the EP, as well as EP-reactivating stimuli may take several forms. Some avoidance strategies may begin as intentional maneuvers, which eventually often become quite autonomous, and some are executed preconsciously. Thus, apparent normality can evolve into a detached lifestyle that relies on avoidance of intimacy and emotion, and concentration on professional or occupational activities. Active behavioral avoidance and escape reactions to external and internal conditioned fear stimuli include distancing from places, people, objects, emotions, and inner voices. These actions include physical distancing, working excessively, (ab)using substances, and mutilating the body (Joseph, Yule, Williams, & Andrews, 1993; King, King, Fairbank, Keane, & Adams, 1998; Solomon, Mikulincer, & Avitzur, 1988). For example, patients with dissociative disorders may use drugs or self-mutilate to temporarily silence inner voices which refer to the EP or its derivates. Passive behavioral avoidance and escape are strategies which prevent exposure to perceived threat, e.g. refraining from actions that involve physical or emotional arousal, and avoiding social interaction by staying at home. For example, sexually abused individuals often avoid looking at or touching their bodies.

Active mental actions to avoid or escape from conditioned fear stimuli include thought suppression, diverting attention to other feelings, thoughts, activities and events, engaging in incompatible mental activities, and especially r dissociation. For example, a patient with depersonalization disorder engaged in involuntary subvocal singing and switching off almost all emotional feelings and body sensations when reactivation of the traumatized state was imminent. Another example concerns a male patient with DES who when exposed to traumatic memories in therapy, "switched" from ANP to EP, and when he learned to prevent this involuntary transition, he was only able to perceive the trauma from a third person perspective. Most patients experience this dissociation as an involuntary, automatic event. However, as we will discuss below, there are data suggesting that this type of mental escape from, and avoidance of, the trauma and the EP can involve preconsciously applied mental effort. Passive mental avoidance involves means to prevent confrontations with external and internal threat cues by mentally withdrawing from the world. For example, to avoid such confrontations, a PTSD patient sat for hours on end in his chair with a blank mind, i.e. with an extremely retracted field of consciousness.

In some traumatized individuals, alternation between the ANP and EP manifests from the acute phase onward. As we remarked above, other individuals function apparently well for extended periods of time before displaying posttraumatic stress symptoms. However, upon close scrutiny it often appears that the latency period was marked by avoidance of the trauma and associated internal and external cues, yielding a condition of chronic depersonalization. In cases of trauma-related dissociative amnesia as a disorder (APA, 1994), access to the episodic and semantic memory of the trauma is lost, as well as to (parts of) one's nontraumatic previous life (Markowitsch et al., 2000; Van der Hart & Brom, 2000; Van der Hart & Nijenhuis, 2001).

Evaluative conditioning

In addition to classical fear conditioning, evaluative conditioning (Baeyens, Hermans, & Eelen, 1993) of external and internal stimuli may occur, i.e. associative learning that results in stimuli that acquire an evaluative tone similar to the appraisal from other external or internal stimuli during or after the trauma. Thus, when the trauma was a shameful event, the ANP may learn to be ashamed of the EP, and to despise it. Traumatized individuals eventually may even develop a generalized shame of their own subjective experiences, such as inner thoughts, feelings, physical sensations, wishes, fantasies and needs, and personal features, such as the body per se. Moreover, due to shyness and emotional neglect, some individuals will have experienced integrative deficits prior to trauma that already limit their ability to tolerate and regulate internal states (Siegel, 1999). Jointly, these negative evaluations promote phobia of mental contents (Van der Hart & Steele, 1999), including body awareness.

Relational factors that maintain structural dissociation

When the trauma involves a socially recognized event (e.g., loss of a close relative; natural disasters), the so-

cial environment usually exerts a benign, supportive pressure to integrate the experience. For example, relatives will gently preclude persistent denial of the death of the loved one, by means of caring and supportive conversation and actions that help personalize the loss. However, when significant others deny trauma instead of assisting in the integration of the painful experience, or prohibit talking about it, dissociative tendencies are enhanced. These social influences prevail in intrafamilial childhood sexual abuse (Freyd, 1996). Consistent with this hypothesis, several studies have found that dissociative amnesia is most strongly associated with this type of trauma (Vanderlinden et al., 1993). Furthermore, PTSD has been associated with lack of support in the aftermath of trauma (King et al., 1998), and in another study, patients with complex dissociative disorders reported total absence of support and consolation when abused (Nijenhuis, Spinhoven et al., 1998). As the theory of structural dissociation predicts, social support can buffer negative effects of trauma exposure (Elklit, 1997; Runtz & Schallow, 1997).

A DEVELOPMENTAL PERSPECTIVE OF DISSOCIATION

So far, we have assumed that the personality prior to traumatization developed as a relatively integrated mental system. However, with young children such is hardly the case. The first years of life are important in laying the groundwork of a personality organization that is rather cohesive across contextual variables, such as place, time, and state. This developmental process can be threatened by the occurrence of traumatic experiences during the formative years.

In infants, emotional and other mental systems seem to operate in relatively unintegrated ways. While infants rather automatically move from one to another state (as manifestations of different mental (sub)systems), over time, with adequate caregiving and attachment, they gradually learn to exert more volitional control over the various states. The sense of self is still highly state-dependent (Wolf, 1990; Wolff, 1987), and for young children the experience of an emotional state is closely tied to, if not synonymous with active behaviors. The relatively low integrative level of young children can be related to the fact that brain regions that have major integrative functions, such as the prefrontal cortices and the hippocampus, have not yet fully matured. Full maturation of the orbitofrontal and prefrontal cortex requires many years (Benes, 1998). Although the newborn hippocampus contains all cell types and cell layers that are characteristic for the adult hippocampus, granule cells and their target neurons are immature at birth and develop through an extended period of time that may last for three years (Seress, 1998). Furthermore, myelination in the hippocampus increases in childhood until adolescence, after which the pattern remains unchanged (Arnold & Trojanowski, 1996). The hippocampus supports the integration and modulation of modality-specific information (e.g., of the sensory, motor, and visual cortices). This processing results in coherent experiences and memories (Squire & Knowlton, 1995; Zola-Morgan, Squire, Alvarez-Royo, & Clower, 1991). It also serves to evaluate context, which is important in the context-dependent modulation of acquired associations between unconditioned and conditioned stimuli. That is, while these mostly permanent associations seem to be stored in the amygdala (LeDoux, 1996), information processing involving the hippocampus and parts of the prefrontal cortex should inhibit response to CS to the extent that the association does not apply in the present context. Thus, hippocampal and prefrontal structures are involved in inhibiting responses to conditioned threat stimuli when these stimuli do not represent actual threat in the present context. As a result, major defensive and other action systems (which essentially involve the amygdala) still operate in relatively uncoordinated and unintegrated ways in early childhood.

The integrative capacity of children is also limited because of a relative absence of experience-derived templates that are helpful as "attractors" (Siegel, 1999) to integrate new and/or emotionally charged experiences. Thus (young) children would seem to be dependent on their social environment for regulation of the commands of instinctual action systems, and prone to integrative failure. In support of this hypothesis, Ogawa et al. (1997) found that dissociation in early childhood was a normative response to disruption and stress, whereas persistent dissociation in adolescence and young adulthood was indicative of psychopathology.

Although little is known about the development of integrative connections among action systems, it is in interaction with caretakers that young children begin to acquire skills to sustain, modulate, and integrate behavioral states (Putnam, 1997). As Putnam suggested: "Modulation of affective behavioral states is a critical aspect of emotion regulation, as well as social behavior." (p. 161) This modulation can be strongly promoted by the sharing of parallel or complementary states between the child and her caretakers. Although this social sharing is associated with powerful synchronizations of physiological processes between the child and the adult that assist the child in regulating states, lack of synchronization has disruptive effects (Field, 1985). "Good enough" parenting includes adaptation to the child's states, tolerance of the child's states within nurturing limits, soothing distress, and planning cycles of activity and rest for the child. Such caretaking activities critically enhance differentiation and integration of states in the child (Putnam, 1997).

Trauma may interfere with this developmental process (Putnam, 1997): the child will have difficulty integrat-

ing action systems, and constructing cohesive autonoetic consciousness and episodic memory. As Perry and his colleagues (Perry, 1999; Perry, Pollard, Blakely, Baker, & Vigilante, 1995) have argued, repeated activation of specific trauma-related states, or, in our terms, EPs, leads to neurobiological "hard-wiring" of the brain. In particular, the wiring of the developing brain seems to be dependent on the child's life experiences, with the first six years of life as a critical period. Because young children have not yet been able to develop a personality structure that allows for the integration of very stressful experiences, early and chronic childhood traumatization can shape the mind and the brain in ways that promote state-dependent functioning or functioning that is dependent on dissociative parts of the personality.

A substantial range of recent (neuro)biological studies indeed suggest that chronic traumatization can affect the developing brain by compromising integrative functions (Gurvits et al., 2000; Teicher et al., 1997, 2006; for reviews see Bremner, 1999; Glaser, 2000; Siegel, 1999).

However, prospective studies are needed to assess to what extent particular brain features are a risk factor for traumatization, the development of PTSD and dissociative disorders, or both, and to what extent they are caused by trauma. Obviously, some interaction among these factors could also apply. Several psychological data are also suggestive of a potential causal relationship between severe traumatization in early childhood, and compromized integrative functions. For example, younger children had more PTSD symptoms than adolescents (Anthony, Lonigan, & Hecht, 1999), and the severity of psychoform and somatoform dissociation among DID patients and psychiatric controls were best predicted by reported trauma during the first six years of life (Draijer & Boon, 1993; Nijenhuis, Spinhoven et al., 1998). Also, the age of onset, chronicity, and severity of childhood trauma were associated with psychoform dissociative symptoms up to 19 years later (Ogawa et al., 1997).

Traumatized young children may not have developed a relatively integrated personality prior to the onset of trauma, so in terms of the present theory, the emergent structural dissociation of their personality will basically consist of at least one or more ANPs and one or more EPs.

Our clinical observations indeed suggest that even in cases of extreme tertiary structural dissociation of the personality, i.e., DID, the basic division is between parts of the personality that manage daily life and that promote survival of the species (ANPs), and parts that are associated with survival of the individual in the face of (perceived) major threat (EPs). Because some patients with DID display strongly developed -- that is, emancipated -- ANPs and EPs, and because some may have learned to control the switching between these mental systems in the course of treatment, these patients are ideal subjects for studying the psychobiological features of ANP and EP.

PSYCHOBIOLOGICAL RESEARCH WITH ANP AND EP

To summarize the essence of the theory of structural dissociation of the personality, we argue (1) that traumatic experiences, especially when they occur early in life and involve severe threat to the integrity of the body, may activate psychobiological action systems that have been developed by evolution, and (2) that due to extreme stress levels and classical as well as evaluative conditioning to traumatic memories these systems may remain unintegrated to varying degrees. ANPs would be mediated by action systems dedicated to survival of the species and normal life, and EPs by action systems dedicated to survival of the severe threatened individual. From this theory, a range of hypotheses can be derived, some of which we have begun to study empirically and experimentally.

In several studies, imagery of personal trauma, audiotaped descriptions of traumatic experiences, and videotaped traumatic scenes have been used to provoke posttraumatic stress reactions in PTSD patients. Compared to controls, many, but not all, PTSD patients have heightened psychophysiological responses (heart rate, blood pressure, skin conductance, EMG) to these types of trauma-related cues (Keane et al., 1998; Kinzie et al., 1998; Orr, Pitman, Lasko, & Herz, 1993, Orr et al., 1998; Pitman, 1999; Shalev, Freedman, Peri, Brandes, & Sahar, 1997). However, using psychophysiological responses to trauma-related cues as a classificatory criterium of PTSD yields a substantial number of false positives and false negatives (Keane et al., 1998; Kinzie et al., 1998), i.e., the positive and negative predictive values of these factors are limited. The theory of structural dissociation suggests that the "physiological nonresponders" to trauma-cues possibly remain, or manage to remain, in the trauma-avoidant ANP. The ANP could involve the ventral vagal branch of the parasympathetic nervous system (Porges, 2003), involving a vagal brake regarding activation of the sympathetic nervous system. In this regard, it is interesting that veterans with current PTSD who did not react physiologically to the challenge task manifested less re-experiencing symptoms (Keane et al., 1998), perhaps indicating less active EP symptoms. According to the theory, "physiological responders" fail, as ANP, to avoid cued intrusion by the EP, or switch into the EP that engages in flight and freeze, i.e., reactions controlled by the sympathetic nervous system. The physiologic nonresponse could also be a manifestation of an EP that engages in total submission, a response pattern that may be controlled

by the dorsal vagal branch of the parasympathetic nervous system (Porges, 2003).

According to the theory, the ANP and EP display different psychophysiological responses to traumatic memories that belong to the episodic memory system of the EP, and that -- at most -- belong to the semantic memory system of the ANP. Brewin (2001) talks about situationally accessible memories (marking EP) and verbally accessible memories (characterizing ANP to the extent that ANP retrieves trauma-related memories). Thus EPs would react as "physiologic responders" with PTSD, and ANPs as "nonresponders." (Incidentally, according to the theory of structural dissociation, the responders would remain as EPs, and the nonresponders as ANPs.)

In the first study of its kind, Nijenhuis, Quak et al. (1999) assessed several psychophysiological reactions of ANPs and EPs to audiotaped descriptions of traumatic memories in 11 women with DID that was assessed by the SCID-D (Steinberg, 1994). Descriptions of recalled responses to the stimuli that constituted the recalled event were not included in the audiotape, because such response descriptions may be suggestive, and therefore may yield experimental artifacts. The memories were autonoetic for the EP, and anoetic, or at most noetic, for the ANP. In support of the hypotheses, it was found that in response to the trauma memory scripts, EPs, but not ANPs, displayed decreases of heart rate variability, and increases of heart rate frequency, systolic blood pressure, and diastolic blood pressure. No habituation or sensitization effects were observed. Both dissociative parts of the personality did not have differential psychophysiological responses to neutral memories that were autonoetic to both ANP and EP. Whereas EPs experienced a wide range of affective and sensorimotor reactions to the trauma memory scripts, ANPs did not have these reactions, or only to a minor degree. Compared with the reactions of PTSD patients found in most studies, the EPs of DID patients had greater increases of heart rate and both systolic and diastolic blood pressure upon exposure to personified trauma-cues. Among PTSD patients more severe pathology was associated with a higher magnitude of psychophysiological reactions to these cues (Orr et al., 1998).

Could these remarkable responsive patterns of DID-patients be a result of suggestion? Pending tests with DID-simulating controls, it should be noted that 80% or more of DID-patients have PTSD (Boon & Draijer, 1993; Darves-Bornoz, 1997; Darves-Bornoz, Pierre, Lépine, Degiovanni, & Gaillard, 1998), and that dissimulating and simulating PTSD is difficult (Gerardi et al., 1989; Orr & Pitman, 1993). When subjects with PTSD were instructed to alter their psychophysiological responses to combat stimuli, they were unable to do so, and although subjects without PTSD were able to increase certain psychophysiological responses to appear more like the PTSD veterans, large differences between PTSD and non-PTSD subjects remained (Gerardi et al., 1989). Thus, if one argued that the ANP and EP in DID result from suggestion, and do not reflect genuine dissociative parts of the personality, one still would have to explain a range of important phenomena. First, why is there comorbid PTSD in these patients? Why does the DID patient's EP have more pronounced psychophysiological responses to trauma-cues compared to the magnitude of response in PTSD patients? What is the explanation of positive (dissociative) PTSD symptomatology in DID that depends on the part of the personality that is dominant at a given moment, such as intrusions, and psychophysiological responses to trauma-cues? And if one does not accept the concept of functioning that is dependent on the activated part of the personality, how does one explain the ability of DID patients to periodically dissimulate their PTSD, a feat that PTSD patients without DID cannot perform? Currently, it is tested whether ANP and EP simulating healthy women have different psychophysiological reactions to neutral and aversive autobiographical memories (Reinders et al, in progress). The preliminary results suggest that these differences do not exist.

In the experiment with DID patients discussed above, patterns of neural activity associated with ANP and EP were also studied using PET (Reinders et al., 2003). There were no differences in regional cerebral blood flow (rCBF) for ANP and EP when the patients listened to shared, neutral autobiographical memories. However, large differences in regional neural activity were found for these dissociative parts when they listened to trauma memory scripts that ANP did not regard as a personal memory. EPs had, among others, more activity in the insula, and less activity in the right medial prefrontal cortex. Compared to EP, ANP had more activity in parietal (BA7/40) and occipital regions (BA 18,19). Interestingly, changed perfusion in BA 7/40 was previously found to be related to differences in sense of self in patients with depersonalization disorder (Simeon et al., 2000). The rCBF changes in the visual association areas (BA 18 and precuneus) and middle occipital gyrus (BA 19) reflect an inability of ANP to integrate visual and somatosensory information. This deactivation pattern is consistent with earlier functional imaging reports in normal subjects (Craik et al., 1999; Fink et al., 1996) exploring autobiographical versus nonautobiographical (i.e., self versus nonself) episodic memory retrieval. Reinders et al. suggested that their findings confirm the nonautobiographical manner in which ANP and the emotional way in which EP process the trauma-related script, supporting the concept of a different sense of autobiographical self for ANP and EP within one brain.

Reinders et al.is more detailed analyses, in a paper that is about to be submitted, also show more activation of the bilateral amygdala, somatosensory cortex (SII), and

caudate, and less activation of the anterior cingulate for EP compared to ANP during exposure to the trauma memory scripts. These findings are supportive of the theory of structural dissociation: EPs have strong emotional responses to traumatizing events that escape inhibition by prefrontal regions, whereas ANPs inhibit emotional reactions, while being depersonalized and not well in contact with bodily feelings. Work in progress tests rCBF for ANP and EP simulating healthy women.

Our theory considers that ANPs can mentally avoid unconditioned and conditioned threat cues, and that EPs will selectively attend to these cues. It is well established that response to major threat cues is controlled by preconscious information processing (LeDoux, 1996). For example, responses to angry faces are essentially controlled by the right portion of the amygdala, thus involving reflexive emotional reactions (Morris, Ohman, & Dolan, 1998), and recent MRI-evidence has demonstrated exaggerated amygdala response to masked facial stimuli in PTSD (Rauch et al., 2000). We thus hypothesized that dissociative parts of the personality will display different reactivity to (un)conditioned threat, and that these differences will be evident following exposure to subliminally presented threat cues, i.e. cues that are presented very briefly to preclude consciously aware perception. In an original study, Van Honk et al. (1999) tested the effects of exposing the ANP and EP in DID patients to subliminally presented neutral, fearful, and angry facial expressions. They found that it tended to take ANPs less time to name the color of the mask that immediately followed the experimental stimuli when this stimulus involved angry facial expressions, compared to exposure to neutral facial expressions. However, EPs did not display this effect. Compared with real DID patients, DID-simulating controls had the reverse pattern: longer response latencies after exposure to angry faces when enacting ANPs, and a tendency toward shorter reaction times after exposure to angry faces as EPs: the interaction group (real DID/DID-simulators) x condition (angry/neutral faces) was statistically significant. These differences did not show up when using fearful faces compared to neutral faces. Thus, the effect seems to be specific for cues that signal an increased possibility of attack. The results are supportive of the hypothesis that ANPs preconsciously avoid subliminal threat cues, and that EPs are focused on threat cues.

If ANPs can preconsciously avoid externally presented (un)conditioned threat cues, it is reasonable to assume that they can also preconsciously avoid internal (un)conditioned threatening stimuli. Hence, it seems quite possible that the ANP preconsciously avoid the EP and its memories. In the theory of structural dissociation, this avoidance is a mental action that explains phobia of traumatic memory, phobia of dissociative parts of the personality, as well as phobia of mental contents. It further explains persistent trauma-related dissociation, including degrees of dissociative amnesia.

Markowitsch and his colleagues have demonstrated that trauma-related dissociative amnesia can be associated with reduced blood flow in parts of the brain that are normally activated during retrieval of autobiographical memories (Markowitsch, 1999; Markowitsch, Calabrese et al. 1997; Markowitsch, Fink et al., 1997; Markowitsch et al.,1998, 2000). Moreover, partial regaining of these memories was correlated with a return to normal brain metabolism in these areas (Markowitsch et al., 2000). These neurobiological data are consistent with the interpretation that dissociative amnesia involves inhibited access to memory. To repeat, this inhibition may reflect preconscious avoidance of perceived threat.

According to the theory of structural dissociation of the personality, there will be testable psychobiological differences between dissociative parts of the personality that are manifestations of the attachment system and dissociative parts that represent the defensive system. For example, it predicts that the neuroendocrine profiles of these dissociative parts of the personality will be similar to the neuroendocrine profiles that are characteristic for the relevant action systems (attachment to and caretaking of offspring; defense). Since these dissociative parts present most distinctively in DID, experimental research into these matters will be best accomplished with patients who have this mental disorder that has remained a mystery for so long.

CONCLUSION

In this paper, we have presented a theory that attempts to comprehend trauma-related structural dissociation of the personality. In this context, the term dissociation has been qualified in several ways. As a process, dissociation has been described as a failure to synthesize and personify terrifying experiences. In the acute phase, this failure manifests in psychoform and somatoform peritraumatic dissociative symptoms, and in the aftermath of trauma, in current dissociative symptoms. The theory holds that dissociative processes do not split the emotional system that constitutes the premorbid personality in random ways, but rather along metaphoric minute cracks that naturally exist between action systems and subsystems. These systems are conceptualized as evolutionary based action systems that serve major functions, predominantly survival of the individual in the face of major threat, survival of the species, and management of daily life. In this context we have proposed three levels of structural dissociation that mark a range of trauma-related disorders: simple PTSD; complex PTSD, DES and DDNOS; and DID. According to the theory, these various disorders can be situated on a continuum of complexity of structural dissociation of the personality. Within this perspective, DID is not a manifestation of suggestion and role-playing as some authors believe

(Lilienfeld et al, 1999; Spanos, & Burgess, 1994), but an extreme on a dimension of trauma-related mental disorders (Draijer & Boon, 1999; Brown, Frischholz, & Scheflin, 1999). However, the theory also holds that secondary elaboration and shaping of previously evoked dissociative mental systems may occur, e.g., by a range of psychological, social, and cultural influences (Laria & Lewis-Fernández, 2001).

We have presented a body of empirical and experimental data that support, or that are at least consistent with, the proposed theory. At a minimum it can be said that the basic distinction between ANP and EP serves heuristic functions in the study of trauma-related mental disorders. For example, the theory predicts testable neuroendocrine differences between both psychobiological systems, such as more prominent norepinephrine levels in EPs (to the extent that they involve activation of the sympathetic nervous system) compared to ANPs upon exposure to (perceived) threat. Another example of the heuristic function of the theory relates to the differential responses of ANPs and EPs to trauma memories and masked angry facial expression, as well as their different cortisol levels. Findings suggest that the processing of (perceived) threat by these dissociative parts of the personality diverges from the very early stages of information processing onward; this hypothesis can be tested using functional MRI. In fact, we currently plan this study. If the hypothesis would be confirmed, the next major question to address is what process controls the rather fundamental reorganization of the brain and mind when the traumatized individual switches from one dissociative part of the personality to another, in particular with respect to alternations between ANP and EP.

The theory also suggests a host of treatment guidelines that cannot be elaborated here (see Steele, Van der Hart, & Nijenhuis, in press). Briefly, it indicates that the treatment of trauma-related disorders, including DID, involves integration of feared mental contents in ways that are adapted to the current integrative capacity of the patient. The treatment basically concerns resolution of the structural dissociation of the personality by exposing the dissociative parts of the personality, and their mental contents, to each other in carefully planned steps that promote integration and preclude re-dissociation. The theory predicts that overcoming tertiary dissociation in DID is less demanding than overcoming secondary dissociation. It also states that overcoming primary dissociation implies exposure to severe perceived threat, and thus requires the highest level of mental functioning.

In practical terms, the theory suggests that the treatment is phase-oriented (cf. Brown, Scheflin, & Hammond, 1998; Herman, 1992b; Van der Hart, Van der Kolk, & Boon, 1998). In the first phase, level of functioning of ANPs is raised, by gradually overcoming phobia of mental contents, phobia of ANPs for each other, and phobia of EPs. Also, phobia of attachment is addressed in that at least a working alliance and cooperation between ANPs and EPs among each other, and with the therapist are secured. If, and only if, the integrative level has been sufficiently raised, phobia of traumatic memories can be addressed in the second treatment phase, by stepwise exposure and prevention of re-dissociation. In the third and final phase, integration of the personality, overcoming phobia of intimate attachment, and coping with life in non-dissociative and otherwise non-avoidant ways are the main goals.

REFERENCES

American Psychiatric Association. (1994). *Diagnostic and statistical manual of mental disorders* (4th ed.). Washington, DC: Author.

Anthony, J.L., Lonigan, C.J., & Hecht, S.A. (1999). Dimensionality of posttraumatic stress disorder symptoms in children exposed to disaster: Results from confirmatory factor analyses. *Journal of Abnormal Psychology*, 108, 326-336.

Appelfeld, A. (1994). *Beyond despair*. New York: Fromm International.

Arnold, S.E. & Trojanowski, J.Q. (1996). Human fetal hippocampal development: I. Cytoarchitecture, myeloarchitecture, and neuronal morphologic features. *Journal of Comprehensive Neurology, 367*, 274-92.

Baeyens, F., Hermans, D., & Eelen, P. (1993). The role of CS-UCS contingency in human evaluative conditioning. *Behavior Research and Therapy, 31*, 731-737.

Benes, F.M. (1998). Human brain growth spans decades. *American Journal of Psychiatry, 155*, 1489.

Boon, S., & Draijer, N. (1993). *Multiple personality disorder in the Netherlands*. Lisse: Swets & Zeitlinger.

Braude, S. (1995). *First person plural: Multiple personality and the philosophy of mind*. Revised edition. Lanham: Rowman & Littlefield.

Bremner, J.D. (1999). Does stress damage the brain? *Biological Psychiatry, 45*, 797-805.

Bremner, J.D., & Brett, E. (1997). Trauma-related dissociative states and long-term psychopathology in posttraumatic stress disorder. *Journal of Traumatic Stress, 10*, 37-49.

Bremner, J.D., Innis, R.B., Ng C.K., Staib, L.H., Salomon, R.M., Bronen, R.A., Duncan, J., Southwick, S.M., Krystal, J.H., Rich, D., Zubel, G., Dey, H., Soufer, R., & Charney, D.S. (1997). PET measurement of central metabolic correlates of yohimbine administration in posttraumautic stress disorder. *Archives of General Psychiatry, 54*, 246-256.

Bremner, J.D., Licinio, J., Darnell, A., Krystal, J.H., Owens, M.J., Southwick, S.M., Nemeroff, C.B., & Charney, D.S. (1997). Elevated CSF corticotropin-releasing factor concentrations in posttraumatic stress disorder. *American Journal of Psychiatry, 154*, 624-629.

Bremner, J.D., Randall, P., Scott, T.M., Bronen, R.A., Seibyl, J.P., Southwick, S.M., Delaney, R.C., McCarthy, G., Charney, D.S., & Innis, R.B. (1995). MRI-based measures of hippocampal volume in patients with PTSD. *American Journal of Psychiatry, 152*, 973-981.

Bremner, J.D., Randall, P., Vermetten, E., Staib, L., Bronen, R.A., Mazure, C., Capelli, S., McCarthy, G., Innis, R.B., & Charney, D.S. (1997). Magnetic resonance imaging-based measurement of hippocampal volume in posttraumatic stress disorder related to childhood physical and sexual abuse--a preliminary report. *Biological Psychiatry, 41*, 23-32.

Brewin, C.R. (2001). A cognitive neuroscience account of posttraumatic stress disorder and its treatment. *Behavior Research and Therapy, 39*, 373-393.

Brown, D., Scheflin, A.W., & Hammond, C.D. (1998). *Memory, trauma treatment, and the law*. New York: Norton.

Brown, D., Frischholz, E.J., & Scheflin, A.W. (1999). Iatrogenic dissociative identity disorder: An evaluation of the scientific evidence. *Journal of Psychiatry and Law, 27*, 549-638.

Burgess, A.W., Hartmann, C.R., & Baker, T. (1995). Memory representations of childhood sexual abuse. *Journal of Psychosocial Nursing, 33*, 9-16.

Charcot, J.M. (1889). *Clinical lectures on diseases of the nervous system delivered at the infirmary of la Salpetriere* (Th. Saville, Trans.) (Vol. 3). London: The New Sydenham Society. (Reprint: Routledge, London, 1991).

Ciompi, L. (1991). Affects as central organising and integrating factors: A new psychosocial/biological model of the psyche. *British Journal of Psychiatry, 159*, 97-105.

Craik, F.I.M., Moroz, T.M., Moscovitch, M., Stuss, D.T., Winocur, G., Tulving, E., & Kapur, S. (1999). In search of the self: a positron emission tomography study. *Psychological Science, 10*, 26n34.

Darves-Bornoz, J.M. (1997). Rape-related psychotraumatic syndromes. *European Journal of Obstetrics and Gynecology, 71*, 59-65.

Darves-Bornoz, J.M., Pierre, F., Lépine, J.P., Degiovanni, A., & Gaillard, P. (1998). Screening for psychologically traumatized rape victims. *European Journal of Obstetrics,.Gynecology, and.Reproductive Biology, 77*, 71-75.

Dell, P.F. (1997, November 8-11). Somatoform dissociation and reported trauma in DID and DDNOS. Paper presented at the 14th International Conference of the International Society for the Study of Dissociation, Seattle, WA.

Draijer, N., & Boon, S. (1993). Trauma, dissocation, and dissociative disorders. In S. Boon & N. Draijer (Eds.), *Multiple personality disorder in the Netherlands: A study on reliability and validity of the diagnosis* (pp. 177-193). Amsterdam/Lisse: Swets & Zeitlinger.

Draijer, N., & Boon, S. (1999). The imitation of dissociative identity disorder. *Journal of Psychiatry and Law, 27*, 423-458.

Ehling, T., Nijenhuis, E.R.S., & Krikke, A. (2001). Hippocampal volume in dissociative identity disorder and matched healthy controls. Proceedings of the 18th International Fall Conference of the International Society for the Study of Dissociation. New Orleans, December 2-4.

Ehling, T., Nijenhuis, E.R.S., & Krikke, A. (2003). Volume of discrete brain structures in florid and recovered DID, DDNOS, and healthy controls. Proceedings of the 20th International Fall Conference of the International Society for the Study of Dissociation. Chicago, November 2-4.

Elklit, A. (1997). The aftermath of an industrial disaster. *Acta Psychiatrica Scandinavica, 96*, 1-25.

Fanselow, M.S., & Lester, L.S. (1988). A functional behavioristic approach to aversively motivated behavior: Predatory imminence as a determinant of the topography of defensive behavior. In R.C. Bolles & M.D. Beecher (Eds.), *Evolution and learning* (pp. 185-212). Hillsdale, NJ: Erlbaum.

Fink, G.R., Markowitsch, H.J., Reinkemeier, M., Bruckbauer, T., Kessler, J., & Heiss, W. (1996). Cerebral representation of ones own past: neural networks involved in autobiographical memory. *Journal of Neuroscience, 16*, 4275n4282.

Freyd, J.J. (1996). *Betrayal trauma: The logic of forgetting childhood trauma*. Cambridge, MA: Harvard University Press.

Gerardi, R., Blanchard, E., & Kolb, L. (1989). Ability of Vietnam veterans to dissimulate a psychophysiological assessment for post-traumatic stress disorder. *Behavior Therapy, 20*, 229-243.

Glaser, D. (2000). Child abuse and neglect and the brain: A review. *Journal of Child Psychology and Psychiatry, 41*, 97-116.

Gurvits, T.V., Gilbertson, M.W., Lasko, N.B., Tarhan, A.S., Simeon, D., Macklin, M.L., Orr, S.P., & Pitman, R.K. (2000). Neurologic soft signs in chronic posttraumatic stress disorder. *Archives of General Psychiatry, 57*, 181-186.

Halgren, E., Walter, R.D., Cherlow, D.G., & Crandall, P.H. (1978). Mental phenomena evoked by electrical stimulation of the human hippocampal formation and amygdala. *Brain, 101*, 83-117.

Harvey, A.G., & Bryant, R.A. (1999). Dissociative symptoms in acute stress disorder. *Journal of Traumatic Stress, 12*, 673-680.

Herman, J.L. (1992). Complex PTSD: A syndrome in survivors of prolonged and repeated trauma. *Journal of Traumatic Stress, 5*,377-392. (a)

Herman, J.L. (1992). *Trauma and recovery*. New York: Basic Books. (b)

Horevitz, R., & Loewenstein, R.J. (1994). The rational treatment of multiple personality disorder. In S.J. Lynn & J.W. Rhue (Eds.), *Dissociation: Clinical and theoretical perspectives* (pp. 289-316). New York: Guilford.

Horowitz, M.J. (1978). Stress response syndromes. Northvale, NJ: Jason Aronson.

Jackson, J.H. (1931/32). *Selected writings of John Hughlings Jackson* (Vol. 1 & 2). London: Milford.

Janet, P. (1889). *L'Automatisme psychologique*. Paris: Félix Alcan.

Janet, P. (1894). Histoire d'une idée fixe. *Revue Philosophique, 37*, 121-163.

Janet, P. (1904). L'amnésie et la dissociation des souvenirs par l'émotion. *Journal de Psychologie, 1*, 417-453.

Janet, P. (1907). *The major symptoms of hysteria*. London & New York: Macmillan.

Janet, P. (1909). *Les névroses*. Paris: E. Flammarion.

Janet, P. (1911). *L'Etat mental des hystériques* (Reprint: Lafitte Reprints, Marseilles, 1983 ed.). Paris: Felix Alcan.

Janet, P. (1919). *Les médications psychologiques*. Paris: Félix Alcan. English edition: Psychological healing. New York: Macmillan, 1925.

Janet, P. (1928). *L'évolution de la mémoire et de la notion du temps*. Paris: A Chahine.

Joseph, S., Yule, W., Williams, R., & Andrews, B. (1993). Crisis support in the aftermath of a disaster: A longitudinal perspective. *British Journal of Clinical Psychology, 32*, 177-185.

Kardiner, A. (1941). *The traumatic neuroses of war*. New York: P. B. Hoeber.

Keane, T., Kolb, L., Kaloupek, D., Orr, S., Blanchard, E., Thomas, R., Hsieh, F., & Lavori, P. (1998). Utility of psychophysiological measurement in the diagnosis of posttraumatic stress disorder: Results from a Department of Veterans Affairs cooperative study. *Journal of Consulting and Clinical Psychology, 66*, 914-923.

King, L.A., King, D.W., Fairbank, J.A., Keane, T.M., & Adams, G.A. (1998). Resilience-recovery factors in posttraumatic stress disorder among female and male Vietnam veterans: hardiness, postwar social support, and additional stressful life events. *Journal of Personality and Social Psychology, 74*, 420-434.

Kinzie, J.D., Denney, D., Riley, C.M., Boehnlein, J.K., McFarland, B.H., & Leung, P. (1998). A cross-cultural study of reactivation of posttraumatic stress disorder symptoms: American and Cambodian psychophysiological response to viewing traumatic video scenes. *Journal of Nervous and Mental Disease, 186*, 670-676.

Kluft, R.P. (1986). High-functioning multiple personality patients: Three cases. *Journal of Nervous and Mental Disease, 174*, 722-726.

Kluft, R.P. (1991). Multiple personality disorder. In A. Tasman & S.M. Goldfinger (Eds.), *American psychiatric press review of psychiatry* (Vol. 10, pp. 161-188). Washington, DC: American Psychiatric Press.

Koopman, C., Classen, C., & Spiegel, D. (1994). Predictors of posttraumatic stress symptoms among survivors of the Oakland/Berkeley, California firestorm. *American Journal of Psychiatry, 151*, 888-894.

Koopman, C., Classen, C., & Spiegel, D. (1996). Dissociative responses in the immediate aftermath of the Oakland/Berkeley firestorm. *Journal of Traumatic Stress, 9*, 521-540

Krystal, J.H., Karper, L.P., Seibyl, J.P., Freeman, G.K., Delaney, R., Bremner, J.D., Heninger, G.R., Bowers, M.B., & Charney, D.S. (1994). Subanesthetic effects of the noncompetitive NMDA antagonist, ketamine, in humans. Psychotomimetic, perceptual, cognitive, and neuroendocrine responses. *Archives of General Psychiatry, 51*, 199-214.

Krystal, J.H., Bremner, J.D., Southwick, S.M., & Charney, D.S. (1998). The emerging neurobiology of dissociation: Implications for the treatment of posttraumatic stress disorder. In J.D. Bremner & C.R. Marmar (Eds.), *Trauma, memory, and dissociation* (pp. 321-363). Washington DC: American Psychiatric Press.

Laria, A.J. & Lewis-Fernández, R. (2001). Professional fragmentation of experience in the study of dissociation, somatization, and culture. *Journal of Trauma and Dissociation, 2(3)*, 17-47.

LeDoux, J.E. (1996). *The emotional brain: The mysterious underpinning of emotional life*. New York: Simon & Schuster.

Lilienfeld, S.O., Lynn, S.J., Kirsch, I., Chaves, J.F., Sarbin, T.R., Ganaway, G.K., & Powell, R.A. (1999). Dissociative identity disorder and the sociocognitive model: Recalling the lessons of the past. *Psychological Bulletin, 125*, 507-23.

Liotti, G. (1992). Disorganized/disoriented attachment in the etiology of dissociative disorders. *Dissociation, 5*, 196-204.

Liotti, G. (1995). Disorganized/disoriented attachment in the psychotherapy of the dissociative disorders. In S. Goldberg, R. Muir, & J. Kerr (Eds.), *Attachment theory: Social, developmental and clinical perspectives*, 343-363. Hillsdale, NJ: The Analytic Press.

Liotti, G. (1999). Disorganization of attachment as a model for understanding dissociative psychopathology. In J. Solomon & C. George (Eds.), *Attachment disorganization*, 297-317. New York: Guilford. (a)

Liotti, G. (1999). Understanding the dissociative process: The contributions of attachment theory. *Psychoanalytic Inquiry*, 19, 757-783. (b)

Main, M. (1991). Metacognitive knowledge, metacognitive monitoring, and singular (coherent) versus multiple (incoherent) models of attachment. In C.M. Parkes, J. Stevenson Hinde, & P. Marris (Eds.), *Attachment across the life cycle* (pp. 127-159). London: Routledge.

Main, M., & Hesse, E. (1990). Parent's unresolved traumatic experiences are related to infant disorganized attachment status: Is frightened and/or frightening parental behavior the linking mechanism? In M.T. Greenberg, D. Cicchetti, & E. M. Cummings (Eds.), *Attachment in the preschool years*, (pp.161-182). Chicago, IL: University of Chicago Press.

Main, M., & Morgan, H. (1996). Disorganization and disorientation in infant Strange Situation behavior: Phenotypic resemblance to dissociative states? In L. Michelson & W. Ray (Eds.), *Handbook of dissociation* (pp. 107-137). New York: Plenum.

Markowitsch, H.J. (1999). Functional neuroimaging correlates of functional amnesia. *Memory*, 7, 561-583.

Markowitsch, H.J., Calabrese, P., Fink, G.R., Durwen, H.F., Kessler, J., Harting, C., Konig, M., Mirzaian, E.B., Heiss, W.D., Heuser, L., & Gehlen, W. (1997). Impaired episodic memory retrieveal in a case of probably psychogenic amnesia. *Psychiatry Research: Neuroimaging Section, 74*, 119-126.

Markowitsch, H.J., Fink, G.R., Thone, A., Kessler, J., & Heiss, W.D. (1997). A PET study of persistent psychogenic amnesia covering the whole life span. *Cognitive Neuropsychiatry, 2*, 135-158.

Markowitsch, H.J., Kessler, J., Van der Ven, C., Weber-Luxenburger, G., Albers, M., & Heiss, W.D. (1998). Psychic trauma causing grossly reduced brain metabolism and cognitive deterioration. *Neuropsychologia, 36*, 77-82.

Markowitsch, H.J., Kessler, J., Weber-Luxenburger, G., Van der Ven, C., Albers, M., & Heiss, W.D. (2000). Neuroimaging and behavioral correlates of recovery from mnestic block syndrome and other cognitive deteriorations. *Neuropsychiatry, Neuropsychology, and Behavioral Neurology, 13*, 60-66.

Marmar, C.R., Weiss, D.S., Schlenger, W.E., Fairbank, J.A., Jordan, K., Kulka, R.A., & Hough, R.L. (1994). Peritraumatic dissociation and posttraumatic stress in male Vietnam theater veterans. *American Journal of Psychiatry, 151*, 902-907.

Marmar, C.R., Weiss, D.S., & Metzler, T.J. (1998). Peritraumatic dissociation and posttraumatic stress disorder. In J.D. Bremner & C.R. Marmar (Eds.), *Trauma, memory, and dissociation* (pp. 229-252). Washington, DC: American Psychiatric Press.

McDougall, W. (1926). *An outline of abnormal psychology*. London: Methuen.

McGaugh, J.L. (1990). Significance and remembrance: The role of neuromodulatory systems. *Psychological Science, 1*, 15-25.

Meares, R. (1999). The contribution of Hughlings Jackson to an understanding of dissociation. *American Journal of Psychiatry, 156*, 1850-1855.

Modell, A. (1990). *Other times, other realities: Towards a theory of psychoanalytic treatment*. Cambridge, MA: Harvard University Press.

Morris, J.S., Ohman, A., & Dolan, R.J. (1998). Conscious and unconscious emotional learning in the human amygdala. *Nature, 393*, 467-470.

Myers, C.S. (1940). *Shell shock in France 1914-1918*. Cambridge: Cambridge University Press.

Nijenhuis, E.R.S. (1994). *Dissociatieve stoornissen en psychotrauma* [Dissociative disorders and psychological trauma]. Houten, The Netherlands: Bohn Stafleu Van Loghum.

Nijenhuis, E.R.S. (1999). *Somatoform dissociation: Phenomena, measurement, and theoretical issues*. Assen, The Netherlands: Van Gorcum.

Nijenhuis, E.R.S., Quak, J., Reinders, S., Korf, J., Vos, H., & Marinkelle, A.B. (1999). Identity dependent processing of traumatic memories in dissociative identity disorder: Converging regional blood flow, physiological and psychological evidence. Paper presented at the Proceedings of the 6th European Conference on Traumatic Stress: Psychotraumatology, clinical practice, and human rights, Istanbul, Turkey.

Nijenhuis, E.R.S., Spinhoven, P., Van Dyck, R., & Van der Hart, O. (1996). The development and psychometric characteristics of the Somatoform Dissociation Questionnaire (SDQ-20). *Journal of Nervous and Mental Disease, 184*, 688-694.

Nijenhuis, E.R.S., Spinhoven, P., & Vanderlinden, J. (1998). Animal defensive reactions as a model for dissociative reactions. *Journal of Traumatic Stress, 11*, 243-260.

Nijenhuis, E.R.S., Spinhoven, P., Vanderlinden, J., Van Dyck, R., & Van der Hart, O. (1998). Somatoform dissociative symptoms as related to animal defense reactions to predatory imminence and injury. *Journal of Abnormal Psychology, 107*, 63-73.

Nijenhuis, E.R.S., Spinhoven, P., Van Dyck, R., Van der Hart, O., & Vanderlinden, J. (1998). Degree of somatoform and psychological dissociation in dissociative disorders is correlated with reported trauma. *Journal of Traumatic Stress, 11*, 711-730.

Nijenhuis, E.R.S., & Van der Hart, O. (1999). Forgetting and reexperiencing trauma. In J. Goodwin & R. Attias (Eds.), *Splintered reflections: Images of the body in treatment* (pp. 39-65). New York: Basic Books.

Nijenhuis, E.R.S., Van der Hart, O., & Kruger, K. (2002). The psychometric characteristics of the Traumatic Experiences Questionnaire (TEC): First findings among psychiatric outpatients. *Clinical Psychology and Psychotherapy, 9(3)*, 200-210.

Nijenhuis, E.R.S., Van der Hart, O., Kruger, K. & Steele, K. (2004). Somatoform dissociation, reported trauma, and animal defence-like reactions. *Australian and New Zealand Journal of Psychiatry, 38*, 678 – 686.

Nijenhuis, E.R.S., Van der Hart, & Steele, K. (2002). The emerging psychobiology of trauma-related dissociation and dissociative disorders. In: H. DiHaenen, J.A. Den Boer, H. Westenberg, & P. Willner (Eds.) pp. 1079-1098, *Biological Psychiatry*. London: Wiley.

Nijenhuis, E.R.S. & Van Duyl, M. (2001). Dissociative symptoms and reported trauma among Ugandan patients with possessive trance disorder. Proceedings of the 18th International Fall Conference of the International Society for the Study of Dissociation. New Orleans, December 2-4.

Nijenhuis, E.R.S., Van Dyck, R., Spinhoven, P., Van der Hart, O., Chatrou, M., Vanderlinden, J., & Moene, F. (1999). Somatoform dissociation discriminates among diagnostic categories over and above general psychopathology. *Australian and New Zealand Journal of Psychiatry, 33*, 511-520.

Nijenhuis, E.R.S., Van Dyck, R., Ter Kuile, M.M., Mourits, M.J.E., Spinhoven, P., & Van der Hart, O. (2003). Evidence for associations among somatoform dissociation, psychological dissociation and reported trauma in patients with chronic pelvic pain. *Journal of Psychosomatic Obstetrics and Gynecology, 24*, 87-98.

Nijenhuis, E.R.S., Van Engen, A., Kusters, I., & Van der Hart, O. (2001). Peritraumatic somatoform and psychological dissociation in relation to recall of childhood sexual abuse. *Journal of Trauma and Dissociation, 2(3)*, 49-68.

Ogawa, J.R., Sroufe, L.A., Weinfield, N.S., Carlson, E.A., & Egeland, B. (1997). Development and the fragmented self: longitudinal study of dissociative symptomatology in a nonclinical sample. *Development and Psychopathology, 9*, 855-79.

Orr, S.P., Pitman, R.K., Lasko, N.B., & Herz, L.R. (1993). Psychophysiological assessment of posttraumatic stress disorder imagery in World War II and Korean combat veterans. *Journal of Abnormal Psychology, 102*, 152-159.

Orr, S.P., Lasko, N.B., Metzger, L.J., Berry, N.J., Ahern, C.E., & Pitman, R.K.(1998). Psychophysiologic assessment of women with posttraumatic stress disorder resulting from childhood sexual abuse. *Journal of Consulting and Clinical Psychology, 66*, 906-913.

Orr, S.P., & Pitman, R.K. (1993). Psychophysiologic assessment of attempts to simulate posttraumatic stress disorder. *Biological Psychiatry, 33*, 127-129.

Panksepp, J. (1998). *Affective neuroscience: The foundations of human and animal emotions*. New York: Oxford University Press.

Pelcovitz, D., Van der Kolk, B.A., Roth, S., Mandel, F., Kaplan, S., & Resick, P. (1997). Development of a criteria set and a structured interview for the disorders of extreme stress (SIDES). *Journal of Traumatic Stress, 10*, 3-16.

Perry, B.D. (1999). The memory of states: How the brain stores and retrieves traumatic experience. In J. Goodwin & R. Attias (Eds.), *Splintered reflections: Images of the body in treatment* (pp. 9-38). New York: Basic Books.

Perry, B.D., Pollard, R.A., Blakely, T.L., Baker, W.L., & Vigilante, D. (1995). Childhood trauma, the neurobiology of adaptation, and "use dependent" development of the brain: How "states" become "traits". *Infant Mental Health Journal, 16*, 271-291.

Pitman, R.K., Orr, S.P., Shalev, A.Y., Metzger, L.J., & Mellman, T.A. (1999). Psychophysiological alterations in posttraumatic stress disorder. *Seminars in Clinical Neuropsychiatry, 4*, 234-241.

Porges, S.W. (2003). The Polyvagal Theory: phylogenetic contributions to social behavior. *Physiology and Behavior, 79*, 503-513.

Putnam, F.W. (1989). *Diagnosis and treatment of multiple personality disorder*. New York: Guilford.

Putnam, F.W. (1997). *Dissociation in children and adolescents: A developmental perspective*. New York: Guilford.

Putnam, F.W., Guroff, J.J., Silberman, E.K., Barban, L., & Post, R.M. (1986). The clinical phenomenology of multiple personality disorder: Review of 100 recent cases. *Journal of Clinical Psychiatry, 47*, 285-293.

Rauch, S.L., Whalen, P.J., Shin, L.M., McInerney, S.C., Macklin, M.L., Lasko, N.B., Orr, S.P., & Pitman, R.K. (2000). Exaggerated amygdala response to masked facial stimuli in posttraumatic stress disorder: A functional MRI study. *Biological Psychiatry, 47*, 769-776.

Reinders, A.A.T.S., Nijenhuis, E.R.S., Paans, A.M.J., Korf, J., Willemsen, A.T.M., & Den Boer, J.A. (2003). One Brain, Two Selves. *NeuroImage, 20*, 2119-2125.

Runtz, M.G. & Schallow, J.R. (1997). Social support and coping strategies as mediators of adult adjustment following childhood maltreatment. *Child Abuse & Neglect, 21*, 211-226.

Schuengel, C., Bakermans-Kranenburg, M.J., & Van IJzendoorn. M.H. (1999). Frightening maternal behavior linking unresolved loss and disorganized infant attachment. *Journal of Consulting and Clinical Psychology, 67*, 54-63.

Seress. L. (1998). Neuronal connections, cell formation and cell migration in the perinatal human hippocampal dentate gyrus. *Ceskoslovenska Fysiologie, 47*, 42-50.

Shalev, A.Y., Freedman, S., Peri, T., Brandes, D., & Sahar, T. (1977). Predicting PTSD in trauma survivors: Prospective evaluation and self-report and clinicial-administrated instruments. *British Journal of Psychiatry, 170*, 558-564.

Shalev, A.Y., Peri, T., Caneti, L., & Schreiber, S. (1996). Predictors of PTSD in injured trauma survivors. *American Journal of Psychiatry, 53*, 219-224.

Siegel, D.J. (1999). *The developing mind: Toward a neurobiology of interpersonal experience*. New York: Guilford.

Simeon, O., Guralnik, E.A., Hazlett, J., Spiegel-Cohen, J., Hollander, E. & Buchsbaum, M.S. Feeling unreal: a PET study of depersonalization disorder. *American Journal of Psychiatry, 157*, 1782n1788.

Solomon, Z., Mikulincer, M., & Avitzur, E. (1988). Coping, locus of control, social support, and combat-related posttraumatic stress disorder: A prospective study. *Journal of Personality and Social Psychology, 55*, 279-285.

Southwick, S.M., Krystal, J.H., Morgan, C.A., Johnson, D., Nagy, L.M., Nicolaou, A., Heninger, G.R, & Charney, D.S. (1993). Abnormal noradrenergic function in posttraumatic stress disorder. *Archives of General Psychiatry, 50*, 266-274.

Spanos, N.P., & Burgess, C. (1994). Hypnosis and multiple personality disorder: A sociocognitive perspective. In S.J. Lynn & J.W. Rhue (Eds.), *Dissociation: Clinical and theoretical perspectives* (pp.136-155). New York: Guilford Press.

Spiegel, D., Frischholz, E.J., & Spira, J. (1993). Functional disorders of memory. In A. Tasman & S.M. Goldfinger (Eds.), *American psychiatric press review of psychiatry*, Vol. 12 (pp. 747-782). Washington, DC: American Psychiatric Press.

Squire, L.R., & Knowlton, B.J. (1995). Memory, hippocampus, and brain systems. In S.G. Michael (Ed.), *The cognitive neurosciences*. (pp. 825-837): MIT Press, Cambridge, MA, US.

Steele, K., Van der Hart, O., & Nijenhuis, E.R.S. (in press). Allgemeine Behandlungsstrategien komplexer dissoziativer Störungen [General treatment strategies for complex dissociative disorders]. In S.O. Hoffman & A. Eckhart-Henn (Eds.). Dissoziative Störungen des Bewusstseins [Dissociative Disorders of Consciousness.] Stuttgart: Schattauer Verlag.

Steinberg, M. (1994). *Structured clinical interview for DSM-IV dissociative disorders, revised*. Washington, DC: American Psychiatric Press.

Teicher, M.H., Ito, Y., Glod, C.A., Andersen, S.L., Dumont, N., & Ackerman, E. (1997). Preliminary evidence for abnormal cortical development in physically and sexually abused children using EEG coherence and MRI. *Annals of the New York Academy of Sciences, 821*, 160-175.

Teicher, M., Tomoda, A., & Andersen, S.L. (2006). Neurobiological consequences of early stress and childhood maltreatment: Are results from human and animal studies comparable? *Annals of the New York Academy of Sciences, 1071*, 313-323.

Tichener, J.L. (1986). Post-traumatic decline: A consequence of unresolved destructive drives. In C. Figley (Ed.), *Trauma and its wake* (Vol. 2, pp. 5-19). New York: Brunner/Mazel.

Tichenor, V., Marmar, C. R., Weiss, D. S., Metzler, T. J., & Ronfeldt, H. M. (1996). The relationship of peritraumatic dissociation and posttraumatic stress: Findings in female Vietnam theater veterans. *Journal of Consulting and Clinical Psychology, 64*, 1054-1059.

Tsai, G.E., Condie, D., Wu, M.T., & Chang, I.W. (1999). Functional magnetic resonance imaging of personality switches in a woman with dissociative identity disorder. *Harvard Review of Psychiatry, 7*, 119-122.

Tulving, E. (1972). Episodic and semantic memory. In E. Tulving & W. Donaldson (Eds.), *Organization of memory* (pp. 381-403). New York: Plenum.

Van der Hart, O. (2000). *Psychic trauma: The disintegrating effects of overwhelming experience on mind and body*. Melbourne: The University of Melbourne, Faculty of Medicine, Dentistry and Health Sciences.

Van der Hart, O., & Brom, D. (2000). When the victim forgets: Trauma-induced amnesia and its assessment in Holocaust survivors. In A. Shalev, R. Yehuda, & A.C. McFarlane (Eds.), *International handbook of human response to trauma* (pp. 223-248). New York: Kluwer Academic/Plenum Publishers.

Van der Hart, O., Brown, P., & Graafland, M. (1999). Trauma-induced dissociative amnesia in World War I combat soldiers. *Australian and New Zealand Journal of Psychiatry, 33*, 37-46.

Van der Hart, O., & Nijenhuis, E. (1995). Amnesia for traumatic experiences. *Hypnos, 222*, 73-86.

Van der Hart, O., & Nijenhuis, E.R.S. (1998). Recovered memories of abuse and dissociative identity disorder. *British Journal of Psychiatry, 173*, 537-538.

Van der Hart, O. & Nijenhuis, E.R.S.. (2001). Loss and recovery of different memory types in generalized dissociative amnesia. *Australian and New Zealand Journal of Psychiatry, 35* (5), 589-600.

Van der Hart, O., & Op den Velde, W. (1995). Posttraumatische stoornisssen [Posttraumatic disorders]. In O. Van der Hart (Ed.), Trauma, dissociatie en hypnose [Trauma, dissociation and hypnosis] (pp. 103-145). Lisse: Swets & Zeitlinger.

Van der Hart, O., & Steele, K. (1997). Time distortions in dissociative identity disorder: Janetian concepts and treatment. *Dissociation, 10*, 91-103.

Van der Hart, O., & Steele, K. (1999). Relieving or reliving childhood trauma? A commentary on Miltenburg and Singer (1997). *Theory and Psychology, 9*, 533-540.

Van der Hart, O., Steele, K., Boon, S., & Brown, P. (1993). The treatment of traumatic memory: synthesis, realization, integration. *Dissociation, 6*, 162-180.

Van der Hart, O., Van der Kolk, B.A., & Boon, S. (1998). Treatment of dissociative disorders. In J.D. Bremner & C.R. Marmar (Eds.), *Trauma, memory, and dissociation* (pp. 253-283). Washington, DC: American Psychiatric Press.

Van der Hart, O., Van Dijke, A., Van Son, M., & Steele, K. (2000). Somatoform dissociation in traumatized World War I combat soldiers: A neglected clinical heritage. *Journal of Trauma and Dissociation, 1(4*), 33-66.

Van Honk, J., Nijenhuis, E.R.S., & Van der Hart, O. (1999). Identity-dependent psychophysiological responses to subliminal threat cues in DID patients. Paper presented at the 15th Annual Meeting of the International Society for Traumatic Stress Studies, Miami, FL.

Van IJzendoorn, M.H., Schuengel, C., & J., Bakersman-Kranenberg, M. (1999). Disorganized attachment in early childhood: Meta-analysis of precursors, concomitants, and sequelae. *Development & Psychopathology, 11*, 225-249.

Van der Kolk, B.A. (1994). The body keeps the score: memory and the evolving psychobiology of posttraumatic stress. *Harvard Review of Psychiatry, 1*, 253-265.

Van der Kolk, B.A., & Fisler, R. (1995). Dissociation and the fragmentary nature of traumatic memories: Overview and exploratory study. *Journal of Traumatic Stress, 8*, 505-525.

Van der Kolk, B.A., & Van der Hart, O. (1991). The intrusive past: The flexibility of memory and the engraving of trauma. *American Imago, 48*, 425-454.

Vanderlinden, J., Van Dyck, R., Vandereycken, W., & Vertommen, H. (1993). Dissociation and traumatic experiences in the general population of The Netherlands. *Hospital & Community Psychiatry, 44*, 786-788.

Vermetten, E, Vythilingam, M., Southwick, S.M., Charney, D.S., & Bremner, J.D. (2003). Long-term treatment with paroxetine increases verbal declarative memory and hippocampal volume in posttraumatic stress disorder. *Biological Psychiatry, 54*, 693-702.

Waller, G., Hamilton, K., Elliott, P., Lewendon, J., Stopa, L. Waters, A., Kennedy, F., Chalkley, J.F., Lee, G., Pearson, D., Kennerley, H., Hargreaves, I., & Bashford, V. (2000). Somatoform dissociation, psychological dissociation and specific forms of trauma. *Journal of Trauma and Dissociation, 1*, 81-98.

Wheeler, M.A., Stuss, D.T., & Tulving, E. (1997). Toward a theory of episodic memory: The frontal lobes and autonoetic consciousness. *Psychological Bulletin, 121*, 331-354.

Weiss, D.S., Marmar, C.R., Metzler, T.J., & Ronfeldt, H.M. (1995). Predicting symptomatic distress in emergency services personnel. *Journal of Consulting and Clinical Psychology, 63*, 361-368.

Wolff, P.H. (1987). *The development of behaviroral states and the expression of emotions in early childhood*. Chicago: University of Chicago Press.

Wolf, D.P. (1990). Being of several minds: Voices and versions of the self in early childhood. In D. Cicchetti & M. Beeghly (Eds.), *The self in transition: Infancy to childhood* (pp. 183-212). Chicago, IL: The Chicago University Press.

Yehuda, R. (1998). Resilience and vulnerability factors in the course of adaptation to trauma. *Clinical Quarterly, 8*, 1-5.

Zola-Morgan, S., Squire, L.R., Alvarez-Royo, P., & Clower, R.P. (1991). Independence of memory functions and emotional behavior: Separate contributions to the hippocampal formation and the amygdala. *Hippocampus, 1*, 207-220.