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# Self or Selves?

## Dissociative Identity Disorder and Complexity of the Self-System.

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**ABSTRACT.** Contemporary discussions within the fields of neuroscience (biology), physics and philosophy have provided profound new insights into the architecture of the brain, brain processes and the nature of consciousness. These insights permit the formulation of theoretical models that attempt to describe the organization of the self-system: that is, the way in which knowledge about the self is organized and related with respect to distinct context-related self-representations. During the last decade the issue of 'dissociative identity disorder' (DID; previously termed 'multiple personality disorder' or MPD) has obtained increasingly greater attention within the fields of psychopathology and psychiatry. The arguments outlined in this paper are based on the assumption that dissociative identity disorder is actually an associative identity disorder. It is the result of deficient integrative and associative processes in the self-system or the use of different ego centers instead of one. Because the inaccessibility of the non-integrated parts of the self (i.e. amnesia) is one of the determining characteristics for the diagnosis of dissociative identity disorder, it is argued that this disorder can only manifest itself with individuals showing a high cognitive complexity of organization of self-relevant information. Cognitive complexity of the neurological system may be an endogenous factor affecting the occurrence of associative disorders and in part explain the many instances in which severe childhood abuse (i.e. physical, sexual and/or mental abuse) does not result in any symptoms of failing association.

**KEY WORDS:** complexity, connectionist modelling, dissociative identity disorder (DID), neurological system, self-system

*[You] enter the brain through the eye, march up the optic nerve, round and round the cortex, looking behind every neurone, and then, before you know it, you emerge into daylight on the spike of a motor nerve impulse, scratching your head and wondering where the self is. (Dennett, 1984, p. 75)*

The purpose of the present paper is to explore the convergence of contemporary conceptualizations of dissociative identity disorder and recent insights

into the development of the self-system. The discussion of the latter also refers to recent developments in neuroscience. Since there is a general consensus that dissociative identity disorder is a consequence of extreme traumatic experiences during infancy and young childhood, it is argued that *associative* identity disorder is a more appropriate name. Dissociation presupposes the presence of knowledge that can be 'split' or dissociated from existing knowledge, or that already during infancy children possess the 'conscious' ability to keep particular painful, self-relevant information dissociated from the main bulk of self-knowledge. In agreement with contemporary understanding of dissociative identity disorder (e.g. American Psychiatric Association [APA], 1994), it is argued that to cope with extreme traumatic experiences and to maintain a positive image of the self, self-organization processes fail (i.e. 'refuse') to integrate such information within the developing self-system. The exploration of dissociative identity disorder from a developmental perspective may lay the foundation of the formulation of a theoretical framework that may guide empirical examination and a more precise diagnosis of 'the presence of two or more distinct identities . . . that recurrently take control of the person's behavior' (APA, 1994, pp. 484–487). This purpose may help in disentangling real pathological consequences of dissociative identity disorder from cultural influences in particular (Aldridge-Morris, 1991; Spanos, 1996). Actually, an attempt is made to examine whether and in what way developmental and neurological bases may account for the occurrence or non-occurrence of dissociative identity disorders as a consequence of extreme traumatic childhood experiences. To do so, and because this purpose involves the relation between brain and behavior, a connectionist paradigm will be used. The latter has as its consequence that 'higher cognitive processes (such as the development of the self-system) are simplified away from details of wet brains' (Elman et al., 1996, p. 366). Simultaneously, however, the use of neuro-computational models is thought to offer the best way toward understanding cognitive change during ontogeny (Johnson, 1997, p. 199).

In addition, if dissociative identity disorder can be accepted as a true disorder, the extent to which it is plausible to expect more than one dissociated or non-associated, alternate personality is discussed.

### **Dissociative Identity Disorder (DID)**

The study of DID is not of recent date. Until the appearance of the fourth edition of the *Diagnostic and Statistical Manual of Mental Disorders* (henceforth *DSM-IV*; APA, 1994), DID was known as multiple personality disorder (MPD). According to the third edition of the *Manual* (*DSM-III*; APA, 1980), MPD involves the:

. . . existence within an individual of two or more distinct personalities, each of which is dominant at a particular time. The personality dominant at any particular time determines the individual's behavior. Each individual personality is complex and integrated with its own unique behavior patterns and social relationships. (p. 259)

From the outset, MPD as a mental illness has resulted in a range of controversies about its existence, diagnosis and definition (see Aldridge-Morris, 1991; Spanos, 1996). For instance, according to Aldridge-Morris (1991), the diagnosis of multiple personalities 'owes as much to cultural influence as does its ontogeny. Even accepting its validity as a clinical entity, as a cultural specific, atypical hysterical psychosis . . . the highly equivocal evidence suggests that it is grossly overdiagnosed' (p. 109). Spanos (1996) detailed this criticism by arguing that any disease theory of MPD is locally (i.e. culturally) defined and reflects primarily 'expectancy-guided, goal-directed displays that change as a function of new information concerning role demands' rather than explaining 'identity enactments as "symptoms" caused by past traumas' (p. 302; see also Spanos, Weekes, & Bertrand, 1985). According to Spanos, the consequences of dissociative identity disorder (i.e. multiple personalities) are not simply social constructions (Aldridge-Morris, 1991), but rather depend on the context in which past experiences are understood and professionally interpreted.

That the 1980 *DSM* definition itself was not without controversy is illustrated by Coons' (1984) comment that 'an absolute essential criterion for the diagnosis of multiple personality is the presence of amnesia. Usually the original personality is amnesic for the other secondary personality' (p. 53; see also Ross, 1989), and Aldridge-Morris's (1991) comment that a central problem for the understanding of multiple personality is the simple fact that 'none has yet come up with a satisfactory explanation of what "personality" means' (p. 71).

While in the revised 1987 manual (*DSM-III-R*; APA, 1987, p. 272), the criterion that each personality should be complex and integrated was deleted, the amnesia condition was included as a diagnostic criterion in the 1994 *DSM-IV* only. In addition, reservations with regard to the emphasis on 'personalities' led Spiegel (1993), chair of the dissociative disorders committee for *DSM-IV*, to comment that:

. . . there is a widespread misunderstanding of the essential psychopathology in this dissociative disorder, which is failure of integration of various aspects of identity, memory, and consciousness. The problem is not having more than one personality; it is having less than one personality. (p. 15)

With the appearance of *DSM-IV*, 'Multiple Personality Disorder [went] out of existence' (Hacking, 1995, p. 17) and is now called 'Dissociative Identity Disorder'.

According to *DSM-IV* (APA, 1994, p. 487), DID involves the presence of two or more distinct identities or personalities or personality states, each

with its own relatively enduring pattern of perceiving, relating to and thinking about the environment and self. At least two of these identities or personality states recurrently take control of the person's behavior. Taking control will result in the inability by the other personality or personality state to recall important personal information that is too extensive to be explained by ordinary forgetfulness. And, finally, the disturbance is not due to the direct physiological effects of a substance (e.g. blackouts or chaotic behavior during alcohol intoxication) or to a general medical condition (e.g. complex partial seizures). In addition, it is noted that in children the symptoms are not attributable to imaginary playmates or other fantasy play.

By the present criteria, multiple personality is a symptom of DID (i.e. the inability to integrate separate parts of the self). Nevertheless, even experts consider the criteria set by *DSM-IV* to be insufficient to reach a clear diagnosis. For this purpose, the careful use of the 'Structured Clinical Interview for *DSM-IV* Dissociative Disorders' (SCID-D; Steinberg, 1993; Steinberg, Cichetti, Buchanan, Hall, & Rounsaville, 1993) is required (Nijenhuis, personal communication, January 2, 1999). Nevertheless, DID is acknowledged 'to be somehow a "real" phenomenon now with a discrete existence [and the shared emphasis] on explanations which locate the source of the behaviour within the individual' (Aldridge-Morris, 1991, p. 83). In addition, there is a general consensus that patients with DID 'typically report a history of [young] childhood trauma and abuse, the latter normally involving sexual assault' (p. 52) and that alternate personalities emerge already during childhood (Bliss, 1980; Boor, 1982). For instance, Boon and Draijer (1993) found that in 94.4 percent of the cases of DID, 'a history of either sexual or physical abuse during childhood was reported' (p. 491), while Putnam, Guroff, Silberman, Barban and Post (1986) reported that the mean age for the first appearance of an alternate personality was 5.98 years and that in 89 percent of the 100 cases studied by these authors, the presence of an alternate personality was retrospectively reported before the age of 12 years.

As with many developments, the development of one or more alternate personalities or personality states (i.e. *explicit personalities*) will probably find its origin one or more years prior to the factual appearance of such an alternate personality or personality states (i.e. *implicit personalities*; see Flavell, Miller, & Miller, 1993), that is, during early childhood. According to Greaves (1980), the development of such (implicit) alternate personality may take place already during infancy when the child is exposed not only to painful stimuli but also to stimuli of a high intensity that are emotionally provocative and contradictory. Hornstein (1996; see also Hornstein & Putnam, 1996; Putnam, Hornstein, & Peterson, 1996) noted a complex symptomatology in childhood as part of dissociative defenses to traumatic experiences (i.e. involving disturbances in identity, affect modulation behavioral control, and attention). On the basis of findings like these, Putnam

(1997) concluded that the resulting 'pathological dissociation' contributes to a core set of developmental disruptions. No empirical clarity is available on possible causal relationships (see Lewis, Yeager, Swica, Pincus, & Lewis, 1997; Marmar et al., 1994), since 'dissociative symptoms can coexist with other childhood psychiatric conditions, and an underlying mood disorder, cognitive disorder, or developmental disorder may make a child more vulnerable to the development of comorbid dissociative symptoms' (Silberg & Nemzer, 1998, p. 708; see also Silberg, 1996, 1998).

### **The Self-System and Psychopathology**

Attempts to relate social-cognitive and psychoanalytic perspectives on the 'self' are not recent (see Lecky, 1945; Rogers, 1951; Snygg & Combs, 1949), though recent examples for such an integration can be found with Horowitz (1987, 1988), Epstein (1973, 1990) and Westen (1990, 1991, 1992). To elaborate on these attempts would go far beyond the scope of this article (for a review, see Westen, 1992). In summary, however, Horowitz (1988) perceived cognitive-affective representations of the self and others to result in different 'states of mind' that consist of recurrent experiential and behavioral patterns (e.g. shameful mortification or exhibitionist excitement). These patterns or states involving cognition-affect relationships are 'central components of enduring personality dynamics. These states are associated with different self-schemas, relationship schemas, affects, motivational tendencies, and defences' (Westen, 1992, p. 7) and represent all forms of experiences by which affective, behavioral and cognitive components are interrelated. For instance, recurrent experiences of extreme pain, threats, behavioral demands, physical neglect, and so on, are examples of such states of mind or patterns (see Ogawa, Sroufe, Weinfield, Carlson, & Egeland, 1997).

According to Epstein (1990), people develop a 'cognitive-experiential self-theory', that is, an implicit theory of reality that includes theories of the self, the world, and their interrelation. The cognitive-experiential self-theory 'assumes that people have separate rational and experiential conceptual systems [and, consequently,] have two selves that are objects of knowledge': a conscious self in the rational system and a preconscious one in the experiential system (Epstein, 1992, p. 36). In addition, it is postulated that a person's theory about him- or herself is the self as agent (i.e. the 'I' or self-as-knower). This theory:

. . . consists of a hierarchic organization of interacting descriptive and motivational schemas, the former consisting of the individual's beliefs about what he or she is like and the latter of the individual's beliefs about what he or she must do to obtain what is desirable and avoid what is undesirable (Epstein, 1992, p. 36; i.e. the real and various possible selves

such as the ideal and feared-for selves; Oosterwegel & Oppenheimer, 1993).

In his attempts to integrate the social-cognitive and psychoanalytic perspectives, Westen (1992) focused on 'several dimensions of self-structure that may be conceptually and functionally quite different from each other' (p. 7). These dimensions are related to issues such as consciousness of representations, organization of representations, motivational processes related to representations, and subjective sense of self as a thinker, feeler and agent continuous through time. The postulation of distinct 'multiple dimensions of self-structure that may vary independently' (p. 7), such as conscious or unconscious 'self-representations', is illustrated, for instance, by 'the dissociation of conscious and unconscious self-representations in adult survivors of childhood sexual abuse' (Westen, 1992, p. 7). As will be discussed below, also in our everyday life, human functioning is characterized by the presence of conscious and unconscious self-representation. That is, we function with one working self-representation in relation to a particular context (e.g. the academic self), while other self-representations are not consciously active (i.e. the self as partner, father, athlete, and so on; see Harter, 1996; Oppenheimer, 1995).

### **The Self-System**

As was noted previously, self-representations include semantic knowledge, sensory-related information and affective components about and related to the self: 'Thus, images, smells, sounds, and feelings (e.g., *self as humiliated*) can be associatively connected elements of the self-system' (Westen, 1992, p. 8). Westen assumes the self-system to be hierarchically ordered to allow for a particular aspect of the self – 'tagged' to a particular level of the hierarchy – to apply to all levels below. The self-representation that is active at a particular moment and context is the 'working self-representation'. That is, a particular configuration of relevant features that may be internally generated or externally present will activate related parts of a neural network that will result in a 'particular idea about the self' (i.e. the working self-representation; Westen, 1992, p. 8) that is experienced as the active agent at that particular moment. From a neurophysiological or biological perspective, the activation of a self-representation is considered to be equivalent to the activation of a 'neural gestalt' (Greenfield, 1995, pp. 97–101) since every mental experience is related to neural activity and neural networks.

The ideas discussed so far correspond to recent perceptions on the structure and development of the self-system (Oosterwegel, 1995; Oosterwegel & Oppenheimer, 1993; Oppenheimer, 1995). Neural networks are thought to store memories either as limited capacity networks (i.e. short-term memory; Changeux & Dehaene, 1993) or as interrelated neural

networks with an apparent unlimited capacity (i.e. long-term memory; Baddeley, 1988). Because the brain is characterized by different biological levels with different complexities of neural interrelationships (Greenfield, 1995), different forms of information processing can be defined (Epstein, 1990; Harter, 1985; Westen, 1992) by which the lower levels provide powerful constraints upon the higher ones (see Karmiloff-Smith, 1993).

To study cognitive self-representations, Harter (1985) proposed a three-mode framework in which valence and salience of features of self-representations play an important role. The first of these modes involves five different types of contents that constitute self-representations, but that become dominant at different periods in development. These contents are physical attributes, behavioral descriptions, emotional descriptions, motivational descriptions and cognitions, which may underlie among others the physical, active, psychological, social and reflective selves reported by Oppenheimer, Warnars-Kleverlaan and Molenaar (1990). That is, developmentally, children will first understand and describe themselves in terms of physical and material characteristics (e.g. blond hair, possessing a nice doll, particular behavior and moods). This type of understanding is followed by an understanding in terms of activities relative to others (e.g. I draw nicer, I run faster); in the next phase, children will use psychological characteristics to describe themselves (e.g. I am smart, I am shy), which are followed by social characteristics (e.g. I have many friends, I am popular). Finally, self-reflective understanding appears around the age of 16, by which characteristics of the self are reflected upon (e.g. while I may appear to be arrogant and sure of myself, I am rather uncertain).

The second mode concerns contexts, in that each of the content dimensions can be applied to a context (e.g. family, peers, school, etc.). This mode results in context-related characteristics or self-representation. That is, individuals will show different characteristics of themselves depending on the context in which they are present (e.g. as academician vs parent). The way in which these different dimensions of content and context are processed cognitively is characteristic for the third mode, whereby four structural developmental stages are distinguished. In the first stage, the self will be perceived by single attributes, behaviors, emotions, motivations and cognitions. Children will know themselves by unrelated characteristics in different contexts (e.g. with their peers by feelings of happiness and particular behaviors and with their parents by feelings of fear and helplessness). At the second stage, these single attributes are integrated into traits whereby interrelationships among unrelated characteristics are involved (i.e. the emergence of states of mind or patterns; Westen, 1992). In the third and fourth stages, the traits are integrated into single abstractions and higher-order abstractions (e.g. context-related self-representations). Within each of these stages, Harter (1985) distinguishes two levels. On the first level the



attributes, traits and abstractions are often global and overgeneralized (e.g. to the home situation or parents in general). At the second level, these forms of self-descriptions become more differentiated and situation-specific (e.g. specified separately with respect to the mother and the father and in relation to the living- or bed-room).

Harter's (1985) three-mode framework can be perceived as a first step in the direction of a system approach for conceptions of self. However, while we may possess or experience clearly delineated abstractions about ourselves that appear to be stored as 'semi-permanent' self-representations, I want to argue here that such representations are temporary only. I believe that we continuously construct and reconstruct self-representations when information systems, stored as activity patterns in our memory, are activated by stimuli that possess a sufficient number of relevant features or by a particular structural configuration of relevant features from outside or inside the brain. An approach that does not necessarily postulate stored 'fixed' abstractions of the self will permit the construction of an unlimited number of self-representations depending on the context, the role of the individual in the context, and the presence of others in a particular context. Such an approach would also allow for the mixture of self-representations, or, more correctly, the perception of the self in different ways in identical contexts (i.e. when different characteristics are salient, or when characteristics considered to be part of another self-representation are linked to the present self-representation).

In other words, stimuli that possess a sufficient number of relevant features or a particular structural configuration of relevant features will activate a multitude of activity patterns on the level of single neurones, neuronal groups and neuronal networks, or, conversely, on the level of neuronal networks, neuronal groups and single neurones. As was noted previously, these activity patterns involve knowledge, affection, action, and so on. However, if all the resulting parallel activity were to become conscious, we would not be able to deal with it. Consequently, we have to resort to a filter, a 'virtual' interface between the individual and the internal and external environment, or what Demetriou, Efklides and Platsidou (1993) call a 'hypercognitive system' (p. 20). According to the latter authors, the hypercognitive system can be compared to a higher-order construct or system that orders the 'random thoughts mode' (Calvin, 1990, pp. 282–286) by selecting lower-level systems that are most appropriate to deal with the incoming information. Such a higher-order system leads to serial processing of information. This *supersystem*, according to Demetriou et al. (1993), is a neutral system permitting self-understanding and -management to come either before, after or concurrently with cognition. The functioning of all other more specialized systems contributes to its 'formation and continuously shapes its functions. Second, its functioning is applied to all other

systems – both domain specific and domain general – and by its application it causes permanent changes in their functioning’ (Demetriou et al., 1993, p. 20, Figure 1).

It would lead us too far afield to try to specify this general system. However, while each subsystem is informed by its lower-order systems, contents and features, and vice versa, each subsystem is again influenced by reorganizations of other subsystems, and so on. In addition, because infants perceive their environments realistically from the first (Karmiloff-Smith, 1993; Neisser, 1992), opportunities and constraints emanating from the structure of the environment are complemented by opportunities and ‘constraints imposed by innate specifications’ (Karmiloff-Smith, 1993, p. 613).

Based on our earlier assumption that conceptions of self are informed by contexts, domains and contents, and that instead of hierarchical structures, self-conceptions should be interpreted as modes of information processing (see Harter, 1985), the self-system could be part of or could be itself such a supersystem (i.e. the ‘I’ or ‘self-as-knower’; Oppenheimer, 1995).

Harter’s (1985) description of the three-mode framework for cognitive self-representations can be translated in terms of modularization and representational redescription (Karmiloff-Smith, 1992, 1993). According to Karmiloff-Smith (1993), knowledge is gained by exploiting ‘internally the information that . . . is already stored by redescribing its representations or, more precisely, by iteratively *re*-representing in different representational formats what its internal representations represent’ (p. 596). This is considered a self-generating process that may take place ‘outside input/output relations’ and ‘turns *implicit* information into *explicit* knowledge’ (pp. 596–597). Representational redescription occurs throughout development and is characterized by reiterated *phases* of development related to particular knowledge domains. Actually, Karmiloff-Smith points here to human abilities to form concepts or representations (about ourselves) by relating separate (stored or currently experienced) knowledge elements (i.e. modularization), whereby the separate knowledge elements obtain new meaning (i.e. are redescribed), and to change the resulting representations on the basis of new information (i.e. again redescription resulting in re-representation; see Elman et al., 1996).

In other words, the development of the self-system as an information-processing system with respect to the self can be perceived as a dynamic process of differentiation and integration of self-relevant information in self-representations (Oosterwegel & Oppenheimer, 1993). Hence, the dynamics of the self-system can be described as a self-organizing ‘process over time by which contexts and contents relevant for the self are continuously evaluated, changed and re-organized to form adaptive subsystems that will allow individuals to interact adequately with their environment’ (Oppenheimer, 1995, p. 135).

## Organization of Self-Knowledge

As noted previously, knowledge about the self is stored in neural networks of different and changing complexity that 'ultimately refer to specific patterns of synaptic connections in the brain' (Elman et al., 1996, p. 359). According to Elman et al., 'knowledge refers to representations that support behavior', whereby representations are operationally defined as the 'fine-grained patterns of cortical activity, which in turn depend on specific patterns of synaptic connectivity'. Such patterns can be implemented in real brains as well as in neural networks. Neural networks are then defined by 'patterns of activations over units in an n-layered system, which depend on the patterns of weighted connection between units' (p. 364).

Nearly two decades ago, Harter (1985) noted, in a reaction to the question of whether neuronal systems can be characterized as hierarchical structures, that hierarchical models should be perceived as theories in the minds of psychologists. Such models are not necessarily self-theories within the mind of the individual, nor are they necessarily hierarchical. While such models are often used as metaphors to facilitate the understanding of complex processes (Dawkins, 1992), an increasing amount of evidence has become available now that shows that hierarchically organized neuronal systems are not merely theories in the mind of psychologists. In contemporary neuroscience literature it is accepted that the brain is constituted of hierarchically organized neuronal systems (e.g., Baars, 1995; Edelman, 1989; Penrose, 1989). It is assumed that information stored at each system level is integrated and informs the next higher level of organization. According to Demetriou and Georgiou (1999), 'in some cases a level is finally reached which provides awareness of the information and, less frequently, of the very processing itself' (p. 418). The present paper assumes the existence of hierarchically structured neuronal systems (i.e. from neurons, to neuronal groups, and different levels of complexity of neuronal networks or knowledge representations). Of course, it is recognized that some may reject this approach and prefer less and even non-hierarchical or more interactive models. I hope these readers will bear with me and accept the present approach as a potentially viable metaphor.

The assumption that interrelationships among neurones, neural groups and neural networks represent differentiated, but interrelated, structures with increasing complexity that are hierarchically organized coincides with the finding that at least the cerebral cortex is highly structured in both laminar and tangential dimensions (Elman et al., 1996). While there is no evidence for any structured (hierarchical) storage of information about the self, such a relational structure could be hypothesized. The more so since the human mind actually consists of an enormous collection of parallel information processors, while information processing itself is subjectively experienced as a serial 'one-thing-after-another' stream of consciousness (Dennett, 1991). It

is this subjectively experienced, serial stream of consciousness that makes the mind a 'virtual machine', a 'user-friendly' way of experiencing the brain.

### *The Neural System*

The interrelations among neurones, neural groups and neural networks are illustrated by a hierarchical structure (see Figure 1). Because neurones never function in isolation, but in neural groups, we can assume that at the lowest level of organization (i.e. the level of single neurones), simple sensory information is stored. It is of interest to note that while, according to Johnson (1997), 'the specification on a detailed cellular level of neural development by network models does not permit any inferences about cognitive representations' (p. 199), the fact that such representations exist requires the postulation of neuronal correlates.

In terms of Harter's (1985) three-mode framework and Karmiloff-Smith's (1993) model of representational redescription, the neural groups may represent the different contents related to the self (e.g. blue eyes and blond hair), which are integrated or redescribed representationally into single abstractions (i.e. the simple subsystems of the self-system). On the next level these single abstractions are redescribed into higher-order and also more differentiated and situation-specific or complex subsystems that may be equivalent to, for instance, context-related self-representations. The latter self-representations are, then, integrated in the 'self-system' to form what Epstein (1990) would term the 'self-theory', or the way I know myself, which is represented by the 'I', or the self-as-knower (see Ogawa et al., 1997). The self-system as an information-processing system dealing with self-relevant information is here perceived as a kind of 'dedicated and encapsulated brain system' (Johnson, 1997. p. 117; see also Brothers & Ring, 1992). According to Brothers and Ring (1992), modular social information systems are present in the limbic system – in particular the amygdala and/or regions of the frontal lobes connected to it, the orbital frontal cortex and higher-order association cortex (i.e. particular parts of the temporal lobe), which leads into the amygdala (see Elman et al., 1996; Johnson, 1997, p. 117).

The use of hierarchical structures not only assists us in understanding continuous, self-organizing processes in the brain, but also represents a developmental process in terms of (progressive) abstractions and redescrptions. Progressive is here bracketed, because I believe that progression involves the optimization of adaptation only. From an objective or absolute point of reference, such optimization can be either positive or negative, that is, progression actually has no direction.

Four important points should be noted. First, the self-system itself (i.e. the 'I', self-theory or self-as-knower) is actually empty. That is, the self-system

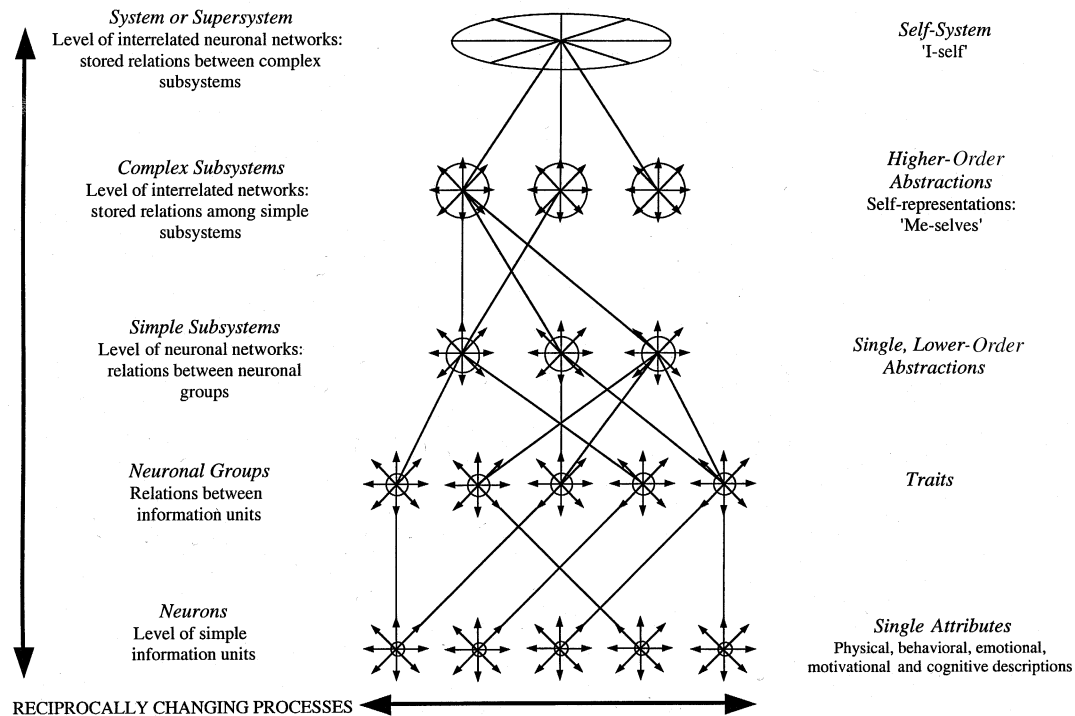


FIGURE 1. A schematic representation of hierarchical neural interrelationships (i.e. neural groups and networks) in terms of subsystems and supersystem (on the left) and the way in which different neurons, neural groups and neural networks are hypothesized to contain particular information units about the self (Harter, 1985; on the right)

is an encompassing system or information processor by which externally presented or internally generated information is channelled and by which self-related information is triggered and redescribed (i.e. integrated) into the most proper self-representations. For instance, in dynamic systems theory, such complex systems exhibit multiple behavioral patterns and switch between patterns 'in a discontinuous manner'. That is, the shift from one stable behavioral mode (i.e. self-representation) to another occurs without stable intermediate states (see Thelen, 1993, p. 564). The self-system or 'I' activates a relevant self-representation on the basis of particular configurations of external or internal stimuli. In addition, there is no reason to assume that we are consciously aware of the self-system. It is the system itself that leads a particular self-representation to become consciously experienced as the 'I' that is most adequate in a particular context (i.e. 'working self-representation', Westen, 1992, p. 8; or 'conscious neural gestalt', Greenfield, 1995, pp. 97–101).

The second note concerns the unconscious nature of adaptive self-organizing processes. We have no conscious access to the 'why and how' of the combination of particular contents into particular self-representations (i.e. the process of representational redescription or, for that matter, assimilation and accommodation). When the resulting self-representations or 'states of mind' are maladaptive or pathological, therapy or psychoanalysis will attempt to uncover the reasons for such combinations, to identify the lower-level units of self-knowledge (e.g. negative emotional contents), and to desensitize these contents (Horowitz, 1988).

Third, in agreement with different approaches to the self-system (e.g. Epstein, 1990; Harter, 1985; Westen, 1992), dynamic systems (e.g. Thelen, 1993) and the brain (e.g. Baars, 1995; Greenfield, 1995), all subsystems of the self-system on all levels of organization remain active and are subject themselves to continuous redescrptions (i.e. informed by lower- and higher-level subsystems). This conceptualization of the self-system is in agreement with Putnam's assumption that the behavior, physiology and consciousness of any individual are subject to different states of discontinuity, self-organization and self-stabilization (Putnam, 1989). According to Nijenhuis, Vanderlinden and Spinhoven (1998), these states are fundamental units of the organization of consciousness and are detectable from the first moments following birth (p. 243).

In this sense, the presence of active (i.e. conscious) and non-active (i.e. unconscious or subconscious) self-representations is reminiscent of earlier ideas by Pierre Janet (1887) and William James (1901). Whereas Janet postulated that different personalities may coexist in the individual whereby each personality has its own set of memories, and is constructed through assigning experiences to what he termed 'different ego centers', James (1901) pointed to the presence of parts of the human mind that are ordinarily dissociated from our daily consciousness (see also Crabtree, 1992, p. 151).

Finally, the postulation of self-representations as 'higher-order' relationships among neuronal networks does not imply the presence of innate modules nor of fixed representations involving a unique set of neurons that react to a particular context in which the self is active (i.e. 'grandmother cells'; see Lettvin in Barlow, 1995). Whereas grandmother cells have often been erroneously used to illustrate the absurdity of localist representations (i.e. fixed neuronal networks; see Page, 2000, p. 445), it is argued by Page (2000) that 'certain cognitively meaningful entities will be represented in a local fashion at some probably late, level of processing' (p. 447). However, even the presence of a well-defined representation of the self in a particular context may on a lower level (but 'subthreshold') of organization be activated by other contexts and similarly activate other self-representations (Page, 2000; see also 'Cognitive Complexity' below).

In the present paper, we base our arguments on Johnson's (1997) assumption that self-representations in the cortex 'are implemented in a similar way to those in connectionist nets, namely as patterns of link strengths (weight changes or synaptic efficacy)'. The development and 'formation of representations involve either the growth and strengthening of synaptic contacts, the selective loss of existing synaptic contacts, or, most likely, combinations of both' (p. 176).

### *Cognitive Complexity*

Of great importance for the present discussion is the realization that knowledge in general, and, subsequently, knowledge about the self, is organized in different forms of complexity. According to Oosterwegel and Oppenheimer (1993, pp. 19–21), the complexity of the self-system is primarily determined by the interrelatedness of self-descriptions (i.e. the content-information of self-representations). The lower the relatedness, the higher the complexity and the higher the relatedness, the lower the complexity (p. 20; see also Linville, 1987). If this assumption is correct, then high complexity would imply that two different self-representations are constituted by essentially different, non-overlapping and even unrelated information or content systems or different interrelated neural networks (Oppenheimer, 1995). In later work, Oppenheimer (1995) argued that low complexity should then imply that two different self-representations are constituted by essentially the same or overlapping information or content systems and, similarly, would be based on almost the same interrelated neural networks. Empirical evidence is available that shows that modularization (i.e. the development of higher-order abstractions) takes place on different levels of complexity, while the process of modularity itself always involves the fact that different cognitive processes are supported by different neural networks in the brain (Elman et al., 1996). These findings suggest that the interrelatedness among differentiated structures (i.e. neurons, neural

groups and neural networks) will be different depending on the level of complexity of the neural system.

According to Linville (1987; see also Campbell, Assanand, & Di Paula, 2000; Smith & Cohen, 1993), high complexity functions as a buffer for the generalization of negative affect such as depressive feelings from one self-representation (e.g. the academic self) to another self-representation (e.g. the social self), because too few relationships among the self-representations are present. Individual differences in the extent to which affect (e.g. negative self-esteem; see Linville, 1987; Oosterwegel & Oppenheimer, 1993) or processes of self-reference (e.g. rigid self-representations that focus on tendencies characterizing paranoia; Fenigstein, 1995) are generalized over different self-representations are perceived by Linville (1987) as a function of the complexity of the self-system. Conversely, differences in behavioral and affective reactions generated by different self-representations as a consequence of one and the same event are also assumed to be a function of the complexity of the self-system. The presence of individual differences of complexity in the organization of self-relevant information has now been firmly established (Bieri et al., 1966; Linville, 1987; Oppenheimer & Wierstra, 1997; Ziller, Martell, & Morrison, 1977). Actually, the distinction between the localist and distributive approaches in connectionist modeling of the brain (Page, 2000; Page & Norris, 1998) parallels the distinction between high complexity and low complexity, respectively. According to Page and Norris (1998), in a distributive connectionist model representations of different information overlap, whereas in a localist model the representations of different information are completely unrelated. Since such a distinction is not realistic in itself, the authors propose a localist distributive model in which the extent of overlap and unrelatedness of information representations relate to differences across individuals.

Similarly, for the present purpose, high and low cognitive complexity are illustrated by their extremes, whereby high cognitive complexity is defined by a total absence of interrelationships among self-representations (i.e. unrelated, lower-order neural networks support different higher-order neuronal modules) and low cognitive complexity by a complete overlap of self-representations (i.e. a high interrelationship between lower-order neural networks). In accordance with Page and Norris (1998), however, complexity is in reality a continuum that ranges across individuals from extremely low to extremely high. Until otherwise demonstrated, it is assumed that a normal distribution for complexity is present (see Linville, 1987).

## **DID: Theoretical Perspectives**

Kluft (1996, pp. 353–356) identified 11 theoretical models that deal with DID. In an attempt to order and evaluate these models, he concluded that a



more encompassing and general model or theory with respect to DID will have to include four and possibly five of these models and address two other models when individual cases are involved. The first of these models – trance state/autohypnotic models – deal with the high degree of hypnotizability of patients with DID. While, according to Kluft, high hypnotizability must be taken into account in any comprehensive model, the trance state/autohypnotic model itself ‘does not account for the full range of DID phenomenology’ (p. 355). The second type of models – ‘behavioral states of consciousness models’ – are perceived by Kluft as very powerful ‘because they are consistent with what is known about the development of states of mind and self-structures’ (p. 355). These models are heuristic and permit the derivation of testable hypotheses. The third type of models focus on neural networks and information processing (see Yates & Nasby, 1993). In these models, alternative personalities or selves are perceived as the result of the development of separate neural networks that are activated and inhibited depending on external or internal stimuli. Though rather new, these models ‘have offered hypothetical explanations from complex DID phenomena bypassed by other theory builders’ (Kluft, 1996, p. 355). In the fourth type of models – neodissociation/ego state models – ‘several simultaneously ongoing and autonomous centers of cognitive activity’ are assumed (p. 355). When congruent, individuals will experience feelings of unity; when incongruent, alternative self-structures are apparent and multiplicity is experienced: ‘multiplicity, then, is the norm and pathological multiplicity occurs when the boundaries across these states or processes are sufficient to impede normal “commerce,” so consistent with subjective and behavioral unity’ (p. 356).

In addition to these four major models, Kluft (1996) proposed the inclusion of the ‘basic affects model’ developed by Nathanson (see Nathanson, 1997), whereby ‘personalities may be organized around different basic affects and or affect scripts’ (Kluft, 1996, p. 356). In this sense, the work of Nathanson may form a bridge between psychological and physiological aspects of DID. With respect to individual cases of DID, Kluft (1996) mentioned two additional models. The first being the psychological models that are not consistent with all known cases of DID. These models ‘will continue to explain why some DID patients behave as they do, but that the condition as a whole will elude a simple formulation’ (p. 354). The second type of models refer to the ‘illegitimate (role-playing/malingering/iatrogenesis/social-psychology) model’ (p. 354). In short, these models perceive DID not as a naturalistically occurring condition, but rather as the result of roles enacted by a patient in different settings and in the therapeutic setting in particular (i.e. iatrogenesis). While there is proof for factitious DID (see Coons & Milstein, 1994; Kluft, 1995) in which iatrogenesis may play a role, there is also compelling evidence that DID is a naturalistically occurring condition (Aldridge-Morris, 1991; Gleaves, 1996; Kluft, 1995;

Ross, 1996). Nevertheless, in individual cases, iatrogenic processes will have to be taken into account.

According to Oakley and Eames (1985), in normal development sub-personalities (i.e. self-representations or social roles) develop that are integrated in one self-system. The different self-representations are then experienced as part of one unitary 'I' because they concern one and the same person or identity. As was noted previously, at any moment of conscious existence all subpersonalities are accessible, though conscious awareness is only present for one self-representation only (i.e. the working self-representation or consciously experienced agent or 'I-self'); the others may be perceived as covert thought processes or latent subpersonalities (pp. 236–237). Because these subpersonalities are related on different levels of hierarchical organization or by way of the 'I', we know that they exist and we can reflect about them. In the case of DID it appears as if multiple 'I's or self-systems are present that are unrelated and not subsumed under a unitary 'I'. That is, two or more complex subpersonalities (i.e. subsystems) exist that direct self-relevant information differently and independently from each other (see Oakley & Eames, 1985) and about which we are not aware (i.e. the reason for the criterion of amnesia in DID).

In addition to attempts to order existing theoretical models, recently the age range with respect to which DID was studied has been extended to younger ages (see Hornstein, 1996; Hornstein & Putnam, 1996; Putnam, 1997; Putnam et al., 1996; Silberg, 1996, 1998; Silberg & Nemzer, 1998). Most existing theoretical models and empirical studies dealing with DID are based on the examination of this disorder with adolescents and adults. The focus on adolescence and adulthood and on the problem of more than one personality may be the result of the terminology of a discipline (e.g. psychoanalysis). Processes like 'splitting' and 'dissociation' assume the presence of *something* that can be split or dissociated (i.e. deconstructed), processes that are difficult to envisage in the developing minds of infants and young children. Hence, it is here assumed that DID is not a phenomenon of 'splitting' or 'dissociation', but rather involves the *inability* to associate particular self-relevant information. The development of DID is, then, the result of failing associative, integrative or constructive processes,<sup>1</sup> and is an 'associative' rather than a 'dissociative disorder' (see Spiegel, 1993).

This assumption is based on our knowledge that, in a high percentage of DID instances, childhood trauma and abuse, the latter normally involving severe sexual assault, underlie the development of multiple personality (Putnam, 1997), that alternate personalities emerge already during childhood (Bliss, 1980; Boor, 1982; Putnam et al., 1986), and that their development may occur already during infancy (Greaves, 1980). However, as Spiegel (1993) noted, our attention should be focused not on the problem of having more than one personality, but on the problem of having less than one personality. Worded differently, the central problem of DID is the failure of

processes of representational redescription by which all aspects of the self are included in one coherent and unitary self-system or self-theory (i.e. 'I'; see Janet, 1887).

Because not 'all child victims of abuse and variants of family psychopathology, even those who cannot express their anger, develop multiple personalities, one must ask what is the contribution of other, perhaps endogenous factors?' (Aldridge-Morris, 1991, p. 48). For instance, Barach (1991) and Liotti (1992, 1995) suggest disorganized attachment or impaired attachment relationships as causes for DID. Empirical support for Liotti's (1992) argument for the existence of a developmental pathway from disorganized attachment to later dissociation is reported by Ogawa et al. (1997, p. 875). Disorganized attachment patterns, however, are characteristic of abused children (George & Main, 1979) and abuse is considered a cause for dissociation. Hence, it appears more logical to assume that disorganized attachment patterns and later dissociation are both symptoms of abuse and, consequently, are highly related to each other, rather than assuming that disorganized attachment patterns underlie later dissociation.

The shift in the present discussion from a dissociative to an associative disorder is important for several reasons. First, an associative disorder involves a developmental phenomenon. At a particular moment in the development of the self-system, parts are not included in the overall self-system and develop into a separate unrelated self-representation (i.e. the 'secondary personality'; Gruenewald, 1984). The causes for this exclusion (i.e. referred to previously as associative, integrative or constructive failures) are thought to be repeated and severely traumatic experiences. These experiences occurring in (very young) childhood result in the assigning of particular context-related, self-relevant information to another 'I' (i.e. a secondary personality or different ego center; Janet, 1887) in order to maintain an adaptive, functional working self-representation for the very same context (e.g. the family) by the 'primary personality' (Gruenewald, 1984). This process is very similar to what Crabtree (1992) describes as a process of 'partitioned assimilation of information and experiences' (p. 152). Depending on the maintenance of context (including abuse), the secondary and primary self-representations will develop in parallel though unaware of each other. If at a particular age the context is changed (i.e. the threatening situation is not present anymore as a consequence of divorce or otherwise), the development of the secondary self-representation will stagnate as it is no longer activated as 'working self-representation'. The latter would explain the occurrence of a 'child alter' in DID (Hacking, 1995).

A second reason for the shift from dissociative to associative processes is to find a compromise between DID symptoms in terms of multiple personalities caused by past traumas and the discussion of DID symptoms in terms of identity enactment as a result of social construction (see Hacking, 1995; Spanos, 1996). Hitherto the diagnosis of DID with adolescents and adults

was perceived to owe 'as much to cultural influence as does its ontogeny' (Aldridge-Morris, 1991, p. 109; Gleaves, 1996). Or as Hacking (1995) aptly noted, 'the action-packed traumatic scenes of what people did may be invested with different meanings at different times', that is, something may be 'experienced now, in memory, that in a certain sense did not exist before' (pp. 248–249; see also Spanos, 1996).

In the following section a theoretical framework will be presented that will involve a combination of aspects of several of the theoretical models discussed by Kluft (1996).

### **Alternate Self-Representations and Development**

In the preceding discussion, the self-system is perceived to develop through phases (i.e. from  $n-k$  to  $n$ ) as a result of recurrent representational redescrptions. The self-system or self-theory shows stage-like changes with age, while these changes are the result of processes of differentiation, integration and representational redescrptions of self-representations in higher-order representations of the self (Oppenheimer, 1995). In addition, already in early childhood (i.e. infancy), traumatic experiences may result in failures to associate extremely negative self-relevant information and the formation of a non-integrated self-representation, which in adolescence and adulthood may result in DID.

The development of a non-integrated self-representation either stagnated in development (i.e. the child alter) or fully developed (i.e. if the abusive context is maintained throughout childhood and adolescence) is assumed to take two extreme forms depending on the cognitive complexity of the neurological system. When this system is characterized by high complexity, a totally unrelated and very difficult to assess secondary self-representation may develop (see Figure 2). When the neurological system is characterized by low complexity, a separate (but still related on various levels of organization) secondary self-representation may be present (see Figure 3). In the latter case, however, because of the distributive nature of information representations (Page & Norris, 1998) and, hence, of relationships between different levels of organization of self-relevant information, it is difficult to envisage the occurrence of amnesia. It can even be argued that in the low-complexity condition it will be problematic to talk of an associative disorder at all; that is, in the sense that the development of an unrelated, non-integrated self-representation (i.e. a secondary personality or ego center; Gruenewald, 1984) and the occurrence of partitioned assimilation of information and experiences (Crabtree, 1992) are almost impossible.

As was noted previously, there are many sexually abused children who do not develop any symptoms of DID (Browne & Finkelhor, 1986;

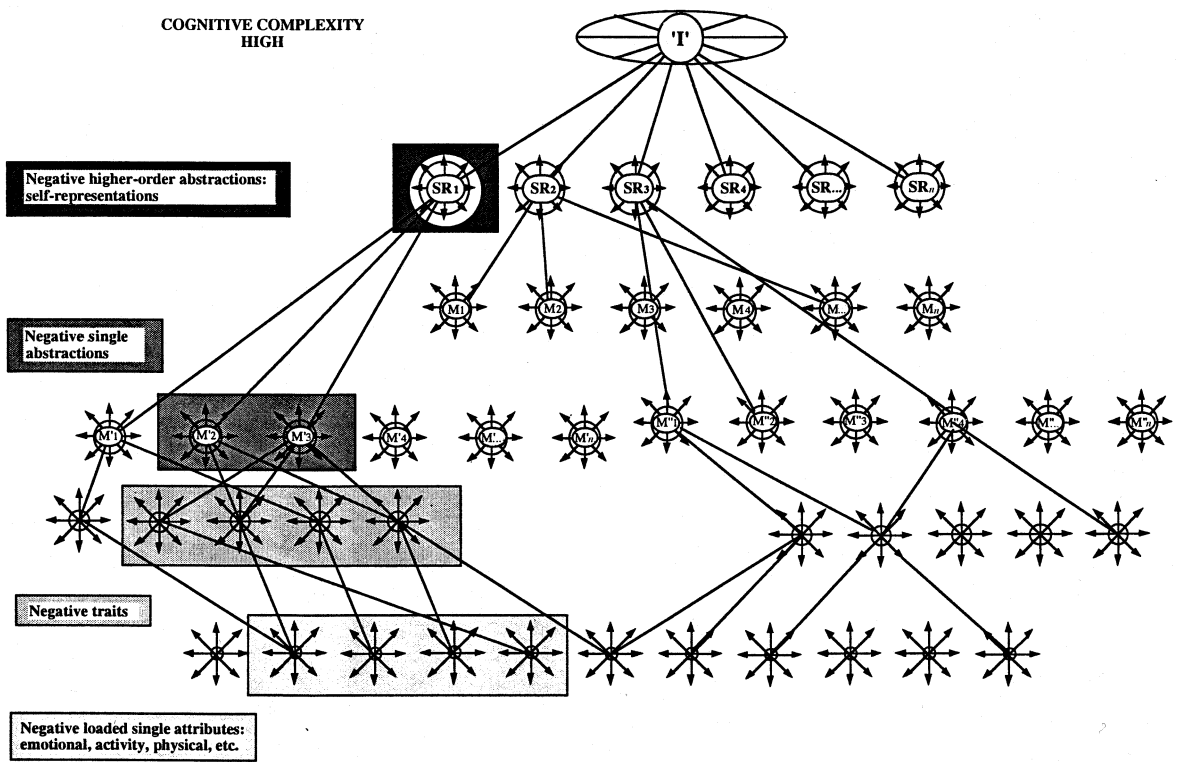


FIGURE 2. The development of an alter self-representation within a high-complexity self-system

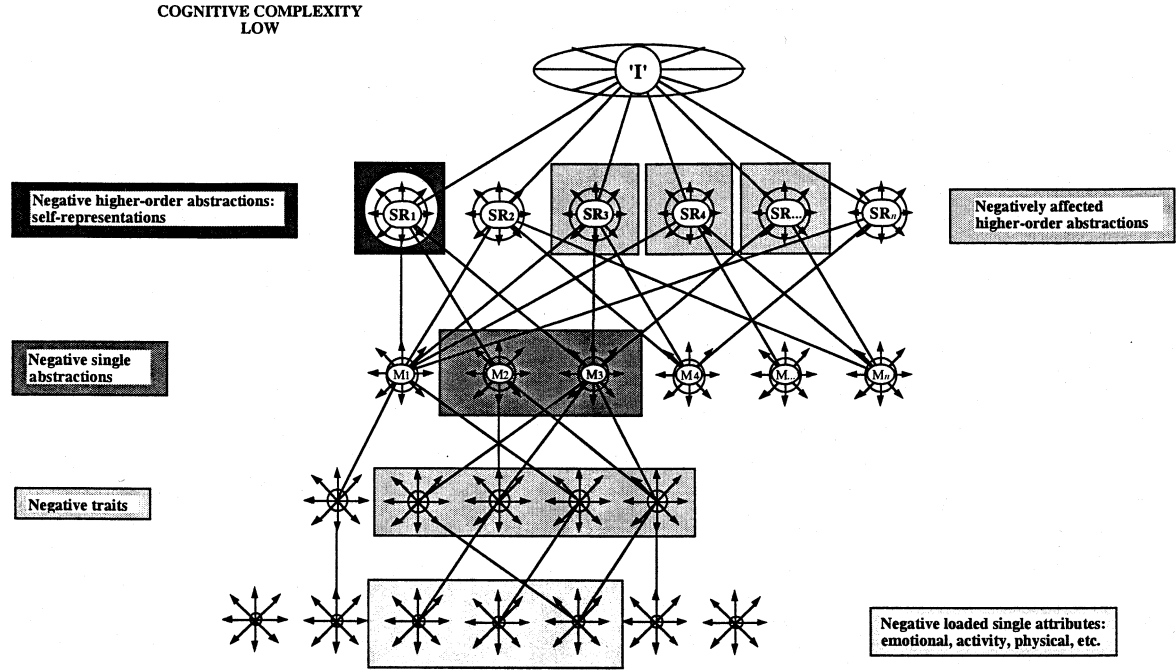


FIGURE 3. A schematic representation of negatively affected self-representations in a low-complexity self-system

Kendall-Tackett, Williams, & Finkelhor, 1993) and, consequently, 'endogenous factors' may be involved in the development of this disorder (Aldridge-Morris, 1991). It is here assumed that the level of organizational complexity of self-relevant information (i.e. cognitive and/or neurological complexity) may be such a factor, though undoubtedly not the only one (see Barach, 1991; Liotti, 1992, 1995).

Consequently, the level of accessibility of negative self-relevant information (e.g. the secondary self-representation) is a function of the level of the complexity in which self-relevant information is organized in memory and increases the lower the complexity. Consequently, extremely high cognitive complexity will lead to a total unawareness of a second self-representation or ego center by the primary self-representation. According to *DSM-IV* (APA, 1994, p. 487), the inability of the primary or host self-representation to recall any of the events and experiences of the secondary self-representation is referred to as 'amnesia' – an important diagnostic criterion. In this model amnesia can only occur in the high complexity condition (Crabtree, 1992; Janet, 1887).<sup>2</sup> Depending on the context and the corresponding particular configuration of externally presented or internally generated stimuli, the 'primary self-representation' is replaced by the 'secondary self-representation' (i.e. one set of neural networks is inhibited and replaced by a more strongly activated alternative set of networks; Greenfield, 1995). These stimuli are here assumed to be sexually, physically and emotionally threatening events, contexts and/or individual(s). This assumption is supported by research by Page and Norris (1998), who demonstrated that if it is necessary to suppress recall of particular information, this can be easily achieved by suppressing the activation of a particular node. Nodes are represented in our model by links between lower- and higher-order neuronal networks, abstractions or neural modules. That is, if self-relevant information is represented by a low complexity (Linville, 1987) or distributive connectionist model only (Page, 2000; Page & Norris, 1998), such that representations of different information overlap, it is difficult to suppress one part of this information without partially suppressing others also.

A secondary self-representation is constructed as the result of traumatization and the inability to integrate particular self-relevant information in a unitary self-system. Consequently, the secondary self-representation, like the primary self-representation, will consist of:

. . . mental imprints of sensory and affective elements of traumatic experiences, that is, as visual, olfactory, affective, auditory, and kinesthetic experiences (cf. Harter, 1985; Van der Kolk & Fisler, 1995) . . . and explain localized pain, as much as anesthesia-analgesia, freezing, and the like, [to] constitute reactivated somatoform memories. (Nijenhuis, Spinhoven, Vanderlinden, Van Dyck, & Van der Hart, 1998, p. 70)

In addition, differences in the level of cognitive complexity may offer an

understanding of the occurrence of total and partial dissociation (Nijenhuis, Spinhoven, Van Dyck, Van der Hart, & Vanderlinden, 1998, pp. 107–109). Since complete dissociation is characterized by an apparent disconnection of 'normal consciousness' and the result of high cognitive complexity, partial dissociation is characterized by intrusions of the primary self-representation by the secondary self-representation, and vice versa, and is thought to be only possible with lower levels of complexity (Nijenhuis, Spinhoven, Van Dyck, et al., 1998).

While the process by which the secondary self-representation is activated is a consequence of information channelled by the self-system, the 'primary self-representation' cannot be aware of this activation because the self-system itself does not contain any information to inform the primary self-representation and both self-representations are not informational-related. In addition, there is evidence that the inhibition of the primary self-representation when threatening stimuli are present is almost instantaneous (see Greenfield, 1995; Nijenhuis, Vanderlinden, & Spinhoven, 1998). However, the self-system as an information-monitoring system is not powerless. Studies of hypnotism, for instance, have shown that when a control system (i.e. the self-system) is passive and merely exercises an observing function, it functions as a 'hidden observer' (Hilgard, 1977) and is capable of storing or memorizing events unrelated to any self-representation (Morton, 1994). Consequently, it is here assumed that the self-system itself may function as an 'intermediate personality', or enable the formation of such an intermediate self-representation that forms a (therapeutic) link between the 'primary' and 'secondary' self-representations. The combination of aspects of information of different self-representations in a temporary 'intermediate self-representation' with lines of communication to the primary and secondary self-representations will enable processes of coming to terms with the traumatic memories, integration of these memories, and rehabilitation (see Bryant, 1995; Van der Hart, Van der Kolk, & Boon, 1998). It should be noted here that in the discussion so far, the development of one alternate personality only has been proposed when associative processes fail as a consequence of extreme traumatic experiences. Since the non-associated (negatively loaded), secondary self-representation is context-related and in most instances limited to the immediate context of the family environment (i.e. in particular during infancy and early childhood), there are no compelling arguments postulating more than one alternate personality.

In short, the formation of unrelated self-representations depends upon the level of cognitive complexity, which will be different for different individuals. The development of such an unrelated secondary self-representation, then, is *not* a general reaction to the exposure of overwhelming and extreme traumatic stimuli (Kluft, 1984; Page & Norris, 1998; Putnam, 1989). Other somatoform dissociative symptoms may appear, such as bulimia and anorexia (Nijenhuis, Spinhoven, Vanderlinden, et al.,



1998), which are consequences of traumatic experiences with low-cognitive-complexity individuals. That is, low cognitive complexity precludes the formation of a clear-cut secondary self-representation.

The argument of the present discussion is directed to the assumption that 'multiple personality in childhood . . . is not a childhood version of the adult syndrome' (Hacking, 1995, p. 93; Hornstein, 1996; Silberg, 1996). In fact, DID is an associative disorder finding its origin in the first experiences of extreme trauma when experiences can no longer be integrated into the total self-system. Of crucial importance, then, is to trace associative disorders and their causes at as early an age as possible. From a neuroconstructivist perspective, failing associative processes are adaptive processes that result in a developmental disorder (Oliver, Johnson, Karmiloff-Smith, & Pennington, 2000). The study of these adaptive processes should include the way in which multiple components, such as activity, emotion, perception and learning, jointly combine and result in a complex developmental process leading either to DID or to other psychological disorders. The more complex dynamic-system models based on connectionist modelling (e.g. Grossberg, 1999; van Geert, 1994) offer a way to do so, because emotional influences are most promising for models of disorder (Fisher & Connell, 2000, p. 25). With extreme cases of emotional trauma, for instance, one experience may result in strong, direct or indirect avoidance of the traumatic situation. One way to avoid such situations is the ability to develop a non-integrated personality by which development is characterized as proceeding 'along dissociative pathways such as multiple personality and hidden family violence' (Fisher & Connell, 2000, p. 25; see also Fisher & Ayoub, 1994; Putnam, 1991). By means of children's 'normal childhood capacity for adaptive-integrative-transformative change' (Hacking, 1995, p. 92), the failure to associate negatively loaded self-relevant information can be remedied. Combined with the removal of causes for failing integration (i.e. traumatic situations), processes of adaptive-integrative-transformation change may then result in non-integrated self-relevant information to become integral parts of the self-system again before they develop into DID.

## Conclusion

It has been my aim to explore DID from a developmental and neuroscientific perspective and to examine the extent to which contemporary conceptualizations of DID relate to contemporary insights into the development of the self-system. The theoretical model that has been developed, of course, is at present speculative only. The model is primarily based on connectionist modelling of neural networks. While for some readers the use of neural network modelling will remain metaphorical only, the connectionist paradigm undoubtedly offers new ways of understanding complex cognitive

processes. The models that have been used and were developed in this paper permit a new level of understanding of a complex behavior such as DID.

By shifting attention from a dissociative to an associative disorder and by relating this disorder to the complexity of the organization of self-relevant information and recent insights into the architecture of the brain, it is possible to embed DID in (social) cognitive and neuroscience developmental theory. By doing so, an attempt is made to offer a balance between culturally determined 'identity enactments' (Spanos, 1996) and the reality of 'dissociative neurological processes' (Fisher & Connell, 2000). Based on the absence of any neurological evidence for the need to develop multiple dissociative pathways within one individual (i.e. more than one alternative personality) and the condition of high complexity (i.e. a more localist connectionist model), the diagnosis of DID may become more accurate. While these assumptions are still speculative, they offer suggestions to study empirically why, given similar extreme traumatic experiences in infancy and early childhood, one individual but not another will develop DID.

## Notes

1. It can be argued that dissociative processes involve the ability to inhibit relationships between information units in the brain (i.e. relationships among neural networks). This process would not essentially differ from repression or 'forgetting' of self-relevant information or experiences. Information is then removed from conscious access. It has been reported, however, that repressed or dissociated (i.e. unconscious) information affects individuals' behavior (Aldridge-Morris, 1991; Ross, 1989). As a consequence of hormonal changes and subsequent deficiencies in the production of inhibiting chemicals in the brain as the individual gets older (Greenfield, 1995), non-accessible information may reappear into consciousness (e.g. the concentration-camp syndrome). On the basis of such findings it can be questioned whether 'true dissociation', as a coping mechanism that involves the ability to prevent the association of extremely, negatively loaded self-relevant information, is a 'real' phenomenon. Given the characteristics of the self-system or of any monitoring system as a 'hidden observer' (see below) that is 'aware of or has access to' all associated or non-associated self-relevant information, it would be more proper to speak of self-relevant information that is not properly integrated into the self-system and 'repressed' intentionally (see James, 1901; Janet, 1887; Meyers, 1903).
2. With respect to amnesia, as many different theoretical explanations can be found as there are theoretical models. For instance, if dissociation is the process of the formation of multiple ego centers, or the result of a weakening of synthesizing (i.e. integrative) powers of the psyche (Janet, 1887), then 'the experience of a second ego center is not and never was available to the primary ego center or ordinary consciousness' and, hence, 'there is no such thing as *amnesia*' (Crabtree, 1992, p. 151). More recently, it has been argued that separate self-systems are based on an anatomical rather than functional distinctiveness between neural systems. As a consequence, particular units of information are dealt with by different anatomically unrelated brain areas. The dominance of a particular

self-system at any time would then automatically lead to the non-accessibility of experiences by the non-dominant self-system. Hence, an anatomical or neurological explanation of amnesia is offered. Neurological studies so far have failed to support this thesis (Aldridge-Morris, 1991; Greenfield, 1995; Hacking, 1995; Oakley & Eames, 1985).

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