MEMORY AND FRAGMENTATION IN DISSOCIATIVE IDENTITY DISORDER

by

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Dissociative identity disorder (DID), formerly called multiple personalities, is a condition in which aspects of experience and memory are separated from each other and from awareness. The current study adds to the literature in this area by utilizing a broad conceptualization of memory functioning in DID, combining ecologically valid memory tests with experimental paradigms, and examining shareability, switching, and integration. Eleven women with DID participated in a two-session experiment that included a variety of memory measures. Participants were given no instructions regarding switching among alters, but were later asked how often they had switched. They reported significantly higher levels of trauma than did a group of 13 female university students. DID participants were faster than student participants at producing autobiographical memories in response to cue words. DID participants also showed a decreased ability to answer detailed questions about a story containing fear, compared with a neutral story. This decrease did not appear in the student group. In a procedural learning task, DID participants improved more than

did the student group on percentage of mirror-reversed words read correctly. Although these results were not statistically significant, effect sizes were moderate to high.

Shared and unshared autobiographical memories had similar properties, although in the DID group the unshared memories included significantly more taste imagery than did the shared memories. The student group scored significantly higher on a measure of overall memory than did the DID group. Percentage of alters who knew about the unshared memory was significantly negatively correlated with how long ago the memory was formed.

DID participants switched among alters an average of 5.8 times during the memory-testing session, and switching was highly correlated with high levels of lifetime betrayal trauma. This study also introduces the Integration Measure (IM), which is the first standardized measure of integration in DID. Integration was related to switching, though this relationship may be complex. Regression analyses demonstrated that lifetime high betrayal trauma was the best predictor of switching. Frequent switching may also slow reaction time in a variety of tasks. Directions for future research and suggestions for researchers are also discussed.

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CHAPTER I

BACKGROUND AND INTRODUCTION TO DISSOCIATION

Dissociative identity disorder (DID), formerly known as multiple personalities, is one of the most fascinating enigmas in psychology. This condition, with its long and checkered history, has been somewhat controversial. A growing research literature is now uncovering the underlying etiology and mechanisms involved in DID, but much is still unknown about the functioning of the cognitive processes, especially attention and memory, that underlie its symptoms. Before exploring these processes, it is useful to summarize what is known about the phenomenology of multiple personalities.

This chapter considers several different definitions of dissociation in general. It then provides a brief introduction to the literature on multiple personalities, including a few of the many controversies associated with this condition. Finally, the chapter examines the major theories about how high levels of dissociation develop.

Definitions of Dissociation

Many definitions and theories attempt to illuminate the complex construct of dissociation. Variously defined as a discontinuity of states and as an important survival mechanism, dissociation provides a method of sectioning knowledge and storing it in a largely state-dependent manner. There is some evidence, discussed below, that pathological dissociation arising out of trauma is qualitatively, as well as quantitatively, different from more “normal” kinds of dissociation.

Dissociation has been defined as a jump between behavioral states, or as a special and distinct state of profound disconnection (Putnam, 1997). The American Psychological Association defines it as a separation between processes that are normally integrated, such as events, emotions, and memories. It has been conceptualized as a

response to trauma, as a neural network, as a survival mechanism, and as a compartmentalization of information processing. One conceptualization that has been common in the past is the psychodynamic interpretation that dissociation is a defense mechanism that protects against unbearable anxiety, and as such is considered a relatively "immature" defense (e.g., Bowman, Blix, & Coons, 1985; McElroy, 1992). Sometimes dissociation is seen as a form of self-hypnosis. There is some evidence to support many of these interpretations, as discussed further below. Possibly the most useful definition of dissociation from a clinical perspective is that it is an experience of disconnection from the self, from the world, from emotions, from memories, and from others.

What these definitions have in common is a separation of information. Whether dissociation is seen as a jump between states, as a special state, or as a functional (rather than physiological) separation, all definitions agree that dissociation allows memories, skills, affects, and other knowledge to be sectioned off and stored in less easily-accessible ways. The state-dependent nature of dissociated memories is not disputed, although the motivations assumed to underlie this segmentation can vary by theory. Whereas psychoanalytic theory views dissociation as a primitive defense against being overwhelmed by unacceptable or unmanageable emotions, other theories (such as attachment theories, including Betrayal Trauma Theory, discussed later) emphasize that the most salient danger is not that of being threatened by one's own emotions, but rather the very real danger of losing an essential attachment relationship and with it the physical and emotional care necessary for survival. Putnam (1997), in his Discrete Behavioral States theory, discussed below, defined pathological dissociation as an aberrant developmental pathway made necessary by abuse and begun as young as infancy; but, according to this theory, other forms of dissociation are non-pathological. In fact, Putnam's is the only definition that includes an explanation for the development of non-pathological dissociation as well as dissociation arising out of trauma.

Defining dissociation as an extension of self-hypnosis was more common in the 1980s than in recent research. This definition was the one that most conceptualized dissociation as a voluntary process. However, more carefully controlled studies seem to

lead to the conclusion that hypnotizability and dissociation are related, but not isomorphic. Children do seem to be more hypnotizable than are adults, and also more dissociative; both hypnotizability and dissociation decline with age (e.g., Ogawa, Sroufe, Weinfield, Carlson, & Egeland, 1997). Empirical evidence linking dissociation with trauma is well-replicated, however, while evidence linking trauma and hypnotizability has been elusive. While emphasizing that hypnosis is not synonymous with dissociation, Putnam (1996) pointed out that "there may be a complex, nonlinear interaction […] If one selects out a subgroup of traumatized, highly hypnotizable or highly dissociative individuals, then it is possible to demonstrate a stronger statistical relationship between hypnotizability and dissociation" (p. 292).

Theory of Structural Dissociation

Nijenhuis' theory of structural dissociation has gained prominence in recent years, partly because it provides testable hypotheses about dissociative responses to various situations. Nijenhuis distinguishes between two possible kinds of states: the emotional personality, or EP, and the apparently normal personality, or ANP. EPs hold traumatic memory, often being stuck in the sensory experience of the memory and unaware of the passage of time. Their purpose is to survive any threat, for example by freezing, fighting, or submitting, similar to the defensive responses of animals (Nijenhuis, 2003; Nijenhuis, van der Hart, & Steele, 2002). ANPs, in contrast, manage the tasks of daily life, such as working, and the functions of attachment and caretaking. They may be emotionally unconnected to, or amnesic for, past traumatic events (Nijenhuis & van der Hart, 1999).

One benefit of this theory is that it can explain what appear to be opposite responses to threatening stimuli, depending on whether the personality being tested is an EP or an ANP. For example, ANPs seem to deal with threatening stimuli by averting their gaze, while EPs pay close attention to any potential threat; simulators cannot reproduce this pattern of results (unpublished research cited in Nijenhuis, et al., 2002). The two types of systems evaluate memories and stimuli differently and may even become afraid of each other. Because these two systems are so different, it is difficult for integration to occur across them, particularly under conditions of neuroendocrine

instability that are produced by chronic childhood stress and arousal. In fact, the activation of traumatic memories in an EP state can actually inhibit access to other kinds of memories (Nijenhuis & van der Hart, 1999). This theory also explains the perpetuation and increase of dissociation, as the ANP is not equipped to deal with the emotional trauma held by the EP, and must therefore re-dissociate the traumatic memories and avoid anything that will trigger the emergence of the EP (Nijenhuis, et al., 2002).

Neural Network

Li and Spiegel (1992) proposed a unique conception of dissociation from a neural network perspective. They defined dissociation as "a special form of consciousness in which events that would ordinarily be connected are divided from one another" (p. 144). Similar to Putnam's (1997) theory of discrete behavioral states (DBS), Li and Spiegel believed that jumping from one state to another produces dissociation. These jumps are due to the neural network behaving in a rigid fashion that has been constrained by trauma.

In this model, a neural network stores information in a series of connection strengths. The network's "state" can be seen as a point that moves over a conceptual map of all the connections, finding a location where all of its constraints are satisfied. This point does not move until conditions change, at which time it must satisfy the new constraints and move to a new location. Trauma is one such constraint.

Intense psychological trauma constrains the neural net by "cementing" just a few connections into a schema, which is a rigid pattern of connection strengths that is built out of experience and emerges when it is needed. Trauma produces such powerful emotions that they override other constraints. This process leads to an inability to respond flexibly to situations, even when the trauma is no longer present (Li & Spiegel, 1992). Therefore a traumatized person's consciousness may rapidly "jump" to a state of consciousness that includes flashbacks or abreactions. The person behaves with similar affect and thought processes as during the trauma, even if such behavior is no longer appropriate.

This particular definition of dissociation is fairly unique in that it also attempts to explain the functioning of a normal system that is not dissociative and has not experienced trauma. The concept of "states" is similar to Putnam's definition of dissociation, discussed in more detail later, but Putnam did not specifically describe how the system as a whole chooses which state will best satisfy the current constraints of the situation. Li and Spiegel's theory could also use expansion. The authors stated that trauma produces strong emotions that constrain the network, but they do not explain very much about what these emotions could be or why they are so strong and so salient. Li and Spiegel's neural network theory combines well with Putnam's DBS theory (and with Forrest's orbitalfrontal explanation of it; see below). All of these theories view dissociation as a way of organizing thoughts, memories, affects, and physiology to serve as an important, if involuntary, coping mechanism and survival skill.

In adults, there is also some evidence that pathological dissociation is distinct from high levels of normal dissociation, an idea first advanced by Janet in the 1800s. Putnam (1996, 1997), Macfie and colleagues (2001), and Gleaves and colleagues (2001) summarized taxometric research by Waller and colleagues that led to the development of the DES-T, or taxon. This subset of items measures only the aspects of dissociation that are differentially experienced by those with a diagnosed disorder, such as hearing voices, and does not assess high levels of what Putnam classified as normal dissociation, such as becoming absorbed in a book or movie. The taxon could reliably distinguish people with a dissociative disorder from people with another disorder and from people with no disorder (although recent research suggests that the taxon may not be as stable as was once assumed; Watson, 2003). The results of these studies support an understanding of a distinct type of dissociation, distinguished by depersonalization and amnesia, and unlike more normative dissociation.

However, Putnam's (1997) distinction between normal and pathological dissociation is imperfect. Normal dissociation is comprised of activities such as absorption in a good book, and a narrowing of attention with no significant state-dependent memory. Pathological dissociation, according to Putnam, includes profound

amnesia and significant alteration in identity, with significant state-dependent memory for autobiographical information. These definitions are intimately connected to a Western, industrialized culture that sees identity alteration as pathological rather than as a routine method of accessing higher states or deities, such as during meditation or prayer. In addition, state-dependency of autobiographical memory is an established part of such normative dissociative states as *amok*.

The most useful conceptualization of dissociation probably varies with the context. Depending on what the objectives of a particular study are, it may be more appropriate to view dissociation as a continuum in some cases and as a taxon in others. Dissociation's dual nature has been likened to the nature of light as both a particle and a wave (Putnam, 1997); using whichever definition seems most useful at the time does not eliminate the possibility of using the other.

What is DID?

Dissociative identity disorder (DID), formerly called multiple personality disorder (MPD), is currently defined by the presence of two or more identities, each of which takes control of the body. Its five most prominent symptoms are amnesia, depersonalization, derealization, alterations in identity, and identity confusion. These disturbances cannot be the result of drugs or a medical condition, nor can they, in children, be the result of an imaginary companion (e.g., ISSD, 1997; Gleaves, May, & Cardeña, 2001; Maldonado, Butler, & Spiegel, 1998; Steinberg, 2001). People with multiple personalities often exhibit a wide variety of confusing and seemingly bizarre physical, mental, and emotional symptoms (Putnam, 1989, provides an excellent overview of DID phenomenology). DID is almost always the result of severe and chronic childhood abuse. Patients with DID are highly polysymptomatic, presenting with almost every other disorder in the DSM. Because of this factor, they are often misdiagnosed and spend years in unproductive treatment, receiving many incorrect diagnoses (e.g., Arbour, 1998; Maldonado, et al., 1998; Ross, Norton, & Wozney, 1989).

The prevalence of DID has been estimated at 1% of the general North American population, although the rate of diagnosis is higher in women and among psychiatric

inpatients (e.g., Gleaves, et al., 2001; Maldonado, et al., 1998; Putnam, 1995). Compared to boys, girls may have a higher risk of encountering more types of abuse, more abuse perpetrated by caregivers, and more chronic abuse (e.g., Putnam, 1989; 1995). Bowman (2002) reported that, across 11 studies, women received the diagnosis of DID nine times as often as men. There is some evidence that men may have a more subtle presentation than women, although there are very few other differences that are reliably found between men and women with DID, and those differences that exist may be due more to gender socialization than to the DID (e.g., Akyüz, Dogan, Sar, Yargiç, & Tutkun, 1999; Loewenstein & Putnam, 1990; Bowman, 2002).

What Is an Alter?

Definitions of an alter vary according to training, experience, and ideology. The definition of an alter is intimately connected with the question of whether alters are separate people (see below), and hence whether they have moral or legal rights. In the past, it was common to view dissociated alters as demons or possessing spirits; this view is still prevalent in some cultures outside the mainstream U. S. culture. The psychoanalytic concept of introjects has also fallen into relative disfavor as an explanation for DID, although some modern writers pair this idea with more recent conceptualizations.

A definition that is fairly standard and reflective of the views of many clinicians and researchers is that an alter is "a distinct identity or personality state, with its own relatively enduring pattern of perceiving, relating to, and thinking about the environment and self (Modified from DSM-IV). Alters are dissociated parts of the mind that the patient experiences as separate from each other" (ISSD, 1997, p. 132). The DSM definition is the one that focuses most on the separateness of alters, and the one that treats them as most complex and person-like. This definition is misleading, however, because it is clear in other language that alters are not actually full people and should not be treated as such. The ISSD elaborated further that, although the DID patient experiences parts of the mind as functioning autonomously or semi-autonomously, they are ultimately all part of the same person (1997).

Another set of definitions that has been very influential comes from the work of Frank Putnam. In his book on adult dissociation he defined an alter as a discrete state of consciousness "organized around a prevailing affect, sense of self (including body image), with a limited repertoire of behaviors and a set of state-dependent memories" (Putnam, 1989, p. 103). He later elaborated his discrete behavioral states theory and explained that alters are "…complex, enduring, identity-based, discrete dissociative states that evolve during childhood and adolescence [and] arise in the context of severe trauma occurring early in childhood. […] Over time, they become increasingly differentiated…" (Putnam, 1997, p. 175). Many scientists and theorists have definitions similar to these, which focus on shifting states of consciousness. These definitions are appealing because they provide clues for measurement of different alters' characteristics in the laboratory. States of consciousness can be studied; state-dependent memory is a well-established effect. Putnam's 1997 definition also takes the traumatic developmental course into account, which is an important consideration in understanding DID.

In an article influenced by Putnam's work, Forrest (2001) conceptualized alters as different Me-concepts that are not integrated into a Global Me. This view comes from the work of Piaget and William James, and postulates that infants start to develop concepts of "me" when they can direct their thinking onto themselves. Experiences in the world provide the context for different Me-concepts, such as the "social me" and the "me-in-relation-to-a-caregiver." Each of these Me-concepts is held by a different set of neural networks, and the relation to the caregiver helps the infant regulate transitions between the states, developing a Global Me that is stable across contexts. The orbitalfrontal cortex probably aids this process, and when it fails, alters are the result.

A third view of alters comes from Ross, who views alters as "abnormally personified containers of schemas and cognitive errors" (Ross, 1997, p. 361). According to Ross, alters are merely serving as containers of mental patterns, most of which are incorrect. His definition is similar to the others in that it treats alters as patterns that, over time, have become more like separate people. His therapy style emphasizes getting the alters to realize that they are all part of the same person.

Diagnosis

A variety of instruments is available for the diagnosis of DID, including the Structured Clinical Interview for DSM Dissociative Disorders (SCID-D), the Dissociative Experiences Scale (DES) and the DES-taxon (DES-T), the Dissociative Disorders Interview Schedule (DDIS), and others. For children, there are the Child Dissociative Checklist (CDC) and the Child Behavior Checklist (CBCL), and others. Most of these measures are structured clinical interviews, although several are self-report questionnaires. Most of them have been validated and normed and can reliably diagnose DID (see below). The SCID-D can even catch cases of DID that have been previously missed (Steinberg, 2001). The best way to diagnose DID involves taking a very detailed history of current symptoms, including somatization symptoms and Schneiderian first-rank symptoms, the five core symptoms of DID, as well as a history of childhood and past diagnoses (e.g., Maldonado, et al., 1998; Putnam, 1995).

An issue of the *Journal of Trauma and Dissociation* was devoted largely to a debate over whether the criteria for DID should be changed. The main article in this section was written by Paul F. Dell (2001a), who argued that there are at least ten major disadvantages to the current diagnostic criteria, and offered his own alternative system of diagnosis for the dissociative disorders. In summary, he stated that the current DID criteria are not user-friendly, are out of date, are not based on taxometric analysis, have poor reliability and low validity (causing misdiagnosis), imply that DID is completely understood, discourage future research, cause controversy, disregard important information, and artificially reduce the base-rate of diagnosis. His alternate classification system is “Major Dissociative Disorder,” which encompasses a wide range of criteria that cover all the current DSM dissociative diagnoses. The main advantage of this system is that people with some dissociative symptoms who do not meet the criteria for full DID will automatically receive a lesser dissociative diagnosis, which would be more descriptive and more appropriate than the current DDNOS. Dell proposed that the new criteria would lead to less misdiagnosis, thereby reducing the amount of time dissociative patients spend unproductively utilizing the resources of the medical system before they

can get adequate treatment. I believe, as do the other commentators, that he is correct in his assessment of the need to revise these criteria, if not in his statements of their problems.

Although Dell's taxonomy is certainly an interesting reconceptualization of the DID diagnosis, I and others disagree with many of the purported weaknesses of the current criteria. I agree with Cardeña (2001) and Steinberg (2001) that Dell ignores the vast evidence of the reliability and validity of the DID criteria. Dell did not provide sufficient evidence for his claim that the average clinician cannot reliably diagnose DID (although we know that misdiagnosis does occur by the numbers of previous diagnoses and years in the mental health system that DID patients often accrue). He admits that measures do exist that can reliably find DID but did not cite the considerable evidence of their utility. In fact, his new proposal has almost no empirical support at all; his "Preliminary empirical validation" (2001b, p. 69) is unconvincing and has been criticized as merely a very long and tedious version of the DES (Cardeña, 2001). Cardeña argued that Dell's criteria will result in *more* under-diagnosis of DID, rather than less. Coons (2001) and Spiegel (2001) also agreed that Dell's criteria are extremely complex and long to read, especially for a clinician who has little training or experience in the dissociative disorders; in fact, even Dell admits this point (2001b).

Despite the problems with Dell's proposed criteria, it is true that there has been an explosion of new research in this area since DSM-IV came out, and the criteria need to change to reflect it. For example, as Putnam (1997, pp. 94 – 95) pointed out, currently a diagnosis can be made solely on the basis of self-report because the clinician is not actually required to witness any alter personalities, although they are the focus of the definition. I agree with Putnam (who also prefers the term MPD over DID, as do I) that, while the current diagnostic criteria leave something to be desired, the underlying concept is valid, robust, and useful.

Integration

One unique aspect of this dissertation is the preliminary development of the first standard instrument to measure integration. Integration, or the fusion of all alters into

one personality, is a controversial topic. It is often a lengthy and subtle process, but a few studies have begun to show that treatment works and leads to stable integration (e.g., Coons & Bowman, 2001). Integration is associated with a wide variety of benefits, including reduction of non-dissociative symptoms (Coons & Bowman, 2001; Kluft, 1993b). Still, there are disagreements about its necessity, with some arguing that it is merely a by-product of therapy rather than its explicit goal (Fine, 1996).

Full integration may be more important in children than in adults, because they are still developing. Integration is also faster, easier, and sometimes totally spontaneous in children (Kluft, 1985a; Waters & Silberg, 1998). But the spontaneous fusion of alters without working towards it seldom happens in adults for the alters that are relatively complex, with a wide range of affects and functions. Kluft (1993b) suggested that therapists use images of rebirth or union rather than dying, elimination, or subtraction as metaphors for integration. In particular, adolescents find the prospect of integration more frightening, and they fear being left alone or dying (Waters & Silberg, 1998).

Kluft (1993a) described at least three different approaches to integration. Whereas in strategic integrationalism integration is the product of a primary focus on eroding dissociative defenses, in tactical integrationalism the therapy is planfully focused on specific goals, one of which is integration. The personality-focused approach is more concerned with getting all the alters to collaborate and solve problems together in a diplomacy; integration may be pursued but is not the main goal. These three approaches frequently alternate during the course of treatment, depending on the current context and needs of the client. Sinason (2002) made the point that it is very important not to integrate forcefully or violently, or against the client's wishes. Kluft (1993b) agreed, and says that his stance is not to push it or argue about it, but to wait and see whether integration is attractive to the client later on.

As an alternate opinion, Southgate (2002) proposed that the goal of therapy for DID is to aid the person in becoming an "associating multiple person." His conception of self is that all people have some degree of multiplicity within themselves, and those who are healthy have the ability to be flexible, attached, and creative by choosing which state

of self is appropriate for each situation. This position is not to say that the person still has DID, but rather, the person is now only as multiple as everybody else. However, I must agree with Rivera (1989) in her feminist view of why full integration is important for female trauma survivors: it gives women more power, choices, and maneuverability within the power structures of our patriarchal society. Given that all participants in this dissertation research are female, this perspective may be particularly relevant to their experience.

This dissertation assesses integration as an important component of understanding memory functioning in DID. Previous research has neglected this important aspect of the experience of functioning with DID. "Switching", or changing which alter is in control of the body, is also related to integration and has also been understudied. It is probable that the switching of alters due to lack of integration affects the performance of DID participants on a variety of laboratory tasks; therefore, measures of these two phenomena are an important contribution of this dissertation.

Does DID Really Exist?

There has been considerable debate in the past over whether DID exists as an entity, or whether it is merely a fad or even iatrogenically created. It has been called merely a variant of schizophrenia, posttraumatic stress disorder (PTSD), hysteria, or borderline personality disorder (see Gleaves, May, & Cardeña, 2001). Supposedly it can be convincingly faked by college students, or brought on by media exposure. Kluft (1985b, 1986) pointed out that actual presentations of multiple personalities in the clinician's office bear very little relation to what is portrayed in the movies. Many people with DID hide their alters rather than flaunt them; they lie to cover their memory lapses; they try to "pass" and they are often quite successful (e.g., Kluft, 1986). In a study comparing people with genuine multiple personalities to simulators, Kluft (1987) found that the malingerers did a poor job of convincing experts of their purported multiple personalities. Although some of the symptoms can be easily malingered, none of the simulators was able to be consistent in memory, personality, or voice patterns. None endorsed as many Schneiderian first-rank symptoms as the genuine patients, and none

gave the characteristic history of treatment failure and multiple diagnoses. In addition, Kluft (1987) pointed out that dissimulation, or pretending *not* to have multiple personalities, is far more common than simulation.

Some people have argued that DID is merely an artifact of Western civilization and diagnostic criteria (see Maldonado, et al., 1998). Still others have made the claim that all people have multiple personalities in some way (see Rivera, 1989, for a poststructuralist examination of "self"). Despite these assertions, DID does exist as a valid and reliable category, even if there is room for improvement in the diagnostic criteria, and as such it is treatable. This dissertation examines only the phenomena associated with the Western label of DID, although many cultures include dissociative phenomena and rituals with culturally-specific meanings and expressions that differ from the Western conceptualization of this disorder.

In the past few years, considerable evidence has accumulated that DID is a distinct category that can be found in similar manifestations all over the world and reliably distinguished from other conditions. For example, Akyüz, Dogan, Sar, Yargiç, and Tutkun (1999) report that cross-cultural similarities in the expression and diagnosis of DID have been found in North America, the Netherlands, and Turkey. In their study of a general population in Turkey, Akyüz and colleagues found that the prevalence and presentation of DID were almost equal to those found in other parts of the world, even though the Turkish sample had no exposure to Western psychotherapy and no public or media awareness of the disorder. The prevalence rate was probably lowered by the social pressures involved in reading the DES aloud to illiterate participants. Similarly, Maldonado and colleagues (1998) report that DID has been found multiple times in all racial and ethnic groups and all classes across various cultures, including African-Americans, European-Americans, Asian-Americans, and Hispanic Americans, and residents of Canada, India, Australia, New Zealand, the Netherlands, and the Caribbean.

DID is also one of the best-documented Western diagnoses, with cases dating back over two centuries. Numerous studies show that it can be reliably distinguished from other disorders and conditions with which it is associated (other dissociative

disorders, psychosis, and other psychiatric disorder in general), as well being distinguished from having no disorder at all, from complex partial seizures, and from PTSD (Gleaves, et al., 2001; Putnam, 1997). It can also be distinguished from schizophrenia, even though these two disorders share several overlapping features of the Schneiderian first-rank symptoms (hallucination, delusions, passivity experiences). Although DID patients actually report more of these first-rank symptoms than do schizophrenic patients, the Structured Clinical Interview for DSM-IV-Dissociation (SCID-D), Dissociative Disorders Interview Schedule (DDIS), Dissociative Experience Scale (DES), and DES-Taxon (DES-T) have all been shown to discriminate these groups successfully (e.g., Gleaves, et al., 2001; Putnam, 1995, 1997; Steinberg, 2001). Watson (2001) also was able to show that dissociation is distinct and separate from schizotypy, although both were related to each other and to abnormal sleep experiences.

Are Alters "Real People"?

The issue of whether alters are real people depends on one's definition of "real" and of "person." The cognitive and neurological evidence reviewed in Chapters 2 and 3 demonstrates that alters do have some qualities of separate people, although they are not completely separate from each other. Several of these studies also included control or simulation conditions, and some of the neurobiological effects could not reliably be produced by simulators (e.g., Sternlicht, Payton, Werner, & Rancurello, 1989). The fact that some information "leaks" between alters is not inconsistent with the evidence showing separation, as demonstrated best by Dorahy's (2001) logical synthesis of the results. Merckelbach, Devilly, and Rassin (2002) argued, in an extremely biased and selective review, that there is no valid evidence for the reality of alters. Their statements are based largely on atypical or questionable cases of DID (such as the "Hillside Strangler"), unconvincing analogues (college students pretending to be murderers), and incomplete discussion of the empirical literature.

Ignoring the alters does not make them go away; in fact it is associated with treatment failure (e.g., Arbour, 1998; Coons & Bowman, 2001; Ross, 1997). If alters are unwelcome in therapy they may stop appearing, but that does not mean that they have

been integrated. Putnam (1997) noted that treatment for other symptoms that are adaptations to trauma and concurrent with dissociation (such as substance abuse and promiscuity) will fail unless the dissociation is addressed.

Kluft (1996) said, "DID is that mental disorder that dissolves in empathy" (p. 317). Therefore it is important to call the alters by their names and allow them room to expand, but, to maintain order, they must all go by the legal name in public and all are responsible for the actions of the body. The system's responsibility for the actions of all its members is also a point emphasized by other therapists (e.g., Putnam, 1997; ISSD, 1997). As a key part of therapy, Ross (1996, p. 364) "specifically and repeatedly" reminds his patients that all their alters are part of the same person, and he thinks that the idea that they are all separate people is a key cognitive error (1996, 1997). Putnam (1989) agreed with Ross that it is a serious therapeutic error to treat alters like separate people. However, he disagreed with Ross in that he observed that it is useless to get tied up in trying to prove it. Therapists should rather empathize with a feeling of separateness while implicitly emphasizing wholeness. Kluft (1993a) agreed.

Alters are in fact real, argued Putnam (1997), but not as individual people, rather as discrete states of consciousness that are demonstrably dissociated from each other (different respiration rates, muscle tone, skin tone, etc.). Therapy should focus on the whole person, although there are times when it is appropriate to engage the alters. Addressing alters individually is a technique best reserved for adult patients, who are at a lower risk than children of dissociating further in response to therapist suggestion (Putnam, 1995, 1997). An interesting side note is that Steele (2002) reported that many of the participants in his study experienced the administration of the Adult Attachment Interview as threatening to them, because the interviewer assumed that there was only one valid voice telling the story of their early family experiences.

Evidence is beginning to accrue that treatment for DID can be effective in the long term (e.g., Coons & Bowman, 2001; Maldonado, et al., 1998). Successful integration is associated with a host of benefits encompassing both dissociative and non-dissociative symptoms, and can be maintained for at least ten years (the longest follow-up

so far). Simpler cases (i.e., fewer alters) have shorter treatments, but even for those who take longer, the vast majority of patients see improvements in their functioning, even while they are still in therapy (Maldonado, et al., 1998; Putnam, 1995). Putnam (1997), however, counters this cautious optimism with the reminder that treatment is very hard and not automatically successful, even with children. There is a definite need for more and better-designed treatment outcome studies that have better control over a number of variables such as clinician training and experience. Few longitudinal studies exist, and only one study followed up on patients after more than three years. However, slowly but surely the studies are showing that DID can be successfully treated, once the correct diagnosis is made. Treating dissociative patients for only one or two of their numerous comorbid conditions will usually result in failure unless the dissociation is also addressed.

The Developmental Course of Dissociation

The study of dissociation in children has been complicated by the fact that behaviors that are considered normal in children, such as extensive fantasy play and imaginary companions, are "clearly pathologic" in adulthood (Putnam, 1996, p. 285; though Putnam does not explain exactly why this distinction is clear). In general, dissociation is high in children and declines with age, in part due to the high percentage of time children spend in fantasy play and imaginary worlds. There has been some debate over whether imaginary companions are a marker of pathology, and if so, what kind of imaginary companions; however, most research has shown that imaginary friends are usually normal (e.g., Taylor, 1999) and that children's high dissociation is mainly a function of high hyponotizability and absorption, which are not pathological (Putnam, 1997).

Dissociation in children has been the focus of several interesting studies. Macfie, Cicchetti, and Toth (2001) found that, during the preschool years, dissociation increased for maltreated children but did not increase for non-maltreated children. Their study is unique because it includes both teacher reports of children's dissociation and children's self-reports of their own dissociative experiences. Their findings suggest that abuse can

lead to a qualitatively different developmental trajectory and increasing fragmentation of the self. Children who had not been maltreated had a slight decline in dissociation over the course of a year; children who were abused, however, had a significant increase in dissociation. These different patterns of development led the authors to conclude that the preschool years are a sensitive period for the development of dissociation and the consolidation of the self (Macfie, et al., 2001). The finding of a different pattern of development also supports the notion of pathological dissociation as a distinct taxon, rather than just the extreme end of a normal developmental process.

A large, multi-site study of dissociation in various types of samples also provided evidence for the taxometric nature of pathological dissociation. Different diagnostic groups, such as people with schizophrenia, borderline personality disorder, and DID, showed different mean dissociation scores, consistent with previous research. However, these group differences were not the result of smooth distributions of dissociation scores; rather, the group differences were determined by the percentage of people in each group who clustered into a distinct high dissociation category (Putnam, Carlson, Ross, Anderson, Clark, Torem, et al., 1996).

A longitudinal study of children from infancy through adolescence provided further support for a dissociative taxon (Ogawa, et al., 1997). The authors concluded that dissociation, while normal in young childhood, is an increasingly pathological response in adolescence. Rather than being on the high end of a continuum, children who had experienced severe trauma exhibited a qualitatively different pattern of responses, which is consistent with Putnam's (1997) conceptualization of pathological dissociation as a separate and abnormal developmental pathway, as well as with the results of Macfie and colleagues (2001). Ogawa and colleagues' study found three groups of dissociation scores: low normal, high normal, and high clinical. Membership in the clinical group was assigned on the basis of the DES taxon, which was a clear breaking point in the distribution of scores. Clinical group membership was predicted by very different factors than the factors that predicted membership in the high normal group. The clinical group had experienced more neglect than either of the normal groups, but compared to the high

normal group, the clinical group was less likely to have experienced emotionally unavailable caretaking and less likely to witness interparental violence (Ogawa, et al., 1997). There is some evidence that pathological dissociation arising out of trauma is qualitatively, as well as quantitatively, different from more normal kinds of dissociation. Besides being more severe, pathological dissociation also seems to follow a different developmental trajectory.

Children presenting with dissociative disorders are often easier to treat than adults, since their defenses are not as entrenched or complex. Fagan and McMahon (1984) reported on four children who seemed to be in the process of developing full-blown multiple personalities but were able to be treated before it progressed. Peterson (1991) proposed an entire distinct diagnostic system for dissociative children, which recognizes their incomplete separation into different alters. Putnam (1997) also emphasized that dissociative children are easier to integrate than adults, and Waters and Silberg (1998) reported effects of integration in children that are slightly different from effects in adults.

However, dissociation can also be more difficult to recognize in children than in adults. Dissociative children may be difficult to diagnose because the full-blown symptoms of a dissociative disorder may not appear until adulthood (Waters & Silberg, 1998). Further, pathological dissociation in children may mimic normal dissociation that occurs in fantasy, pretend play, and imaginary companions. The age regression that may occur due to dissociation can be mistaken for normal phases of regression that occur in many children (Peterson, 1998). Dissociative disorders may also be masked by or mistaken for more common childhood disorders such as oppositional defiant disorder, conduct disorder, learning disorders, or attention deficit disorders. Other disorders (such as autism, schizophrenic disorders, and mood disorders with psychosis) that are not dissociative in nature sometimes mimic some of the same symptoms (Silberg, 1998). Children are often accused of lying when they are amnesic for their actions or are trying to hide their lapses in time and memory. In addition, the sense of self in children is still

developing, which may make them both more vulnerable to dissociative disorders and more difficult to diagnose.

What Leads to High Trait Dissociation?

Models of dissociation continue to be revised as researchers become increasingly aware of the prevalence of trauma and of its effects. Further, understanding the brain's structure and function is a challenge that is now increasingly addressed with brain scanning and other physiological technology. This section discusses possible pathways to high dissociation: trauma itself and several theories about disorganized attachment, shame, and genetics.

Trauma

Severe dissociative disorders are almost always the result of childhood trauma (e.g., Maldonado, et al., 1998; Putnam, 1995; 1996). Putnam has described a "window" for trauma leading to DID at around 3 to 10 years old. Alters appear at around 4 to 8 years old (Putnam, 1995), or at the latest by age 12 (Maldonado, et al., 1998). Numerous correlational studies have confirmed a high incidence of childhood trauma—sexual, physical, and probably emotional abuse—in adults and children with dissociative disorders or very high levels of dissociation (e.g., Arbour, 1998; Bowman, et al., 1985; Chu & Dill, 1990; Coons, 1994; Dalenberg & Palesh, 2004; Draijer & Langeland, 1999; Kisiel & Lyons, 2001; Loewenstein, 1994; Macfie, et al. 2001; McElroy, 1992; Nijenhuis, Spinhoven, van Dyck, van der Hart, & Vanderlinden, 1998; Ogawa, et al., 1997; Ross, et al., 1989; Zlotnick, Begin, Shea, Pearlstein, Simpson, & Costello, 1994; Zlotnick, Shea, Pearlstein, Begin, Simpson, & Costello, 1996). Many of these studies further find that an earlier age of trauma, more severe trauma, and more perpetrators also increase the risk of developing a dissociative disorder.

It is difficult to know which aspect of trauma leads most specifically to dissociation, because many of the risk factors are confounded—for example, more severe and frequent trauma may begin at a younger age, involve more perpetrators and more force, and occur in a general atmosphere of family dysfunction (e.g., Putnam, 1996). It is partly because of this complexity in research that Tillman, Nash, and Lerner (1994)

concluded, in an unwarrantedly selective review of literature, that the link between trauma and dissociation has not been definitively proven. They are mistaken. At least for high levels of pathological trait dissociation, the link has been repeatedly demonstrated in several kinds of populations, using various methods.

Disorganized Attachment

Several models of dissociation fall under the general heading of "attachment" and have been influential in the field. Liotti's (1999) conceptualization of dissociative processes draws on the work of Bowlby and other attachment theorists. Liotti examined various motivational systems at work in the behavior of humans and other animals. The systems that affect social behavior, dependent on the limbic system of the brain, moderate care-seeking and care-giving, dominance and submission, courtship, and cooperation (Liotti, 1999). Attachment is a vital piece of these social motivational systems.

Dissociation may begin with an early disorganized attachment, even if no overt abuse is occurring (Hesse & Main, 2000; Liotti, 1999). The key element being dissociated, argued Liotti, is what it means to feel vulnerable when one should feel most protected, i.e., in a relationship with a parent or caregiver. "Therefore," he said, "children can dissociate […] only when the attachment figures are the direct or indirect source of their traumatic experiences" (p. 779). Barach (1991, p. 118) concurred, saying that detachment or dissociation "protects the abused child from crying out for help and finding out that he is alone," which would be unbearable.

When a parent with a history of trauma or loss interacts with the child, he or she may communicate in ways that are affected by past trauma. Parents with unresolved trauma, particularly those who have an Unresolved/disorganized classification on the Adult Attachment Interview, are especially likely to have infants with disorganized attachment. When external or internal stimuli trigger unresolved trauma, parents may appear dissociated, frightened, or threatening for no visible reason, which is scary for infants (Hesse & Main, 2000; Main & Morgan, 1996). The child finds this interaction frightening and withdraws; however, loneliness is even worse, and drives the child back

to the parent for comfort. Infants have no way to separate the frightening aspects of their parents from the comforting ones, and so they continue to seek comfort in the parents' presence (Hesse & Main, 2000). In such a situation, a child develops contradictory models of the self as frightening to the parent, but also comforting and loved. The child develops disorganized and contradictory internal working models (IWMs) of both the self and the attachment figure. When the attachment system is activated, IWMs rapidly switch between the self as victim, perpetrator, and rescuer. This triad is played out both interpersonally and in the development of three different types of alters in adult DID. Therefore, the child's ability to form an integrated view of the self and others is overwhelmed (Liotti, 1999). Children with frightening caregivers are placed in an impossible bind, in which the parent is both the alarming stimulus and the stimulus that is sought in response to alarm. In this situation, infants cannot develop coherent coping strategies; they may display simultaneous approach and avoidance behaviors (Hesse & Main, 2000; Main & Morgan, 1996; Schore, 2001b) with simultaneous sympathetic and parasympathetic arousal (Schore, 2001b). One possible solution to this confusing situation is to split off good and bad representations of the caregiver, and good and bad representations of the self in response. Here is the beginning of dissociation, which may be embodied not only interpersonally but also intrapersonally, with different dyads of alters playing out different kinds of attachment relationships (Blizard, 1997).

If the child attempts to avoid the painful feelings of dissociation that this rapid switching in the attachment system causes, he or she may learn to interact through alternate motivational systems. Adult symptoms are predicted by which motivational system is activated. Liotti (1999) proposed that adults sexually abused as children will be more likely to interact sexually; adults, especially men, physically abused and humiliated as children will be more likely to interact aggressively; and adults whose parents were frightened by their own memories but not abusive may resort to compulsive caregiving. Disorganized attachment therefore increases vulnerability to dissociative disorders, but is not in itself sufficient without additional trauma (Hesse & Main, 2000). Dissociative disorders emerge when the defense mechanism of these competing motivational systems

breaks down and attachment to a caregiver is massively activated, causing rapid switching of IWMs to occur. These incoherent and multiple IWMs only increase the feelings of fear and anxiety in the face of a new trauma, and ensure that further dissociation will occur (Liotti, 1999). In addition to the evidence given by Liotti, preliminary support for this model was found in an additional study that showed that a familial pattern of disorganized attachment may predispose children to dissociate in response to later trauma (Pasquini, Liotti, Mazzotti, Fassone, Picardi, & The Italian Group for the Study of Dissociation, 2002).

Discrete behavioral states (DBS). Putnam's (1997) theory of discrete behavioral states has been very influential. In brief, humans are born with the capacity for a few basic states (resting, dreaming, awake and alert, fussing, crying). These discrete states can be distinguished by patterns of affect, motor activity, spontaneous verbalization, heart rate, respiratory patterns, and attention. Later, development and experience contribute to the formation of more numerous and complex states. The infant's main task in the first few years of life is to acquire the ability to control his or her own behavioral state transitions. Parents play a crucial role in this process, teaching children to recognize and control their own emotional states, and how to re-establish them if they are disrupted. Parents also help children to know which state is appropriate for various situations, and to integrate these various states across contexts so that a unified sense of self is developed (Putnam, 1997).

Abuse disrupts these processes. Instead of being helpful to the child, the abusive parent is actively reinforcing a situation in which the child is overwhelmed with unbearable emotional and physiological arousal, and has no way to manage it. Abuse by parents also leads to the necessity of children having different senses of self for different situations, which they use in an attempt to control the state of their caregivers and not get hurt. The vital importance of attachment prevents children from disconnecting entirely from abusive caregivers, but at the same time children are left reliant on parents who are actively undermining their growth. When the caregiver does not help regulate transitions between states, metacognition is impaired and the child does not develop a unitary self

(Forrest, 2001; Putnam, 1997); in fact, abusive, dissociative, or inconsistent parents force the child to alternate rapidly between various behavioral states. Under these circumstances, the child's development takes a serious departure from what is normal. Dissociative states arise in response to social and environmental cues, and the child's knowledge and skills are isolated into mutually inaccessible states and are not always available (Putnam, 1997).

Schore (2001b) concurred with this conceptualization. In a thorough examination of the effects of trauma on infants' brain development, he explained that abusive caregivers not only do not help infants learn to regulate their arousal, but they actively induce dysregulation without repair capabilities. This situation results in wild alterations of the infant's biochemistry, with resulting damage to the developing brain.

Orbitalfrontal cortex (OFC). The orbitalfrontal cortex (OFC) may play an important role in the development of dissociation. Forrest's (2001) orbitalfrontal model is based on Putnam's DBS theory and the neurobiology of OFC maturation. The OFC is in the prefrontal cortex, which handles such functions as short-term memory, attentional set, and inhibitory control. In particular, the OFC is responsible for inhibitory control of incoming information (both internal and external), which allows the maintenance of goal-directed behavior. It connects directly to the limbic system in the amygdala, aids in regulating states by regulating the autonomic nervous system, and is more developed in the right hemisphere than in the left. It is also involved in the pleasurable effects of social interaction and the initiation of movement towards emotionally significant stimuli. In particular, it processes social signals, bonding, and emotions (Schore, 2001a, 2001b). Perhaps one of its most important inhibitory control functions is allowing delayed responses to stimuli so that the organism can react on the basis of stored information rather than immediate context (Forrest, 2001; Schore, 2001a).

The OFC develops substantially during the same years that attachment to a caregiver is being formed and emphasized, approximately age 10 to 12 months, with another period of rapid maturation between the ages of 6 and 9 years. This development aids in regulating emotions and their related states so that the individual experiences

inner continuity across contexts, which is critical for the development of a coherent sense of self. Interactions with the caregiver are the primary input used to shape the development and abilities of the OFC. Securely attached infants are able to regulate their affect and sense of self, and can flexibly adapt to new situations throughout life (Forrest, 2001; Schore, 2001a, 2001b). However, in insecurely attached infants, the OFC has developed without interactions that teach the infant how to regulate his or her own states. Relational trauma during this early period results in drastic pruning in the OFC and subsequent information processing that relies on the amygdala instead, leading to fearful states without cortical input. Infants therefore cannot learn to regulate their states effectively and soothe themselves. Because of damaged connections from the right orbitofrontal area to the left language areas, affective information is not effectively transferred into language for processing, leading to difficulty expressing emotions (Schore, 2001b). Similar to Liotti's (1999) proposed attachment model, Forrest (2001) explained that infants with disorganized attachment show contradictory behavior, because they have a need for attachment and yet their attachment figure is frightening and their life is chaotic. Contradictory parental behaviors do not provide a consistent pattern around which the child can organize a self (see also Blizard, 1997).

In this case, the OFC prohibits the integration of different representations of the self into one coherent self. When different contexts arise, the OFC responds on the basis of the immediate environment, which triggers different conceptions of the self to be active, without taking into account all the other senses of self from other contexts (Forrest, 2001). This organization is quite adaptive in childhood, because it protects the developing child from having to be always aware of the frightening aspects of the parent. It is the brain's attempt to deal with a lack of a stable environment, instead organizing the self around the immediate context (which results in switching behavior) and laterally inhibiting the knowledge in other systems (amnesia).

This model makes testable predictions about the development of dissociative disorders. It brings together evidence from neuroanatomical animal studies, attachment studies, cognitive research, and neurological research in humans. It provides

explanations for many of the phenomena seen in abused children and adults, and offers intriguing areas of research for the future.

Betrayal Trauma Theory

Freyd's (1996) Betrayal Trauma theory is based largely on attachment models. It starts from two basic premises: infants need attachment, and the social human species needs to avoid cheaters. As infants, humans are totally helpless. They are dependent on their caregivers not only for basic physical needs of food, warmth, etc., but also for emotional needs of love and care. Infants of many species, especially primates, which mature slowly and therefore have a lengthy period of dependence, have a very strong drive for attachment. In most circumstances, this attachment is what enables infants to survive. In situations of distress, such as hunger or loneliness, infants will seek the parents to whom they are attached, for example by crying or motioning to be picked up. Parents become attached to their offspring and take care of them; in return, babies give back love and affection. Humans also have a strong motivation to avoid being cheated or betrayed (see Freyd, 1996, for further discussion of "cheater detectors"). The most adaptive responses to being cheated are either to confront the cheater or withdraw from further contact, sometimes both.

When a young child is abused by a parent or caregiver, these two needs come into direct conflict. Withdrawing from or confronting the betrayer threatens survival in direct and indirect ways. Losing basic care may result in physical starvation, while losing or damaging the emotional care of the attachment relationship may result in emotional starvation. In this situation, it is more adaptive to not know about the trauma that is occurring. Therefore, the theory proposes, people become blind to betrayal to the extent that being aware of it would threaten a relationship in which they are dependent (Freyd, 1996).

Under this theory, the purpose of dissociation is not escape from pain, but maintenance of the attachment relationship by not-knowing about information that would threaten it (Richardson, 2002, proposed a similar logic). The more important the relationship, the stronger the motivation to preserve it. Thus, abuse by a parent or other

trusted caregiver would be more likely to lead to amnesia and/or dissociation than would abuse by a stranger. Dissociation is therefore conceptualized as an adaptive survival response to a bad situation. Splitting the abuser and the self into good and bad representations is a way to preserve attachment, as is internalization of the abuser (Blizard, 1997).

Betrayal trauma theory is supported by empirical evidence that relationship to the perpetrator is related to rates of forgetting (e.g., Freyd, DePrince, & Zurbriggen, 2001), as well as by reports from people with DID that the betrayal by trusted family and caregivers was the part of the trauma that most disrupted their internal organization of self (Steele, 2002). Kluft (1993a, p. 36) speaks of "multiple reality disorder" because abused children must endorse multiple realities, including ones in which the parent is idealized and ones in which the parent is abusive. This basis of dissociation is consistent with Liotti's (1999) conceptualization of how disorganized attachment leads to dissociative disorders. Further support for this theory can be found in Freyd's (1996) re-analysis of previous data, as well as in many recent studies of sexual abuse that assess closeness and betrayal (e.g., Chu & Dill, 1990; Schultz, Passmore, & Yoder, 2003).

Shame, Guilt, Externalization

Unresolved shame and guilt have been hypothesized to lead to the development of dissociation. These emotions, which are often associated with having been abused, may act as a mediator for the differential development of a dissociative disorder; however, there is little evidence on this subject. Irwin (1998), using a questionnaire technique, found that up to 36% of the variation in DES scores was accounted for by a combination of shame, guilt, gender, and age. Irwin proposed that as dissociation increases, the trauma becomes less and less likely to be resolved, leading to higher levels of shame and guilt. Proneness to dissociation would therefore be a function of proneness to guilt and shame. One criticism of this study is that feelings of shame and guilt may have been primed by questionnaires asking about sexual abuse experiences. Nonetheless, it is an interesting step in clarifying the relationship between trauma, dissociation, and specific affective responses.

Talbot, Talbot, & Tu (2004) reported an additional piece of support for the contribution of shame to dissociation, again using questionnaires. In a female hospitalized population, the authors found that shame-proneness was positively correlated with dissociation, especially in women who reported histories of child physical or sexual abuse, or adult physical abuse. Shame and abuse both predicted dissociation, but no causal inferences could be drawn from this study (Talbot, Talbot, & Tu, 2004).

Dissociation may also be related to the development of externalizing phenomena. In a fascinating chapter, Heineman (1998) related dissociation to obsessive-compulsive disorder through a common need to control the situation and environment. Dissociation, Heineman claimed, aids the abused child in maintaining an external focus so as not to be aware of inner pain. When depersonalization occurs in response to psychological or physical pain, the body becomes disembodied, and a part of external reality rather than internal experience. Thus, aversive emotions and memories do not become part of the self but are stored in separate fragments.

Heineman (1998) described how adults often collude with children in maintaining an external focus, for example by distracting them with thoughts of a reward when they are undergoing a medical procedure. In the case of children who have been abused, adults may concentrate on concrete, pragmatic methods of addressing the trauma while downplaying children's inner emotional world. Some well-meaning adults direct their energies towards assuaging their own guilt, anger, and pain by making efforts to punish the perpetrator who has hurt their child, rather than asking the child what would be most helpful for him or her. Sometimes this need for control is "contagious" from parent to child and they both develop ritualized behaviors, such as obsessive cleaning, in order to control the danger in the world and keep the child safe. Perpetrators also deny the child's inner world of pain and betrayal, instead imposing an alternate external reality: "This didn't happen." The child then develops defenses with an external focus, such as a hypervigilance of others' behavior. However, healing cannot occur until the underlying emotional effects of the trauma are processed in therapy. Therapy can never erase the

reality of the trauma that happened, but it can aid clients in regaining a true sense of control over their lives rather than an illusory one (Heineman, 1998).

Genetics

Recently, studies have been undertaken to determine whether dissociation has a genetic component. Putnam (1996) reported that there is some preliminary evidence that parents and their children have moderately correlated scores on measures of dissociation, in both healthy and abusive families, and Ross, Norton, and Wozney (among others), have found high rates of dissociative disorders in the families of those diagnosed with DID (Braun, 1985; Ross, Norton, & Wozney, 1989). However, these findings provide no clear support for a genetic contribution over and above family environment.

Three studies have examined genetic contributions to pathological and non-pathological dissociation. In one study, family environment accounted for 45% of the variance in dissociation scores, and nonshared environment accounted for the rest; there was no significant genetic contribution (Waller & Ross, 1997). Another study, however, found that shared environment was a nonsignificant contributor, with the variation in dissociation accounted for by nonshared environment (52%) and genetic influences (48%) (Jang, Paris, Zweig-Frank, & Livesley, 1998). The study's authors concluded that there may be a common genetic predisposition to dissociate, which is moderated by different environmental factors, leading to different kinds of dissociation. These two studies, both using twin samples, provide an argument that genetics and environment are both important in the development of dissociation, but that further research is necessary to tease apart their effects.

Becker, Deater-Deckard, Eley, Freyd, Stevenson, and Plomin (2004) examined genetic and environmental effects on individual differences in children and adolescents; previous studies had only included adolescents and adults. This study was also unique in that it allowed analysis of how influences may change over time, because in one of their samples the children were re-evaluated every year for four years. Becker and colleagues collected data regarding dissociation in adopted and full siblings, as well as identical (MZ) and fraternal (DZ) twins. Parents and teachers completed a six-item scale derived

from the Child Behavior Checklist (CBCL). It is important to note that this scale is designed to measure non-pathological dissociation, and that their samples probably did not have high levels of abuse.

Their results showed that, contrary to some theories, amount of dissociation was relatively stable from middle childhood through mid-adolescence. Although dissociation is hypothesized to decline slightly with age, and there is some support for this assertion, this decline is probably driven largely by the presence or absence of abuse, and by whether hypnotizability is used as a measure of dissociation (see Putnam, 1997, for a review; cf. Macfie, Cicchetti, & Toth, 2001). Becker and colleagues found that genetic dominance may be present, and that additive genetic factors and nonshared environment best accounted for individual differences. There was no effect of shared environment. The authors hypothesized that environmental factors reinforce sibling differentiation rather than sibling similarity, and that the normative dissociation measured in this study may constitute an underlying diathesis that affects how children respond to later trauma. They pointed out, however, that their methods were based on the assumption that all the siblings of the same family (full siblings, adopted siblings, MZ and DZ twins) had the same environment, an assumption that may be faulty in some circumstances. They also assumed that gene-environment interactions were minimal, which, again, is a limitation. Despite these limitations, however, the study is an important step in showing that, for normative dissociation at least, genetic factors do play a role in the development of dissociation. This theory is bolstered by the findings of Ogawa and colleagues (1997) that temperament measured at the age of three months was one of the best predictors of dissociation in adolescence.

Summary

This chapter has summarized the general phenomenology, prevalence, and development of dissociative identity disorder. DID is a condition that develops in childhood due to severe abuse and that, if not properly treated, continues to affect functioning. One aspect of DID is the development of separate pieces of consciousness, or alters. The assessment of this separation will be explored further in the next chapter.

The degree to which alters are fragmented or integrated is of particular relevance to this study, which examines and measures integration and switching among alters.

CHAPTER II

DISSOCIATION IN THE LAB, PART 1: NEUROLOGICAL STUDIES OF DISSOCIATION

Since the 1980s, an increasing number of published articles have examined the physiological and neurological phenomena of dissociation in an attempt to understand its biological bases. Although the exact brain mechanisms of this complex process are still largely unknown, there is an emerging consensus about how dissociation can be measured in the laboratory. Decades of research now support a conceptualization of dissociative identity disorder (DID) as a genuine condition that may have widespread physiological underpinnings. Despite the limitations of each of the studies described in this chapter, as a group they provide compelling evidence that there are measurable neurophysiological differences among alters in DID.

Neurological Studies of Dissociation

Modern techniques allow us to capture images of the brain in motion, but pioneers of this research have been systematically examining neurophysiological evidence of dissociation for well over 20 years. In one of the earliest studies, Prince and Peterson (1908) found, in a woman with three personalities, that personality A showed galvanic skin response (GSR) changes in response to words that related to the experience of a different alter. Personality A did not personally experience the event, nor did she know about the other's experience. Prince and Peterson (1908) also found that an alter who was co-conscious but not participating during a peripheral vision test could describe the details of the stimuli presented in that test, even though the alter who was participating could not consciously see the objects.

GSR, ERPs, and Other Physiological Measures

Several of the cognitive studies described in the next chapter also included neurological measurements. Ludwig, Brandsma, Wilbur, Bendfeldt, and Jameson (1972) performed a variety of tests on a male patient with four personalities. GSR for emotionally laden words varied across personalities, and interestingly, the pattern of GSR followed the reported pattern of memory sharing among the alters. That is, all the alters reacted to words that were emotionally salient to the host. Each alter also showed increased GSR in response to words that were emotionally relevant to that alter only, and did not react to the words that were emotional for the other alters (Ludwig, et al., 1972). The results of a conditioning paradigm measuring GSR were inconclusive, however. In addition, EEG results showed that the alters had qualitative differences in alpha frequencies and amplitudes. One alter also differed from the others by having deficits in two-point discrimination, taste discrimination, and sense of pain (Ludwig, et al., 1972).

Another case study also found physiological differences between alters: visual average evoked responses from EEGs differed between alters to the same degree that separate people differ (Larmore, Ludwig, & Cain, 1977). However, a slightly later study using a single male participant found that changes in EEG readings among alters could be explained by amount of alertness, without the need for conceptually different personalities (Cocores, Bender, & McBride, 1984). Cocores and colleagues also argued that alpha rhythms do not provide compelling evidence for differing patterns of EEG readings.

Event-related potentials (ERPs) have also been used to study dissociation. The P300 component of ERPs is often used as a measure of subjective “surprise” or perceived stimulus infrequency. It probably reflects the time taken to update an internal model, and it appears only for stimuli that are relevant to the current task. Interestingly, it can potentially be used as a measure of how self-relevant a stimulus is, even when the self is not relevant to the task at hand (Gray, Ambady, Lowenthal, & Deldin, 2004). Therefore, future research should investigate the feasibility of applying this technique to studying transfer of information among alters in DID.

One study compared four ERP components in four women with MPD, each tested in three different alters. Ladle (1987) found that, overall, the P300 component was different among the three alters in each participant, with three of the four participants showing a distinctive pattern. Their "emotional" personalities had longer latencies for the P300 than did their "host" and "unemotional" alters, taking longer to process information. Although this effect did not reach full statistical significance, it supports Nijenhuis' theory of structural dissociation, as the emotional alters were the ones who had memory for abuse and processed information differently than the other two types of alters, especially words related to sexual abuse. Ladle's (1987) sample size was probably too small to detect most effects, but the results did demonstrate overall differences in the way that different alters within the same person process information.

A recent study using university students grouped into low- and high-dissociation groups revealed that high dissociators were better than low dissociators at both directing and dividing their attention (de Ruiter, Phaf, Veltman, Kok, & van Dyck, 2003). ERP positivity was larger and began earlier for the high dissociators, in comparison to the low dissociators. This positivity remained strong throughout the entire recording for the high dissociation group only, demonstrating greater focused attention in addition to a greater ability to attend to irrelevant aspects of the stimuli (de Ruiter, et al., 2003; de Ruiter, et al., 2004).

A brief report by Bahnson and Smith (1975) described the autonomic nervous system (ANS) features of a single case of MPD partway through therapy. They noted that switching between alters was associated with bradycardia and extremely slow breathing, as well as a temporary drop in skin conductance. Heart rates and skin potentials varied among the alters, with the most intellectual and unemotional personality showing the lowest physiological reactivity. Related to this report is a study by Brende (1984): in a single case of MPD, electrodermal response fluctuated during switches between alters and was associated with emotional responses of the alters, triggering switching. However, Brende's methodology did not allow adequate control of artifacts (Zahn, Moraga, & Ray, 1996).

Excellent work by Williams, Haines, and Sale (2003) demonstrated how dissociation protects against extreme distress by modifying physiology. In a series of scripts, psychophysiological arousal as measured by heart rate and self-reported distress increased during the lead-up to a traumatic event, and then suddenly dropped during the report of the traumatic incident, as dissociative responses came into play. This case study, bolstered by similar findings in a sample of self-mutilators (Haines, Williams, Brain, & Wilson, 1995), certainly merits replication and expansion. Research by Nijenhuis and colleagues, as yet unpublished, demonstrated the same pattern of results. Control participants were unable to imitate the pattern of heart rate change that DID participants showed in response to emotional faces, and simulators also could not imitate the DID participants' patterns of blood pressure and self-reported distress in response to traumatic scripts (Nijenhuis, 2003).

Other physiological oddities have been reported, as well. Braun (1983a, 1983b) summarized early reports of how serious allergic reactions, handedness, microstrabismus, and various electrophysiological measures varied strongly between alters. Putnam (1984) also described common reports of varying medication response, physical symptoms, and allergies. Braun (1983b) reported cases in which multiples developed scars, rashes, and other visible skin changes in response to which alter was present. When alters who had not experienced the traumas that originally caused these scars or irritations appeared, the skin slowly returned to normal and cleared. He suggested that these results may not be as surprising as they first appear, because many previous studies from the 1950s through 1980s demonstrated that vascular changes can be due to emotion, hypnosis, conditioning, or beliefs. These vascular changes can lead not only to skin conditions but also to severe headaches, which are a common symptom in people with multiple personalities (Braun, 1983b).

An article along somewhat similar lines by Putnam, Zahn, and Post (1990) includes an early form of Putnam's Discrete Behavioral States theory. Putnam and colleagues studied nine multiples and five control participants who attempted to simulate alter personalities. Of the nine participants with MPD, eight of them consistently showed

physiological differences according to differences among alters (the ninth had differences that were not significant). Three of the five simulators also produced significant differences, and these were as large as the differences among the MPD group. However, the specific types of physiological differences shown were not the same between the two groups. Whereas in the MPD group alters tended to be differentiated by heart rate and respiration, in the control group the simulated "alters" tended to differ on skin conductance. The authors concluded that muscle tension may play an important role in differentiating alters in a person with MPD, and also that generalized ANS arousal may transfer between alters. They further concluded that "alter personalities of MPD subjects are highly organized, discrete states of consciousness" (Putnam, Zahn, & Post, 1990, p. 256). Zahn and colleagues (1996) later elucidated some of the flaws in this study, including the artificiality of the experimental timing procedures and the lack of individual predictions for each participant. Furthermore, many of the points raised by Putnam and colleagues (1990) are unclear because important details were omitted from the article.

More general physiological differences among alters have been reported in many places. Alters may have different handedness or different handwriting, and differential response to drugs or alcohol (e.g., Coons, 1988; Miller & Triggiano, 1992; Putnam, 1984; Putnam, Guroff, Silberman, Barban, & Post, 1986; Taylor & Martin, 1944). They may show differences in color-blindness, vision in general, deafness, response to pain, paralysis, or language use (e.g., E. T. Carlson, 1989; Coons, 1988; Ischlondsky, 1955; Taylor & Martin, 1944). Compared with insomniac controls, patients with MPD showed significantly more slow-wave sleep, although there was no difference in REM sleep (Jenkins, Radonjic, & Fraser, 1987, unpublished, as cited in Miller & Triggiano, 1992). MPD patients also had different patterns of thyroid functioning among their alters, which was not the case in control participants (Hunter, 1986, unpublished, as cited in Miller & Triggiano, 1992).

Brain Mapping Techniques; More EEG Findings

Braun (1983a) reported on the physiological changes that occurred in two MPD patients after integration. One of his participants regained her ability to see color; the

other participant suddenly developed diabetes during treatment, and her required insulin dosage varied depending on which alter was in control of the body. Braun also found changes in the visual evoked potentials of his participants following integration. Post-integration, the topographic maps were more complex and showed more frontal activity. The visual evoked potentials of each alter were different from each other and from the post-integration potentials. Interestingly, the brain maps of those personalities who were formed by integrating several other personalities were more complex than the maps of adult personalities tested before integration (Braun, 1983a). Pitblado and Cohen (1984) also found that visual evoked potentials in one woman with MPD were significantly and stably different among her five alters. These results were replicated by an unpublished study reported in Putnam (1984), using 11 MPD patients and 10 control participants. The MPD participants had different patterns of potentials across their alters, a pattern which could not be replicated by controls simulating MPD.

A study by Coons, Milstein, and Marley (1982) had questionable methodology, including the use of Coons as a control participant. At the time, he was a dissociation researcher, the paper's first author, and the therapist of one of the participants. Additionally, a doctor who may have been aware of the study's hypotheses interpreted the EEGs. This study included two women with DID and one male control (Coons), who attempted to simulate the alters of one of the DID participants. The authors reported that, in contrast to the control participant, the DID participants did not show compelling EEG differences among their alters. They argued that reported EEG differences reflect not different personalities but rather changes in concentration, muscle tension, and mood (Coons, Milstein, & Marley, 1982). This interpretation, however, is consistent with Putnam's Discrete Behavioral State (DBS) theory of dissociation as a lack of integration between differing states that are characterized by differences in muscle tone, respiration, heart rate, etc. It is also consistent with the results of Putnam, et al. (1990).

Hughes, Kuhlman, Fichtner, and Gruenfeld (1990) used EEG measurements to assess changes among ten alters in a case study. This study was unique because the participant acted as her own control group. Measurements were taken in the host

personality, the alters, and again in a condition where the host personality was instructed to act like descriptions of four of her alters, without switching to them. A professional actress impersonating the alters was also studied. The topographic maps showed large differences between the host and some of the alters, and only subtle differences between the host and other alters. Without knowing the results of the study, the participant's psychiatrist independently classified the similarity of each alter to the host personality, and these results were remarkably similar to the results shown by brain mapping. There were no significant differences found between the host and the host simulating alters; there were also no significant differences among simulated alters in the actress (Hughes, et al., 1990). This study definitely deserves replication because of its unique design and intriguing results.

Tsai, Condie, Wu, and Chang (1999) also studied brain differences in a female case study, using the relatively new technique of fMRI. Scans performed as the participant switched between alters showed significant hippocampal inhibition during the switch process. Tsai and colleagues also measured hippocampal volume, which was significantly smaller than normal, perhaps due to the participant's concurrent diagnosis of PTSD. However, the participant did not show significant memory impairment when tested as a system. The authors concluded that volitional switching may be mediated by changes in hippocampal function, although involuntary switching may involve different processes or areas. In another study of brain function, Markowitsch, Kessler, van der ven, Weber-Luxenburger, Albers, and Heiss (1998) demonstrated that an emotionally traumatic shock can produce drastic hypometabolism in the hippocampus and other memory areas nine weeks after the trauma, although there was no evidence of hippocampal volume reduction.

A recent study (Hopper, Ciorciari, Johnson, Spensley, Sergejew, & Stough, 2002) used a measure called EEG coherence, which is "an objective measure of phase synchrony" (p. 77). It is said to be a measure of cortical connectivity and, possibly, of cortical maturity. Five participants with DID ("hosts") produced 15 alter personalities for testing. Five experienced professional actors, matched for age and with no psychiatric

history, portrayed the specific alters that appeared for testing, including their gender and personal characteristics ("acted alters"). There was very little difference between the hosts, the actors, and the acted alters. The hosts and the genuine alters showed significant differences in some regions of the frontal, central, temporal, and parietal lobes. In most regions, the EEG coherence was lower for the alters than for the host, indicating functional disconnection and possibly less developmental maturity of those brain regions. "The professional actors were not able to simulate the coherence patterns of the alter personalities" (p. 84). In fact, EEG variations in DID have been reported consistently when they have been studied (see also Larmore, Ludwig, & Cain, 1977; Ludwig, Brandsma, Wilbur, Bendfeldt, & Jameson, 1972; but cf. Cocores, et al., 1984). This evidence is consistent with other reports that trauma can seriously affect and impede the brain's development, especially in the limbic system (e.g., Bremner, 1999; Hopper, et al., 2002; Schore, 2001a, 2001b). However, one criticism of this study is that the genders of the DID participants, their alters, and the actors are not described, nor are possible gender effects explored.

Visual Functioning

Smith (1989) reported on a Native American patient who had culturally-congruent non-human alters. Differences in visual acuity between the alters were reliable, with the best vision in the "hawk" alter and the worst vision in the "old man." Other studies have also examined visual functioning in patients with multiple personalities. Unpublished data from Shepard and Braun suggest that there were clinically significant differences in visual or optical functioning among the alters of their seven MPD participants. They found that, for seven of nine measures of visual function, there was evidence that participants' performance on these measures was related to which alter was tested (cited in Miller, 1989 and Miller, Blackburn, Scholes, White, & Mamalis, 1991).

In order to replicate and extend these results, Miller (1989) conducted a new study using nine participants with MPD and nine simulating controls who met none of the DSM-III criteria for MPD. All participants underwent, in three different personality states, a detailed eye exam, conducted by an ophthalmologist who was blind to diagnosis.

This exam involved both subjective measures (measures that require some degree of self-report or interaction with the examiner) and objective measures (in which there is little or no opportunity for interaction, or measures that examine physical properties of the eye itself). Previous research has found differences among alters in MPD patients more consistently using subjective than objective measures (Miller, 1989). Miller found differences in visual functioning among alters in his MPD group on five of the six measures used, including eye-muscle balance. In fact, compared with controls simulating alters, the participants with MPD had more than four times the average number of optical changes among their alters. Miller also reported several MPD participants who displayed eye disorders that are usually found only in children when they were in their child alter but not when they switched to an adult alter (Miller, 1989).

Miller and colleagues (1991) followed up on this study with a replication using 20 MPD outpatients and 20 role-playing controls of similar age. Their results confirmed those of the previous study, viz., that there were differences among alters in certain aspects of visual functioning. The MPD group demonstrated a significant difference from the control group on two measures of visual acuity. Multiples also demonstrated "more clinically significant variability in visual functioning than controls" (p. 133). That is, among their different alters, the MPD group had almost twice as many changes in visual functioning as did the simulating control group (Miller, et al., 1991). However, the particular visual changes that were found were not entirely consistent across this and previous studies. In the 1991 study, the most consistent differences were found on subjective (self-report) measures of visual functioning, but there were also clinical differences found on the objective measures of keratometry and eye muscle balance.

The 1991 experiment also improved the methodology used in the 1989 study in a number of ways; for example, the authors included a question to assess the experimental control of the single-blind technique. The ophthalmologist who performed the assessments of both the MPD and control participants was blind to participants' membership in the MPD diagnostic category; he was asked after each participant to indicate the degree to which he believed that each participant was in the control or MPD

group. Results demonstrated that the examiner was not able to distinguish the two groups reliably (Miller, et al., 1991). One shortcoming of this study was that the participants were assessed only once; the experimenters were not able to draw conclusions about the stability of visual differences among particular personalities in the MPD group (Miller, et al., 1991).

Another paper on this topic reviewed previous research demonstrating physiological differences among alters in MPD, and presented a case study of one participant diagnosed with MPD and seen in therapy over a period of three years (Birnbaum & Thomann, 1996). The participant came in with complaints about her glasses and explained that they no longer worked because they had been made to the prescription of another alter who now was integrated with most of the others. A later visual field examination revealed that she was having extreme difficulty seeing to her right side; in a subsequent session she explained that this problem only manifested when certain alters (who had looked away from other children being abused) became present. Like Miller et al. (1991), this case study found differences among alters in several tests of visual functioning. Over five visits, both subjective and objective measures showed variability too great to be explained by testing error, and the authors were unable to explain the physiological mechanisms that could account for some of the changes, such as corneal curvature (Birnbaum & Thomann, 1996).

A final study on visual functioning and dissociation used a nonclinical population recruited from a variety of sources in Finland (Lipsanen, Lauerma, Peltola, & Kallio, 1999). Lipsanen and colleagues investigated the prevalence of visual distortions and their relationship to dissociation. They found that some form of distortion was reasonably common, but was often dismissed. For each of the four types of visual distortions studied, those who reported experiencing at least one episode of dissociation scored significantly higher on the DES than those who did not report the distortion. The authors suggested that, at least in nonclinical populations, visual distortions may be partially accounted for or caused by trait dissociation (Lipsanen, et al., 1999).

Proposed Brain Areas and Mechanisms of Dissociation

One model of the process of dissociation involves the connections between the limbic system and higher cortical areas. According to this model of the functioning of the reticular activating system, stressful experiences cause the hippocampus to compartmentalize memory storage and the pathways to the higher processing areas, which then leads to automatic behavior any time a similar situation arises. Thus, experiences cannot be viewed as new situations or in a new way, remaining in a sense state-dependent, and eventually connections to some areas of the frontal lobes will be shut down (Sternlicht, Payton, Werner, & Rancurello, 1989). This model bears some similarity to that of Nijenhuis (see previous chapter).

In addition to state-dependent memory, differences between implicit and explicit access systems have been hypothesized to play a role in dissociation (Siegel, 1996; van der Kolk & Fisler, 1995). Van der Kolk has additionally proposed that a narrowing of awareness and the disabling of Broca's area are partially responsible for the difficulty of retrieving memories of trauma. As a result, traumatic memories are encoded without words and are difficult to access. This reduction in Broca's area activity, leading to an emotional rather than verbal encoding of memories, is consistent with an earlier study by Mathew, Jack, and West (1985). In a study using a measure of regional cerebral blood flow (rCBF) with one DID participant and three control participants, Mathew and colleagues (1985) found that the only significant difference in blood flow among the alters of the DID participant was in the right temporal lobe. The authors speculated that, because the right temporal region is associated with memory and emotional experience, the increase in activation in this region may be due to a surge of emotional childhood memories. This particular study suffers from some methodological flaws, including a somewhat incomplete write-up and the fact that the DID participant appears to be a slightly unusual case. Nevertheless, the findings are suggestive and deserve further research. An unpublished study by deVito and colleagues also found that patterns of rCBF varied significantly among alters, and were abnormal (as cited in Miller & Triggiano, 1992).

A newer study with a larger pool of participants (15 male and female DID patients and 8 controls) and more advanced scanning technology contradicted in some ways the findings of Mathew and colleagues. Sar, Unal, Kiziltan, Kundakci, and Ozturk (2001) found that, compared to the control group who did not report any childhood trauma, the DID group had increased rCBF to the left lateral temporal area, not the right. There were also no differences in rCBF among the alters of the DID participants in this study. In addition, Sar and colleagues (2001) found decreased blood flow to the orbitofrontal areas bilaterally in DID participants as compared to the controls. Although this difference did not remain significant after Bonferroni correction, it is a very interesting finding given Forrest's (2001) orbitalfrontal theory of the development of dissociation that was discussed in the previous chapter. The study by Sar and colleagues (2001), while inconsistent with Mathew and colleagues (1985), does support an earlier study by Saxe, Vasile, Hill, Bloomingdale, and van der Kolk (1992). Saxe and colleagues (1992), again using only a single participant with DID but with a higher-resolution method than Mathew et al., found that there was increased blood perfusion in the left temporal lobe when the participant's alters were active.

This pattern of increased left activity was replicated in a sample of right-handed university students who had no history of psychiatric treatment (Spitzer, Willert, Grabe, Rizos, Möller, & Freyberger, 2004). Using the DES as a measure of dissociation, the authors divided participants into low (n = 66) and high dissociators (n = 8). Transcranial magnetic stimulation (TMS) techniques assessed motor thresholds and inter-hemispheric transfer times. As hypothesized, there were significant differences between the low and high dissociators on both measures. When comparing hemispheric excitability, as measured by motor thresholds, the high dissociators had significant lower excitability threshold in the left than in the right hemisphere. Additionally, they had a shorter left-to-right inter-hemispheric transfer time than did the low dissociators; in other words, their hemispheres were less well balanced. These results led the authors to conclude that dissociation on a neural level involves either a dysfunction and lack of integration in the right hemisphere, or superiority of the left hemisphere. However, these results may not

be limited to dissociation but may to some extent apply to many kinds of psychiatric disorders; further research must extend these findings into clinical populations (Spitzer, et al., 2004). One study that does so is a PET case study of a man with dense and persistent psychogenic amnesia and fugue (Markowitsch, Fink, Thöne, Kessler, & Heiss, 1997). The patient, NN, in contrast to a control group, showed increases in rCBF only in his left hemisphere when presented with autobiographical information. The control group processed autobiographical information mostly in the right hemisphere, which specializes in processing self-relevant information (Schore, 2001a), but NN seemed to process information about his own life in a semantic, neutral way that was not personally relevant. An additional interesting feature of NN's experience is that his allergic asthma disappeared after his fugue state caused him to start a new life as a different person (Markowitsch, et al., 1997).

These data are also consistent with findings by Flor-Henry, Tomer, Kumpula, Koles, and Yeudall (1990). In a study of two female participants with MPD and several kinds of control participants, the MPD participants showed much larger than usual differences in hand strength between the left and right hands. A battery of neuropsychological tests showed that there was dysfunction in the left temporal region and bilateral dysfunction in the frontal lobe for both participants, with more deficits on the right side. EEG results showed that there were no differences among alters in the MPD participants. However, the left hemisphere was, relative to the right, significantly more activated in the MPD participants during all conditions. The opposite pattern was found in the participants with chronic hysteria and no MPD. The authors hypothesized that the extreme abuse the MPD participants suffered during childhood might disrupt the organization of the dominant hemisphere through disrupting hippocampal function (Flor-Henry, et al., 1990).

Hopper and colleagues have also implicated the hippocampus and prefrontal areas in the initiation of dissociative states, as well as seeing differences in the temporal and parietal cortices (2002). Tsai and colleagues (1999) have discovered differences in the hippocampus and the nigrostriatal system in DID, which may explain why both

declarative and nondeclarative memory are impacted. Moreover, Nijenhuis (2003) reported unpublished research that showed not only a lower hippocampal volume in florid than in recovered DID, but also a case study wherein hippocampal volume increased over time as healing took place.

Forrest (2001) has proposed that the orbitalfrontal cortex also plays a crucial role in dissociation (see previous chapter). In addition, the thalamus may play a role in dissociative responses and in sensory distortions that result from stress. The thalamus is associated with the onset of night terrors, which can be differentiated from simple nightmares by their similarity to flashbacks, including the presence of motor activity, and which often include amnesia (Krystal, Bennett, Bremner, Southwick, & Charney, 1996).

Research by Simeon and colleagues on depersonalization disorder implicated several more specific brain areas that may be related to dissociative experiences. Using PET, they found that participants with depersonalization disorder had abnormalities in glucose metabolism in the posterior cortex, as well as in portions of the temporal, occipital, and parietal lobes. Scores on the Dissociative Experiences Scale were strongly positively correlated with activity in Brodmann's area (BA) 7B in the parietal lobe, as well as with other areas (Simeon, Guralnik, Hazlett, Spiegel-Cohen, Hollander, & Buchsbaum, 2000).

Nearby Brodmann's areas are also implicated in the findings of another study using PET (Reinders, Nijenhuis, Paans, Korf, Willemsen, & den Boer, 2003). Like Simeon and colleagues, Reinders and colleagues found differences in parietal integration areas for participants with DID. They concluded that different patterns of rCBF among alters in a sample of 11 DID participants corresponded to qualitatively different senses of self, who found different things personally relevant. When listening to a personally-relevant trauma script, Traumatic Personality States had a reduced perfusion in BA 7/40, as well as visual association areas, BA 18/19, and other areas. The authors argue that the reduced blood flow to association areas reflects a blockage in processing emotional material, which enables people with DID to function (Reinders, et al., 2003).

Although each of these studies individually has its limitations and alternate explanations, taken as a group they provide a strong argument that there are measurable neurophysiological differences shown in DID. These studies need greater expansion, wider and more numerous subject populations, more control over factors like psychiatric medication and time in therapy, and certainly replication. However, they are an important and intriguing basis for future research.

Summary

In this chapter, physiological methodologies have illustrated the neural effects and correlates of dissociation. Among other issues addressed was the question of how separated is the functioning of different alters. The evidence reviewed suggests that there can be genuine differences among alters, and that these differences correspond to the phenomenological reports of people with DID. Separateness among alters is related to the research in this dissertation because the daily functioning of people with DID may rely on this separation, which will be displayed during the experiment. The degree to which participants' alters act as independent agents will affect the results of various memory tasks used in this study, perhaps especially those that rely on participants having sustained and focused attention. The more physiologically separated are the alters in my participants, the more compartmentalization of autobiographical memory they may show. In addition, separation among alters may also preserve or improve functioning, for example, by allowing participants to perform better on certain tasks when they employ dissociation to put distractions out of awareness, or when participants with DID can recruit several internal parts to work on a task at once.

CHAPTER III

DISSOCIATION IN THE LAB, PART 2: COGNITIVE TESTS OF MEMORY, ATTENTION, AND DISSOCIATION

Memory, Attention, and Directed Forgetting

The phenomenon of state-dependent memory is well documented and does appear to play a role in DID. Context exerts a definite influence on what is remembered. For example, people in a depressed state tend to disproportionately report negative memories, while people in a manic episode inflate their recall of personal successes (Putnam, 1997). An intriguing application of this effect is Sahakyan and Kelley's (2002) theory of contextual change and amnesia in directed forgetting tasks[1]. In the list method of directed forgetting, participants are given a list of words and then either told to forget or remember it. Then participants see a second list, and finally they are tested on recall of both lists. Participants told to forget List 1 recall fewer items from that list (cost), and more items from List 2 (benefit), than the participants who were told to remember List 1. Sahakyan and Kelley (2002) proposed that both the costs and benefits, which have been well replicated in this task, can be explained by the participants in the "forget" group changing their internal context in between the lists. For participants in the "forget" group, they are told to forget List 1 but not List 2, so therefore the testing situation is different than the context of List 1, and more closely matches the context in which they saw List 2. For the "remember" group, there is no difference between the two lists and therefore the testing context is similar to the context of both lists, essentially creating one long list with a break in the middle.

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[1] Special thanks to Ulrich Mayr for bringing this article to my attention!

Solid cognitive experimental evidence supports this theory, but Sahakyan and Kelley (2002) have not extended their results to the realm of memory for trauma. The conditions of child abuse that lead to dissociation are very similar to a directed forgetting task. First, an event happens and the child is implicitly or explicitly given a strong instruction to forget about it. Then a context change occurs. The abusive father is a pillar of the church community and the terrified victim goes to school and tries to act normal. It is easy to see how this situation, in conjunction with the contextual hypothesis of forgetting, can explain the dissociation of traumatic memory. In most of everyday life, the context is radically different from the context in which abuse occurs. Abuse usually happens only in private, in secret, often at night. Therefore the context mismatch makes it less likely that the victim will recall the abuse until placed in a similar situation. The more effectively the encoding context is reinstated, the easier it is to recall the memories (Sahakyan & Kelley, 2002).

As compelling as this account is, however, state-dependent memory is not likely to be the main explanation for the patterns of amnesia seen in DID. Amnesia in DID tends to be more robust under recognition conditions than is amnesia caused by state-dependent memory, which usually only manifests under conditions of free recall (e.g., Bower, 1994). The amnesia seen in DID also tends to be much more severe (Bower, 1994; Peters, Uyterlinde, Consemulder, & van der Hart, 1998; Silberman, Putnam, Weingartner, Braun, & Post, 1985; Szostak, Lister, Eckardt, & Weingartner, 1994).

Studies conducted with non-diagnosed college student participants have shown some interesting results regarding the interactions of attention, memory, and dissociation. While it is debatable how well their results would generalize to actual memories and experiences of abuse, these studies provide an intriguing look at the advantages and cognitive processes of dissociation. Freyd, Martorello, Alvarado, Hayes, and Christman (1998) found that high dissociators showed greater Stroop interference but not overall reaction time slowing in a standard, selective attention Stroop task. The stimuli were all neutral words; the use of kinship terms had no effect on results. DePrince and Freyd (1999) found that performance on the Stroop task was related to the attentional demands

of the task, such that high dissociators (DES > 20) performed worse in a selective attention task and better in a divided attention task relative to low dissociators (DES < 10). The high dissociators also recalled fewer sexual trauma words and more neutral words compared to the low dissociators. These results may indicate that at least non-pathological dissociation is a distinct style of information processing. This study was the first standard laboratory study in which highly dissociative participants were shown to have better than normal performance.

Another study of 105 female college students also assessed dissociation and attentional direction (Waller, Quinton, & Watson, 1995). Participants were split at the median DES score into high and low dissociator groups. In a selective attention task with neutral and threatening words, the high dissociation group responded more slowly to the presence of threatening words than did the low dissociation group, although they perceived the words equally well (Waller, et al., 1995). This effect was mostly the result of high levels of absorption in the high dissociators, not of the presence of "pathological" dissociation, which is not surprising because participants with present or past DSM diagnoses of any kind were excluded from analysis.

In contrast to the results of Freyd and colleagues (1998) but supporting the findings of DePrince and Freyd (1999), de Ruiter and colleagues (2003) found that high dissociators in a college population had an advantage in both selecting *and* dividing attention relative to low dissociators. In this study, nonspecific threat words, but not neutral words, helped only the high dissociators reduce reaction time in detecting a relevant characteristic of the words. Low dissociators did not show a reaction time benefit with negative emotional valence and overall performed worse than the high dissociators. Like DePrince and Freyd, this study supports the assertion that divided attention is a situation in which high levels of dissociation are differentially adaptive.

High dissociators also showed slightly longer verbal working memory than low dissociators in another college sample (de Ruiter, et al., 2004). A difference of about half a word may be attributable to the effects of having a few very high or "pathological" dissociators in the high dissociation group; this advantage was more associated with

identity confusion/amnesia than it was with absorption. In a smaller followup study, Veltman, de Ruiter, Rombouts, Lazeron, Barkhof, van Dyck, and colleagues (2005) found that high dissociators (n = 11) performed better than low dissociators (n = 10) on two different working memory tasks. In addition, the high dissociators recruited relevant brain networks more highly during the tasks than did the low dissociators.

Further evidence of a distinct information processing style in clinical samples of DID participants comes from the work of Dorahy and colleagues, who assessed cognitive inhibition. Cognitive inhibition is the extent to which distracting or irrelevant stimuli can be inhibited or ignored in order to free up attentional resources to focus on relevant stimuli. In an initial study assessing inhibitory functioning in DID with the use of neutral words as distracters, the participants with DID had slower reaction times compared to general population and psychiatric samples. The DID participants also showed weakened inhibitory functioning compared to the general population (Dorahy, Irwin, & Middleton, 2002). In contrast, two subsequent studies found that, when single numbers rather than words were used as distracters, the DID participants did *not* have lower inhibitory functioning than other groups. All the DID participants in these studies completed the experiments while in their host alters, which were ANPs by Nijenhuis' definition and were therefore disconnected from the emotions of traumatic memories. Unfortunately, neither of these two studies could determine whether the findings were affected by gender differences among the groups (Dorahy, Irwin, & Middleton, 2004; Dorahy, Middleton, & Irwin, 2004).

A final study did use comparison groups matched for gender, and attempted to explain the discrepancy in these three studies with regard to the presence or absence of deficits in cognitive inhibition in DID (Dorahy, Middleton, & Irwin, 2005). The authors hypothesized that the initial study using words as stimuli was a more anxiety-producing context for the DID participants than for the other groups, because some participants had reported that they were constantly on alert for triggering associations from the seemingly neutral words. This anxiety therefore reduced the DID participants' abilities to effectively filter distracting stimuli, but the single digits used in the other two studies did

not present this problem. Therefore, the final study used a manipulation of numbers and words in order to vary the experimental context from neutral to negative. DID participants reported more anxiety in the negative context than did the depressed and general population control groups. DID participants showed reduced cognitive inhibition in the negative but not the neutral context, while for the other two groups the neutral and negative contexts did not affect performance. Furthermore, the DID participants also displayed an attentional bias that slowed their RTs to negative but not neutral words, and this result did not occur in the other two groups (Dorahy, et al., 2005). This experiment provided support for the theory that anxiety differentially affects high dissociators' abilities to process information.

A related line of research using different methodology also examines information processing in dissociation. In a directed forgetting paradigm, again using a college student sample, DePrince and Freyd (2001) again found the same pattern of memory results that they had found before, viz., high dissociators recalled fewer trauma and more neutral words when divided attention was required, while low dissociators again showed the opposite pattern of results. This pattern was true of the to-be-remembered (TBR) words that had been presented using the item method; there was no difference between high and low dissociators on memory for to-be-forgotten (TBF) words. The authors concluded that high levels of dissociation were helpful in blocking out traumatic information only in situations where participants could not ignore it.

Results that seem to contradict this pattern came from two other directed forgetting experiments using the item method (Elzinga, de Beurs, Sergeant, van Dyck, & Phaf, 2000). In the first experiment, 35 college students were split at the median DIS-Q score into two groups, labeled high and low dissociative groups. When presented with neutral words, the two groups had no significant difference in directed forgetting performance. In fact, using only the performance of the 15 lowest and highest dissociators, the high dissociators appeared to have a decrease in directed forgetting ability, being less able to forget the TBF words. A follow-up experiment included 43 college students, again split into high and low dissociators, as well as 14 patients with

dissociative disorders. In this experiment, sexual words and anxiety words were added to the neutral words. Again, the patient group showed a decreased ability to forget the TBF words, especially words related to sex. The overall results showed that the high-dissociating students and the diagnosed patients outperformed the low-dissociating students on memory tests (Elzinga, et al., 2000). These experiments were performed under selective attention demands. Therefore the lack of benefit in high levels of dissociation from the first experiment is not surprising, as DePrince and Freyd only find these benefits under divided attention conditions. The other results are slightly more puzzling, however, and more careful control over and analysis of experimental conditions is needed in future research.

In a further examination of these effects, Elzinga and colleagues conducted a directed forgetting experiment within and across the alters of 12 patients with DID who could switch on command (Elzinga, Phaf, Ardon, & van Dyck, 2003). Stimuli were neutral and sexual trauma words. Consistent with participants' reports of inter-identity amnesia, they recalled more words when tested in the same alter who had read the words than when tested across alters. Overall, the participants recalled more trauma words than neutral words, which is the normal finding under selective attention conditions. Also consistent with their previous research, the authors found that, when tested within an alter, there was a lack of forgetting for the TBF words. However, when tested across alters, directed forgetting functioned so that TBF words were recalled less frequently than TBR words. There was also evidence of perceptual priming across alters equal to that found within alters on a picture-fragment completion task. The authors suggested that switching alters is a major strategy that DID patients can use to block out unwanted information (Elzinga, et al., 2003).

Memory and DID

A second, expanding group of studies has used participants with DID and measured their performance on a variety of cognitive and memory tasks. Dorahy (2001) provided the most comprehensive and thoughtful review of these studies, tying them together to form a comprehensive theory of memory and amnesia in dissociative identity

disorder. One of the most interesting and frequently cited studies was conducted by Nissen, Ross, Willingham, MacKenzie, and Schacter (1988). In one participant with DID, mutually amnesic alters reported no transfer of information on explicit memory tests, although some of the implicit tests showed some "leakage" of information. The authors hypothesized that this pattern of results was due to differences in the stimuli. Material most likely to leak were stimuli that were interpretable without knowledge-based processing; material that did not leak required interpretation and gist for understanding. One example that illustrated this interpretation was the differing results for word stem completion and word fragment completion. In stem completion, the participant could complete the stem with any word that began with the three letters presented. In fragment completion, the participant was asked to complete a word fragment with any word that could be spelled given the blanks presented between letters. Both tasks are implicit tests of memory, but they have one key difference. Whereas the fragment completion task is likely to be interpreted as a problem-solving task with one right answer, the stem completion task is likely to be seen as an opportunity for idiosyncratic free association. The authors hypothesized that this difference contributed to the finding of cross-alter priming in the fragment task, yet no cross-alter priming in the stem task (Nissen, et al., 1988).

In two studies, Eich, Macaulay, Loewenstein, and Dihle (1997a; 1997b) found that, again, while there was no explicit transfer of knowledge between amnesic alters, there was some leakage of information when measured on tests that used priming, such as picture-fragment completion. The authors concluded that "Testing memory implicitly is a necessary but not a sufficient condition for demonstrating transfer of information from one personality state to another" (1997b, p. 421). Simulators were unable to mimic the inter-identity priming. Their results were consistent with Nissen et al.'s interpretation, as were the results from Peters and colleagues (1998).

Peters and colleagues (1998) examined the transfer of neutral information between amnesic alters in four participants with DID. Word list memory was assessed both explicitly, using free recall and recognition, and implicitly, using word stem

completion. Contrary to the authors' hypothesis, but in line with the findings of Nissen and colleagues (1988), there was no leakage of information between alters on the word stem completion task. On the explicit memory tests, evidence supported participants' reports of one-way amnesia, though one participant showed mixed results (Peters, et al., 1998).

A related study, Silberman and colleagues (1985), found that there was interference on related word lists between supposedly amnesic alters in nine participants with MPD, and that the MPD participants were statistically no better than normal at compartmentalizing information. These results could be consistent with Nissen et al.'s interpretation if the task required implicit as well as explicit processing. The materials that "leaked" between alters were emotionally neutral, so it is not surprising that there is more transfer than there would be of emotionally upsetting material. Silberman and colleagues (1985) also found that, while a group of simulating control participants was able to replicate some of the memory findings of the DID group, their cognitive performance was qualitatively different.

Huntjens and colleagues have also studied priming and memory in DID (Huntjens, Postma, Hamaker, Woertman, van der Hart, & Peters, 2002). On perceptual and conceptual priming tasks using neutral stimuli, the DID participants were no different from control participants, although the DID participants were slower and less efficient in most tasks than were controls. The study also included a word stem completion task, whose findings were in direct conflict with the results of Nissen and colleages (1988), Eich and colleagues (1997a, 1997b) and Peters and colleagues (1998). DID participants in Huntjens' study *did* demonstrate cross-alter priming on the word stem task. The authors suggested that this discrepancy could have been due to their use of slightly different and possibly more sensitive methodology than had been used in previous experiments, or to the greater power of their experiment, which had 22 DID participants in the word stem task (Huntjens, et al., 2002).

Ludwig and colleagues (1972) examined both cognitive and neurological measurements in their participant; however, they did not draw a clear distinction between

implicit and explicit memory access and so it is difficult to compare this study to the others, although Dorahy (2001) argued that it could weakly support the Nissen interpretation. On a test of paired-associate learning, there was no transfer of learning across personalities. Another test that is not described in the article appeared to show priming across personalities, but more detail is needed. There was also some information leakage in a logical memory task. All the information that leaked during various tests was emotionally neutral; emotions did not appear to be shared across alters (Ludwig, et al., 1972).

A later study that also used paired-associate learning in an MPD participant did find leakage of the neutral stimuli across three alters who reportedly had amnesia barriers between them. There were also practice effects across the three alters on a perceptual-motor task (Dick-Barnes, Nelson, & Aine, 1987). While these results are consistent with other studies, they are not compelling because the participant had previously been integrated for a brief period of time before re-fragmenting, and was in the process of re-integrating when the experiment was conducted. Therefore, sharing of information across alters should be more expected than in many cases of DID. Of note, however, is the other finding in the study. In a selective attention task with color matching, ERPs showed that the three alters processed words differently from each other. The oldest and most responsible "host" personality was most able to direct attention, while the child alter was least able (Dick-Barnes, et al., 1987).

A more recent study of information transfer in DID used a one-week delay to test memory for word lists in 21 DID participants that reported the presence of one-way amnesia between two of their alters (Huntjens, Postma, Peters, Woertman, & van der Hart, 2003). The stimuli used in this experiment were all emotionally neutral. Overall, the performance of the DID participants was equivalent to that of control participants. When exposed to lists of words that shared categories and therefore caused interference, the DID participants were no better than other participants at resisting the memory interference or at discriminating lists. On explicit memory tests of recall and recognition,

however, the DID participants did not perform as well as the controls (Huntjens, et al., 2003).

In order to evaluate whether emotionally salient information transferred implicitly between alters in a laboratory task, Huntjens and colleagues assessed the transfer of affective priming between reportedly amnesic alters in 19 participants with DID (Huntjens, Peters, Postma, Woertman, Effting, & van der Hart, 2005). The study used four trauma-related words and a conditioning procedure that formed associations between nonwords and real words that were either positive, neutral, or negative (trauma-related). At odds with the authors' hypothesis, emotional priming did transfer across alters (Huntjens, Peters, et al., 2005).

Further research by Huntjens and colleagues specifically assessed the explicit memory transfer of trauma-related words in 19 participants with DID (Huntjens, Postma, Peters, Woertman, & van der Hart, under review). Using lists that included 8 trauma-related words and 8 neutral words, the participants learned the lists in one alter and were tested in another, reportedly amnesic, alter. On the test of free recall, DID participants' performance was equivalent to that of control participants instructed to simulate DID. On the recognition test, too, inter-identity amnesia could not be rigorously demonstrated. The authors point out that these results are in stark conflict with participants' own reports of their memory functioning. However, the DID participants did show reduced recognition sensitivity compared to simulators, meaning that they were somewhat impaired when making "old" vs. "new" judgments in recognition (Huntjens, et al., under review).

Although several studies have examined transfer of memories between alters, one study has particularly addressed autobiographical memory function within one alter (Schacter, Kihlstrom, Kihlstrom, & Berren, 1989). Using the Crovitz word technique, the researchers asked the participant with MPD to generate autobiographical memories in response to three different types of words: objects, activities, and affect words. The participant recalled almost entirely recent memories. She was very slow to retrieve the few childhood memories that she produced, and it upset her to be asked to recall

memories from before the age of ten. Her first memory of her father dated from age 16, and she also reported discovering new childhood memories during the experiment. Her results were quite different from a group of 30 control participants, who did not show amnesia for childhood. The MPD participant also responded faster to affect words than did the control participants (Schacter, et al., 1989). The authors gave no explanation for this finding, but Dorahy (2001) suggested that it may be due to the MPD participant responding quickly in order to prevent herself from remembering other traumatic memories triggered by the emotion words. In order to evaluate this hypothesis, Schacter and colleagues would have had to analyze the data by emotional valence of the affect words, as both positive and negative words were included. Unfortunately, they did not report these results. This study will be discussed in more detail in Chapter 7.

Bryant (1995) is also unique in that it was a study where the test procedure was administered both before and after the participant's diagnosis of DID. Bryant found that compartmentalization of childhood memories increased after the diagnosis, or perhaps the DID participant was merely less hesitant about displaying it. Furthermore, before the DID diagnosis, the participant produced only recent autobiographical memories, while after the diagnosis she produced both recent and childhood memories. After her diagnosis, the participant switched into a child alter when recalling childhood memories, and this child personality became increasingly specialized at holding negative memories. In order to address demand characteristics of the experiment, Bryant (1995) also had two groups of simulators take the same memory tests as the DID participant, but they did not reproduce the pattern of memory results.

Although most of this research demonstrates imperfect compartmentalization of knowledge, it is not inconsistent with reports of how DID works. As long ago as 1944, Taylor and Martin reported that there was a great deal of subtlety in the amount of compartmentalization of information. Zahn and colleagues (1996) pointed out that the implicit transfer of priming between alters is necessary but insufficient evidence to demolish claims of robust inter-identity amnesia. Most of the material that has been studied in the laboratory has perforce been neutral material, which the person would have

less motivation to section off from the rest of consciousness. The studies that have used negative stimuli, such as the work of Huntjens and colleagues, are one step towards understanding memory functioning in DID, but further expansion is needed. For example, van der Hart, Bolt, and van der Kolk (2005) have recently reported that not only did their 30 DID participants report amnesia for childhood trauma, they also reported amnesia for other events that were emotionally significant but not traumatic. Furthermore, the participants with DID remembered their experiences in qualitatively different ways than has been reported in the memory literature. In addition to having somatosensory flashbacks (or "body memories") for traumatic events, they also recalled their non-traumatic important events through their bodies (van der Hart, Bolt, & van der Kolk, 2005). Despite this complexity, which should be explored in future research, the studies demonstrating at least some degree of amnesia are convincing, although they should be replicated with larger samples. Several of them also included simulators attempting to "fake" DID, for the most part unsuccessfully.

Summary

Much of the foundation for this dissertation research has been laid in chapter 3. This chapter reviewed existing cognitive research on dissociation and DID, thereby clarifying what knowledge we possess and what areas still need exploration. Cognitive experiments on memory in DID provide the framework within which this dissertation was designed. The research reviewed in this chapter provides basic knowledge about processes in dissociation from which to expand into the current study.

CHAPTER IV

RATIONALE FOR CURRENT STUDY

The research discussed in previous chapters has opened the door for a scientific understanding of the way DID operates. Since the 1990s, studies have been conducted more frequently in a manner that is well-designed and well-controlled. Some recent studies, notably the work of Huntjens, have also used larger samples of DID participants than have been used in the past. As acceptance of DID has spread and methodology has advanced, knowledge of dissociation and of dissociative identity disorder has become increasingly robust and nuanced. However, previous research still leaves many areas unexplored.

Research such as that done by Eich and colleagues is an essential foundation for a full delineation of how memory functions in DID. Nonetheless, the experimental techniques used by Eich and many others do have the drawback that they require a certain specialized sub-sample of the already small group of people diagnosed with DID. Participants in many studies of memory in DID must be able and willing to switch to certain pre-specified alters at will, and to regulate how long each of those alters remains in control of the body. This type of executive control can take years to develop, and is usually the result of intensive psychotherapy, the goal of which is to break down amnesia barriers so that alters can communicate and cooperate with each other. By requiring participants to have this kind of control over their switching during lengthy and challenging experimental sessions in an unfamiliar laboratory, some researchers have limited their participants to only those people with DID who are furthest along the path to resolving their DID and thus changing the very phenomenon being studied. Such participants are few and far between, and are most accessible in large urban areas.

A more serious criticism of previous laboratory research regards its striking lack of ecological validity and narrow focus. Most of the well-controlled empirical research on memory functioning in DID has used word lists or similar stimuli. While such basic memory research is to be applauded, it can evaluate only a small portion of overall memory usage in the real world, and it is difficult to generalize from these types of studies. People do not develop DID in order to create cross-identity amnesia for lists of neutral words! DID is a coping mechanism for sectioning off knowledge of unbearable trauma. Therefore, experiments that show leakage of inconsequential and neutral information between reportedly amnesic alters do not address the question of how memory functions during daily life, in which people are rarely assessed on whether or not they have acquired conditioning for nonsense syllables. Zahn and colleagues (1996) pointed out that testing inter-identity amnesia based on conditioning results does not provide conclusive answers, and that paradigms using simple stimuli such as word lists are also not definitive. They argued that more complex stimuli are necessary in order to fully assess the presence and extent of memory and memory transfer in DID. In real life, people deal with memories about their own past (autobiographical memory). They share information about themselves with others, or they keep such information to themselves. They also encounter semantically rich and varied stimuli, as well as stimuli with a variety of emotional valences.

Very little research has thus far addressed the impact of emotion on memory in DID. The studies that have used negative stimuli, such as the work of Huntjens and colleagues, are one step towards understanding this relationship, but further expansion is needed. Seeing a few isolated words, no matter how negative, is of debatable relevance to the real-life context in which people live complex lives, with interactions among various emotions occurring during various events.

Finally, no study thus far has attempted to quantify or to measure the extent of integration in DID participants with any degree of standardization. If DID is developed in order to hold various parts of memory away from each other, then experimenters who assesses memory functioning must necessarily be concerned with the pattern and extent

of fragmentation and integration in their participants. These patterns can be subtle, quite complex, and not very amenable to awareness, verbalization, or classification. This dissertation represents a step forward for the field of dissociation studies by its development of an integration scale.

Researching DID is extremely difficult. Many of the limitations apparent in previous research are the inevitable results of the methodological and conceptual challenges inherent in conducting studies with this population. Those challenges, such as participants who are relatively rare and difficult to recruit, who show immense individual variability in their behavior, and who may be emotionally fragile, limit this dissertation as well. Nevertheless, this dissertation was designed to examine memory in DID from a broad and rich perspective. To this end, some degree of laboratory control has been traded for relatively high levels of ecological validity.

Several different types of memory measurements are the basis for the research reported in this dissertation. The experiment began by collecting spontaneous autobiographical memories from participants' lives. Phenomenological data were also collected for two of these memories, one memory that was shared with the experimenter and one that was unshared. Freyd's (1983) shareability theory proposed that there are measurable differences between memories that are shared with other people versus those that are unshared (see also Freyd, 1996). This theory has received some support in the general memory and philosophy literature, but it has never been applied to the situation in which many identities exist with varying degrees of separation within a single person. It was hypothesized that shared memories, compared to memories that had not been extensively shared with others, would show greater sensory detail, a more linear and comprehensible structure, and better connection with surrounding memories.

Next, participants were given a list of word stimuli, similar to the stimuli used in previous research. It was hypothesized that participants with DID would perform generally well on a standard assessment of free recall. Based on previous research, this type of memory assessment generally does not show large deficits in participants with

DID. Moreover, the words were not trauma-specific, and therefore they should not trigger distinctly dissociative information processing styles.

Participants also heard three vignettes concerning events from the narrator's childhood. The first vignette was emotionally neutral, the second contained fear, and the third contained happiness. These stories were an important ingredient in the design of this study, because they were semantically rich, ecologically valid stimuli that contained a variety of emotions. Based on previous research, it was hypothesized that the DID participants would show better memory for the neutral and happy stories than for the fear story. Due to the detailed nature of these stimuli and their possible relevance to the participants' own lives, it was theorized that the stimuli would provide sufficient cues for the employment of dissociative information processing.

Participants also completed a procedural learning task that measured perceptual skill without the influence of motor skills. This study was specifically concerned with procedurally assessing memory and mental skill learning, rather than with assessing procedural learning of motor skills. The task used in this study was therefore a relatively pure assessment of procedural learning, allowing conclusions to be drawn about this area of memory performance independent of any possible physical correlates of DID. It was hypothesized that participants with DID would show performance equal to the performance of college students on this task, as there were no stimuli in the task that were directly related to trauma and therefore no reason to believe that the DID participants would necessarily process the task differently.

In addition, and unique to this study, participants reported when they had switched alters during the testing session and filled out the newly-designed Integration Measure (IM). Unlike in previous research, the participants were not asked to switch at certain times nor to certain alters, but were rather given their choice over when and whether to switch. Participants also filled out questionnaires regarding dissociation and trauma history. Finally, this study is distinct from previous laboratory research in its focus on DID as adaptive and especially in its treatment of participants as the experts on their own internal experience.

Summary of Hypotheses

1. Compared to unshared memories, shared memories will be more sensory, have a more linear and comprehensible structure, and be better connected with surrounding memories.
2. DID participants will show no deficit on word list recall.
3. DID participants will have better memory for neutral and happy stories than for the story containing fear.
4. DID and student participants will have equal performance on a procedural learning task.
5. Switching and integration will be assessed.

CHAPTER V

METHOD

Participants

Recruiting

Student Group

A comparison group of college students was recruited from a psychology department subject pool at a large state university in the Pacific Northwest. This student group provided a measure of baseline or "normal" performance on the memory tasks, as well as allowing the experimenter to pilot and refine the procedure before running the experimental group participants. Some participants completed a prescreening test that included a modified version of the Dissociative Experiences Scale (DES; see below); students who scored on the high or the low ends of this scale were then invited to participate in the experiment. Some time slots were also opened to any students, regardless of whether they had completed the prescreening. Participants signed up via a human subjects website that did not contain any description of the studies (for some reasons why this procedure is important for validity of results, see Barlow & Cromer, in press).

DID Group

There were two waves of recruitment. The first type of recruitment took place at McLean Hospital in Belmont, Massachusetts, and resulted in one inpatient participant. After discussing the project with doctors and staff members, recruitment began with daily chart review of all patients in the Dissociative Disorders Treatment Program and

Women's Treatment Program. For each patient who had a diagnosis of Dissociative Identity Disorder (DID), either confirmed or possible, recorded on her chart, the experimenter contacted the doctor primarily responsible for that patient's treatment. Doctors were asked to determine whether, in their clinical judgment, the patient was appropriate for the experiment, and if so, to pass along the experimenter's contact information to the patient. Reasons for low recruitment were many; for example, there was a fair amount of clinical disagreement about the diagnosis itself. Often it was put on the chart by a different doctor than the one who was currently responsible for the patient, and the doctors disagreed about whether the diagnosis was correct. Such was the case for almost half the potential participants and this situation resulted in lengthy telephone exchanges, by which time the patient was often discharged. Several patients were discharged after only one or two days, thus not staying long enough to be recruited and run. Additionally, approximately half the potential participants were judged by their doctors to be too unstable to participate in research of any kind, despite the protocol being approved by the Chief of Hospital Clinical Services and the McLean IRB for use in this population.

The second type of (outpatient) recruitment took place in the Pacific Northwest, mainly in the Eugene and Portland areas of Oregon and the Seattle area of Washington. A letter explaining the project was sent to clinicians and treatment centers that specialized in dissociation or trauma. The letter asked clinicians to have eligible and interested clients contact the experimenter. Information was also sent out over an electronic mailing list, and a website provided more details about the study.

Demographics

Student Group

The student group consisted of 13 female university students, with a mean age of 23.07 years (SD = 6.42, range = 18 – 37). No student participant reported being diagnosed with a dissociative disorder, although three reported current or past depression. One participant reported a diagnosis of post-traumatic stress disorder, but she still had a dissociation score below the group average.

DID Group

The experimental group consisted of 11 women who had been diagnosed with DID. One was an inpatient at McLean Hospital in Massachusetts, and the rest were community members in the Pacific Northwest. One participant did not answer demographic questions. The average age was 35.35 years (SD = 12.57, range = 23 – 62). Seven participants reported being currently on psychiatric medications, mostly antidepressants. The DID group had one member with a high school education or GED, four people with some college or technical school, two people who had completed college or technical school, two people with some graduate school and one person who had completed graduate school. This group had been hospitalized an average of 3.6 times (range = 0 – 15 times) and had been in therapy for an average of 12.05 years (SD = 6.73, range = 2 – 20 years). One participant had been diagnosed with DID between one and three years ago, four had been diagnosed three to six years ago, and four had been diagnosed more than six years ago (two participants did not answer).

Materials

Experimental materials

Stories

Participants heard three vignettes during the first session; these stories may be found in the appendix. Two of the stories were adapted from those originally used in a previous study in our laboratory (Klest, 2002). Each of the three stories was approximately 200 to 330 words long and described a family event from the narrator's childhood. The first story had no overt emotional valence and was recorded in an unemotional voice. The second story contained fear, both in the wording and in the narrator's recorded tone of voice. The third story (newly created) contained happiness, again in both the wording and the reading.

Word Lists

The words used in the procedural learning tasks, as well as the word-list learning task, were taken from a previous study (Barlow & Freyd, unpublished data). In creating stimuli for the previous study, a list of negative words was created and the frequency of

each negative word in English was determined using the norms of Kucera and Francis (1967). For each negative word, five control words were chosen that were the same part of speech (noun, verb), the same length to within one letter, and had the same frequency in English. The 100 control words were also chosen to be neutral in emotional valence. Words were presented in a random order.

Measures

The measures detailed below are all self-report, pen-and-paper questionnaires. Most have been used in prior studies and several have strong research backing their validity and reliability; some were created for this study. All participants completed the following measures:

Memory Characteristics Questionnaire. This instrument, called MCQ for brevity, is a modified version of the Memory Characteristics Questionnaire developed by Johnson and colleagues (Johnson, Foley, Suengas, & Raye, 1988). The original MCQ assesses qualities of a specific episodic memory, such as the degree of visual and other imagery, perceived importance of the memory, clarity and impact of the memory, as well as how long ago the event occurred. The 31-item modified version clarifies some of the questions and is slightly shorter.

Demographics. The demographics form varied slightly between the student and DID groups. Both versions asked basic questions (open-ended) such as age and gender. The college student control group reported whether they had been diagnosed with any mental illness or dissociative disorder, year in school, and number of psychology classes taken. The DID group reported level of education, job, psychiatric medication, and amount of therapy and prior hospitalization.

Dissociative Experiences Scale (DES; Bernstein & Putnam, 1986). The DES is a 28-item self-report measure that can be used to assess different types of dissociative experiences, ranging from “highway hypnosis” and “spacing out” to amnesia for important autobiographical events, lack of pain awareness, depersonalization, and derealization. It has been used extensively with a wide range of populations in countries around the world, and has been found to have strong reliability and validity (see Briere,

1997; Carlson & Putnam, 1993 for reviews). Bernstein and Putnam (1986) found that the test-retest correlation for normal participants was .84 across one to two months.

For each item, participants are asked to circle the percentage of the time (0 to 100%) that each experience happens when they are not under the influence of alcohol or drugs. This scale was not designed for diagnostic use, and the general population of adults usually scores in a narrow range below 10 (Bernstein & Putnam, 1986; Carlson & Putnam, 1993; Carlson & Rosser-Hogan, 1993). The DES is, however, well able to distinguish DID from other psychiatric and dissociative disorders (Bernstein & Putnam, 1986; van IJzendoorn & Schuengel, 1996). Bernstein and Putnam (1986) also reported DES scores for several different types of clinical groups. Normal adults had a median score of 4.38, alcoholics of 4.72, phobics of 6.04, schizophrenics of 20.63, PTSD patients of 31.25, and multiples (DID participants) of 57.06 (p. 731). Although males and females score similarly on the DES, scores on the measure may be related to IQ or educational level because the items require a high school reading level for comprehension; the instrument may also be susceptible to malingering (van IJzendoorn & Schuengel, 1996). Van IJzendoorn and Schuengel (1996) reported that the mean alpha reliability of the DES in their meta-analysis was .93.

Brief Betrayal Trauma Survey (BBTS; Freyd & Goldberg, 2004). This measure has 14 questions, each with two parts. It is designed to measure the frequency of various traumatic events, including natural disasters, sexual trauma, physical and emotional abuse, and witnessing violence. An example of a low-betrayal trauma is "Been in a major earthquake, fire, flood, hurricane, or tornado that resulted in significant loss of personal property, serious injury to yourself or a significant other, the death of a significant other, or the fear of your own death." A high-betrayal trauma item is "You were made to have some form of sexual contact, such as touching or penetration, by someone with whom you were very close (such as a parent or lover)." Each item asks the participant to circle the number of times an event has happened before age 18 and after age 18 (there were five increments, ranging from *never*, coded as 0, to *more than 100 times*, coded as 5). The BBTS has good test-retest reliability (Goldberg & Freyd, under

review). Participants also rate how upsetting are the questions, compared to everyday life, how important it is to ask about such events, and how good an idea it is to include such questions in research.

Post-experiment Questionnaire (PEQ). This survey measured variables such as whether participants took the experiment seriously, whether they understood the instructions, and whether they had previously practiced mirror-reading (the procedural learning task, discussed below). The PEQ also had open-ended questions about the best and worst parts of the experiment, taking into account both sessions.

Participants in the DID group also completed several additional questionnaires:

Integration Measure (IM). Developed by Barlow and Chu, this questionnaire is the first of its kind (see Appendix). Currently, there is no existing empirical measure of how integrated or fragmented a person with DID is. There are clinician and patient reports describing degrees and components of integration qualitatively, as well as some limited and not well-replicated data that integration is associated with physiological changes. This questionnaire is a first attempt to measure components of integration, such as awareness of other alters, communication between alters, shared executive control, and co-consciousness.

Three additional questionnaires were included in the DID group as part of an undergraduate honors project and will not be reported here.

Equipment

Equipment for the experiment included a Panasonic HD Digital 5100 video camera on a tripod, recording to VHS tapes in a VCR, as well as a portable cassette player.

Procedure

Session 1

All participants in the student group as well as the DID group participants who were from the Eugene, Oregon area came into a university psychology laboratory for both sessions. Other DID group participants in the Pacific Northwest region (Seattle and Portland areas) participated in their own homes or in the home of a friend and fellow-

participant. The experimenter offered to find alternate locations such as a public meeting room in case participants felt uncomfortable with the experimenter coming to their homes, but all participants declined this accommodation. In the case of home visits, equipment set-up and suitably arranging furniture as needed for the experiment was the first step. One participant with DID participated in an office in the building where she was attending residential psychiatric treatment, on the grounds of McLean Hospital in Belmont, Massachusetts.

All participants had individual experimental sessions with the experimenter. Except in the case where several of the DID participants were friends with each other, participants did not see each other or know who else had participated. All participation was coded with an anonymous code number, and the link between number and name was destroyed after the second session. In the case of the hospitalized DID participant, the experimental sessions also included a licensed clinical psychologist who was on the staff of the treatment program there. Allison Berger, Ph.D., was a consultant on the McLean Hospital phase of the experiment and remained in the room as a trusted figure in order to ensure the participant's well-being.

All participants were first given a general informed consent form describing the experiment's purpose, procedure, risks, and benefits, as well as an additional consent form regarding the videotaping procedure. No participant declined to participate in the experiment or to be videotaped. All participants were also given an opportunity to ask questions.

The first task was a modification of the Crovitz Word Technique (Crovitz & Schiffman, 1974). This task is a classic method of assessing autobiographical episodic memory. It consists of a series of 10 neutral cue words. The instructions state that participants should briefly describe the first memory about a specific personal event that comes to mind when they hear the word. Participants can choose not to use any memories that they are uncomfortable describing, instead choosing another memory that relates to the word. The memories described can be from any time in the past, from minutes to decades ago, and can be of any event, from the life-changing to the mundane.

Next, participants chose one of the 10 memories they had produced to describe on a questionnaire. This instrument, called MCQ for brevity, is a modified version of the Memory Characteristics Questionnaire (Johnson, Foley, Suengas, & Raye, 1988). The MCQ assesses qualities of a specific episodic memory, such as the degree of visual and other imagery, perceived importance of the memory, clarity and impact of the memory. After filling out the MCQ for a memory they had just described, participants filled out the same questionnaire again, this time for a different memory of their choice. Participants filled out the second MCQ for a memory they had not previously described in the experimental session, and that they had not talked much about with other people.

The experimenter then read a list of 25 words out loud, at the rate of approximately one word per second. Most participants reported later that during this time, they were making an effort to remember the words for later, though they had not been instructed to do so. Then participants listened to three stories that were recorded on a cassette tape (see description of stories above). The stories were presented verbally rather than written to control for reading time and ability differences among and within participants, and to ensure that participants spent the same amount of time on neutral, fearful, and happy stories. Stories were always presented in the same order: first neutral, then fear, with the happy story always coming last in order to end that task on a positive note and ameliorate any negative affect that may have occurred in response to earlier stories. Listening to the stories took approximately four minutes. Many of the participants reported later that they attempted to memorize details of the stories, though they had not been asked to do so. Participants then performed free recall on the list of 25 words. They were given as long as they wanted to complete this task; when participants gave up, they were informed that there were only 30 seconds left in the task, so as to give them one final opportunity to recall more words.

The procedural learning task was next. In this task, participants saw a mixture of 53 neutral and mildly negative words printed on 4 x 6-inch index cards (for development of word lists, see above). The words were printed in a large, sans-serif font and were mirror-reversed. Mirror-reading was chosen because it is a simple perceptual skill that,

while difficult at first, shows improvement with practice and, unlike some other tests of procedural learning such as pursuit rotor tasks, it is not confounded with motor skills. It has also been shown to be spared in amnesic patients who have impairments in other cognitive tasks, as well as in patients with Alzheimer's Disease, which implies that it is relatively unconnected to explicit memory for the words that are read (Deweer, Pillon, Michon, & Dubois, 1993; Squire, Cohen, & Zouzounis, 1984). In a procedure similar to that of a previous study (Barlow & Freyd, unpublished data), participants saw words one at a time and had to read each word out loud as quickly and accurately as possible. Participants employed a variety of techniques to complete this task. There was a maximum exposure time of approximately 10 to 20 seconds for each word (a slow count to 10). Once a participant read a given word out loud, either correctly or incorrectly, or once time ran out, whichever came first, that card was flipped down and the next word appeared. This task took anywhere from two to ten minutes.

Participants then filled out a memory test regarding the stories they had heard on the cassette tape. This test had both free recall and multiple-choice questions for each of the three stories. After filling out this test, participants completed the test portion of the procedural learning task. The test portion was identical in procedure to the learning portion. That is, participants saw a new list of 23 neutral and mildly negative mirror-reversed words on index cards and read them out loud. The test phase of procedural learning took between 42 seconds and four minutes.

All participants were then given both an oral and a written debriefing, and were provided with copies of the consent forms to keep. They also had an opportunity to ask any questions. Participants in the DID group were given $20, with the exception of the participant covered under the earlier McLean Hospital protocol, who received $10 (payment was lower in the hospital setting so as not to be considered coercive). Participants in the university student group automatically received credit towards a class requirement in exchange for participation. The entire first session took no more than an hour for the student group, and usually less than 70 minutes with the DID group.

The participants with DID did not receive any explicit instructions regarding switching among their alters. If they asked, the experimenter explained that the study would still work whether they switched or not, and that either way was perfectly fine. The rationale behind this strategy was explained in the previous chapter; to wit, that limiting participation to only those people with DID who could control both the timing and the execution of their switching would create a very small and non-representative sample from which to draw. All but one of the participants in the DID group later reported that they had switched several times during the experiment; some participants switched quite visibly, though not all did.

Session 2

The details of meeting and informed consent were similar in the first and second sessions. Participants were seen one at a time. The primary purpose of the second session was to collect participants' reports of what they had experienced in the first session. Although assessing experiences retrospectively rather than online does have its limitations, the first session was already long and participant fatigue would have become a factor. In order to aid participants' recollection of the experiences, the second sessions took place in the same location as the first sessions but on a different day, anytime from the next morning to a few days later. Participants had the option to view the videotape of themselves from the first session; almost all the student group participants consented to this viewing but most of the DID group participants declined it.

Verbally and/or with the aid of the videotape, the experimenter reminded participants of each of the tasks they had performed in session 1. For each task, the student group participants verbally reported on their thoughts and feelings during the task, and whether those thoughts and feelings changed during the course of the task. In the DID group, participants instead verbally reported which alter performed each task, as well as whether there were other alters watching or listening, and whether they switched during the task. For each of the two memories that had an MCQ associated with it, DID participants additionally reported whether the part that filled out the questionnaire experienced the event or got the information from somewhere else, and approximately

what proportion of their alters knew about each event. At the conclusion of the verbal interview, participants filled out several questionnaires (see Materials). All participants filled out a version of a demographics form, the DES, the BBTS, and the PEQ. Before the PEQ, participants in the DID group also filled out the IM and three additional measures for a separate project.

As in session 1, all participants were then given both an oral and a written debriefing, and were provided with copies of the consent forms to keep. They also had an opportunity to ask any questions. Participants in the DID group were given $20, with the exception of the participant covered under the earlier McLean Hospital protocol, who received $10. Participants in the university student group automatically received credit towards a class requirement in exchange for participation. The entire second session took no more than an hour for the student group, usually much less, as their answers to the verbal interview were short and they filled out the questionnaires quickly. In the DID group, the second session took 40 to 90 minutes.

CHAPTER VI

RESULTS

Descriptions of DID Participants

The participants in previous DID studies have differed greatly from each other. These differences, for example differences in amount of control over their switching or in length of time since their diagnosis, may affect the results of such studies or even the methodology that is feasible to use in DID samples. Therefore, it is useful to examine each of the current DID participants individually in order to get a sense of who they are and to understand their contributions to the results of this research.

Participant 1

This participant, who did not report her age, was one of the most well-integrated women in the study, and was a "frequent flier" at the psychiatric hospital near Boston. She was living in the Women's Treatment Program house at the time of the experiment, having been transferred recently from the inpatient dissociation unit, where she had been hospitalized several times before. Her "host" personality for the past several years had been a 16-year old male, and she switched alters visibly during the course of the first session. During the second session, she reported that she had been feeling fragile and easily-triggered after the first session, because part of the procedure had reminded her of her ritualistic abuse. She declined to watch herself on video. She also declined to receive payment for the second session, and gave the money back. On a questionnaire she expressed the hope that the data from this experiment would help clinicians and others better understand DID.

Participant 2

The second participant, who reported her age as approximately 49 or 50, reported that most of her alters watched her life most of the time and that they were fairly co-conscious. She switched floridly during the first session, and then asked the experimenter whether switching was acceptable. Upon receiving the answer that switching or not switching was completely up to her, she continued to switch frequently throughout the session. She also reported the ages, genders, and names of seven of her alters, and the fact that she had not learned to read until she was a teenager. She declined to watch the video of herself from the first session. She was taking an antidepressant and a sleep aid. The participant reported that the experiment was fun and interesting, and that the best thing about it was that "We got to be 'us', not hide as one. Cool."

Participant 3

Participant 3 was the only one who reported that she did not switch at all during the first session, although she did report that she "spaced out" during one of the tasks. She was currently on an antidepressant. She also took a medication used for bipolar mania or schizophrenia; however, she showed no overt symptoms of either condition. She had some graduate training in Psychology and reported that the experiment was interesting and that she was glad it was furthering research. This 44-year old had been hospitalized for psychiatric reasons at least five times, but never on a trauma or dissociation unit.

Participant 4

At age 62, this participant was the oldest participant in the study. She had an unusually low dissociation score, looking more like the student group in this respect. While surprising, this finding is not unknown, as the measure relies to some degree on the participant's self-awareness of dissociative lapses. She reported that her alters were very inter-connected, and that she had been working towards this goal for 20 years. She also reported that writing was difficult because part of her abuse experiences included not being allowed to write, as well as not being allowed to use her dominant (left) hand very often. Approximately 32 years ago, at age 30, she went back to being left-handed. The

separation between her alters allowed her to write when she wished, because the alters that wrote were a different group than those who had been abused. This participant reported that the study was interesting and that she appreciated research "that doesn't regard multiple personalities as freakish."

Participant 5

Participant 5 (age 27) was not the youngest participant, but she was the one who had been diagnosed most recently with DID, between one and three years before the experiment. She reported that the experiment was interesting but that it made her realize for the first time how fragmented her memory really was and how much she did not remember in daily life. She said that it was neither a good nor a bad realization, merely an observation.

Participant 6

This participant reported that she tried to hide her switching, even though she knew it was acceptable to switch during the experiment. She said that, at age 29, she was still "trying to look good and perfect in the world." In each session she switched several times between adult and child parts, both male and female, including switching to a child alter during the second session interview. The participant appeared to have a non-standard gender. She reported that the experiment was somewhat upsetting because it brought up "hard emotions" but that it was also interesting and fun, and the best thing about it was "helping people learn more about dissociation." She was friends with Participants 7 and 8 through a self-help group for multiples. She had been hospitalized for psychiatric reasons an estimated 15 times, more than any other participant, and she was taking an antidepressant and a benzodiazepine.

Participant 7

This participant referred two other multiples from the self-help group she facilitated to the study. She reported that she did not have perfect observation for all of her switches but she was aware of some dissociation and at least one switch during the first session. She also reported some performance anxiety during the first session but wrote that she felt comfortable having the experiment in her home and that she would "be

fascinated to hear the results." She was particularly interested in the memory measures and was creating a database of her memories. This participant reported a history of ritualistic abuse and drugging, as well as childhood prostitution and pornography. At age 23, she was the youngest participant and had been hospitalized "roughly" eight or nine times. She was taking two antidepressants and an anxiolytic.

Participant 8

Referred to the study by the Participant 7, this participant was taking an antidepressant. She switched several times during the first session, including into a child alter, but she reported that she tried hard to keep just one alter participating at a time. She had brought her teddy bear to the experiment "just in case." She reported that the experiment was somewhat stressful and it gave her a headache, but that it was also interesting and that she was glad she was able to participate. Filling out any sort of form took her a very long time and caused her stress in general, but her forms were very complete. Although the experimenter made it clear that she could stop writing at any time, she stayed after her session and continued finishing the forms while another participant completed her session. Interestingly, this participant showed clear changes in her handwriting on one of the memory questionnaires, in what appears to be an interjection by another alter. She later reported that this alter was a 17-year-old who was logical and protective of her mother, and that she intruded with the logical reasoning shown on the form. The participant was 29 years old.

Participant 9

This participant reported that she was very unaware of what her different parts were and of what the different parts were doing. She assumed that other parts were always watching but did not know much about them or about their switching, and in fact she scored much lower than the other participants on a measure of integration. She was 29 years old and was taking an antidepressant. She reported that she "loved the questionnaires in the second session" and that she found the experiment "fascinating."

Participant 10

Participant 10 was given information about the study by Participant 5, who lived in a different state. This participant seemed somewhat unfocused, talking and writing a great deal throughout both sessions without necessarily answering the questions at hand. She reported that she was 36.5 years old, that she switched easily and flexibly, and that she had a history of ritualistic abuse, being stalked, anorexia, and irritable bowel syndrome. She was taking an antidepressant and an anxiolytic. She also reported that the best thing about the experiment for her was learning about and identifying her parts. She wrote that she had "high hopes" that the experiment would help other trauma survivors.

Participant 11

The last participant, a 25-year old woman, thought that it was "hilarious!" to watch herself on videotape, and her switches were very apparent to her on the video. She wrote that she had always wanted to fill out the DES (and she had the highest score on it). She also wrote that the experiment was fun and interesting.

Equipment Limitations and Number of Participants

There were difficulties with the equipment for six of the DID participants. In five cases the videotape did not record at all, and in one case it did record, but the quality of the tape was unusable due to poor lighting conditions and sound pickup in the participant's home. Therefore, two of the analyses reported in this chapter included five DID participants and the thirteen student participants. Much of the previous research on DID has used samples of one to five participants (e.g., Nissen, et al., 1988; Loewenstein, Hamilton, Alagna, Reid, & deVries, 1987; Peters, et al., 1998; Schacter, et al., 1989; Tsai, et al., 1999), so this sample size is not unusual in this field. Additionally, DID participants were occasionally unable to answer some of the questions they were asked, due to lack of knowledge. Again, this situation is not uncommon in research about DID. Refer to Table 1 for the number of participants included in each analysis.

Table 1.
Number of Participants Measured for Each Variable

Variable	**DID Group**	**Student Group**
DES	11	13
BBTS	10	13
Crovitz Word Technique	5	13
Word List Recall	11	13
Vignette Memory Analyses	11	13
Procedural Learning	5	13
Shareability Analyses, Shared/Unshared Memories	11	13
Switching	11	0
Percentage of Alters Who Knew About Shared/Unshared Memories	8	0
IM	11	0

Demographic Summary

The student group had a mean DES score of 9.01 (*SD* = 10.13), which is within the normal range, as would be expected in this college population. The DID group had a mean DES score of 56.16 (*SD* = 21.88), which is well above the normal range. This difference was significant and large, $t(22) = 7.00$, $p < .001$, effect size $d = 2.78$. A one-way ANOVA revealed that the DID group reported much more trauma in all areas of the BBTS (see Table 2 for means).

Table 2.
Mean Score on the BBTS

	Student Group	**DID Group**	**Effect Size**
All trauma before age 18	3.00 (2.61)	31.40 (13.05)	3.02
All trauma after age 18	1.15 (2.03)	19.1 (10.84)	2.30
High betrayal trauma before age 18	1.08 (1.61)	13.00 (3.37)	4.52
High betrayal trauma after age 18	0.85 (1.57)	9.20 (4.57)	2.45

Note: Standard deviations in parentheses.

All tests reported in this chapter are two-tailed. The DID group had more trauma before the age of 18 than did the student group, $F(1, 22) = 59.30$, $p < .001$, $d = 3.02$. The DID group also reported more trauma after the age of 18 than did the student group, $F(1, 22) = 34.55$, $p < .001$, $d = 2.30$. Trauma that is high in interpersonal betrayal, especially

in childhood, is related to the development of dissociative disorders (e.g., Chu & Dill, 1990; Draijer & Langeland, 1999; Kisiel & Lyons, 2001). Indeed the DID group reported quite a bit more high betrayal trauma before the age of 18 than did the student group, $F(1, 22) = 126.94$, $p < .001$, $d = 4.52$. They also reported more high betrayal trauma in adulthood, $F(1, 22) = 38.12$, $p < .001$, $d = 2.45$. Because the two groups were not matched on age or psychiatric diagnoses, it is not surprising that the older DID group would report more adult trauma than the younger student group, simply because they had lived longer. Of note are the comparisons that show that the DID group also had more childhood trauma than did the student group.

Memory Results

Autobiographical Memory

On the Crovitz word technique, where participants produced autobiographical memories in response to cue words, all participants in both the student and DID groups were able to produce a memory for each stimulus. The task was conducted in an unconstrained manner, meaning that memories could be from any point in participants' lives and were not constrained to a certain time period. Schacter and colleagues (1989), in their study of one DID participant and 30 controls, found that the DID participant was somewhat slower to produce memories than were the controls. The current study did not replicate this finding. Table 3 presents the mean and median reaction times (RT) that the student participants and the five DID participants took to come up with memories.

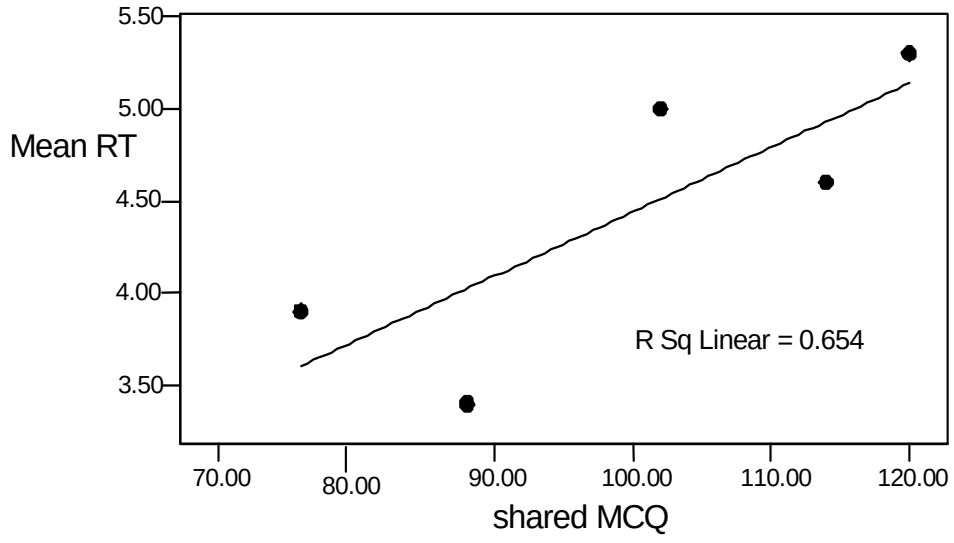
Table 3.
Time to Produce Autobiographical Memories in Crovitz Task, In Seconds

	Mean Time	Median Time
DID Participant 1	5.30 (2.84)	4.50
DID Participant 2	3.90 (2.79)	2.00
DID Participant 4	3.40 (1.90)	3.00
DID Participant 9	5.00 (4.77)	4.00
DID Participant 11	4.60 (3.06)	4.00
Student Group Mean	6.09 (2.20)	4.62

Note: Standard deviations in parentheses.

The student participants were younger than the DID participants, and college students generally have faster RTs on a variety of laboratory tasks than do middle-aged participants. However, in this case the DID participants were faster than the student participants. Although this difference was not statistically significant [$F(1, 16) = 2.62$, $p = .125$], the effect size was large, $d = 1.00$. Observed power was .33. Within the DID group, time to produce autobiographical memories was most highly correlated with childhood high betrayal trauma ($r = .93$, $p = .07$), with DES score ($r = .62$, p = .26), with total memory score for the shared memory ($r = .81$, $p = .10$, see Figure 1), and with percentage of alters who knew about the shared memory ($r = .88$, $p = .11$). Although due to small sample size none of these correlations were statistically significant at an alpha level of .05, they are nonetheless high correlations that deserve consideration.

Figure 1.
Relationship Between RT to Produce Memories and Total MCQ Score on Shared Memory in DID Participants



Word List Recall

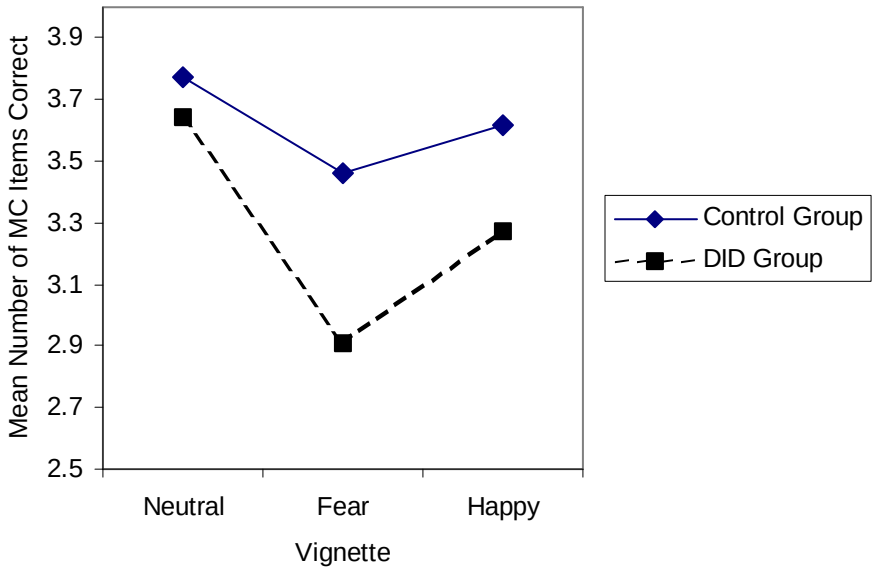
The student group recalled an average of 6.85 words (*SD* = 3.16), and the DID group recalled an average of 5.73 words (*SD* = 3.74). The two groups were not different, $t(22) = -.80$, $p = .44$, $d = -.32$.

Memory for Vignettes

Memory for vignettes was assessed in two ways. Participants summarized each vignette in a sentence or two, and also answered five multiple-choice questions about each story. Story summaries were coded as either 0 (did not answer), 1 (few details), or 2 (good summary with a few details). On the story summaries, the DID participants overall did slightly worse than the student participants, but this difference was not statistically significant, $F(1, 22) = .16$, $p = .695$, $d = -.15$, using repeated measures ANOVA. There were also no statistically significant differences among the three stories.

On the multiple choice items, the DID group also did worse than the student group, though again the difference was not statistically significant, $F(1, 22) = 1.12$, $p = .301$, $d = -.30$, using repeated measures ANOVA. An interesting pattern emerged when looking at each story individually. The first story was neutral in tone, the second contained fear, and the third contained happiness. In Figure 2, the top line is the student group, and is functionally a straight line. The bottom line is the DID group. Although scores in the DID group for vignette 1 (neutral) and vignette 2 (fear) were not statistically different [paired samples $t(10) = 1.268$, $p = .233$], there was a larger effect size difference between these two points than between any of the other points, $d = .56$.

Figure 2.
Mean Number of Items Correct on Three Vignettes by Group



Procedural Learning

There were no statistically significant differences between the two groups on number of words read correctly, on baseline mean time per word, or on amount of procedural learning as measured by an increase in speed. Table 4 presents the means of the student participants and the five DID participants. The five DID participants improved more than did the student group on percentage of words read correctly. Although this effect was not statistically significant [$F(1, 15) = 2.14$, $p = .163$], the effect size was moderate, $d = .65$.

Table 4.
Procedural Learning Data

	% Words Read Correctly – Initial Phase	% Words Read Correctly – Test Phase	% Improvement in Correct Reading	Procedural Learning (improvement, in sec.)
DID Participant 1	56.60	91.30	34.70	1.98
DID Participant 2	52.83	65.22	12.39	0.70
DID Participant 4	90.57	95.65	5.08	2.43
DID Participant 9	86.79	100.00	13.21	3.24
DID Participant 11	94.34	95.65	1.31	1.03
Student Group Mean	84.91	91.64	6.73	1.92

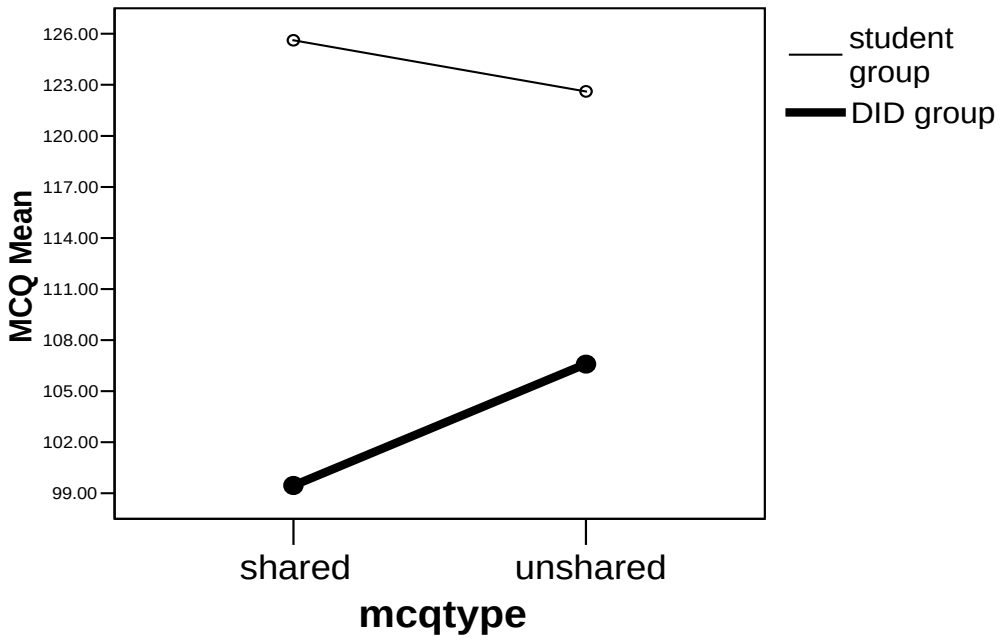
Shareability Results

Participants filled out the MCQ twice, once for a memory they had shared with the experimenter during the Crovitz technique ("shared"), and once for a memory that they had not discussed with others ("unshared"). The experimenter also asked DID participants how many of their alters knew about each memory and whether the alter(s) that filled out the questionnaires were the ones who experienced the events, but participants answered these questions in an open-ended manner. Shareability theory (Freyd, 1983) would predict that unshared memories would be more sensory than shared memories. This prediction was not supported, however. Across groups, repeated measures ANOVAs showed that the shared and unshared memories did not differ on amount of visual detail, sound, smell, touch, or taste. Looking only within the DID group, however, the unshared memories did include significantly more taste on a seven-point scale (M = 2.36, SD = 1.57) than did the shared memories (M = 1.09, SD = .30), $F(1, 10) = 8.83$, $p < .02$. This effect was large, $d = 1.13$, and had an observed power of .764. Shareability theory would also predict that, compared to unshared memories, shared memories might be less confusing or more comprehensible, and better connected with surrounding memories. Neither of these predictions was supported in either the total sample or within the DID group only. As in other analyses, observed power was very

low, ranging from .052 to .445, at best less than a 50% chance of detecting an effect. Having a larger sample size would make these analyses more effective.

The DID and student groups were significantly different on their total MCQ score across both shared and unshared memories, $F(1, 22) = 7.62$, $p < .02$, using repeated measures ANOVA. The student group had higher scores than did the DID group, indicating better memory, more vividness, and better connection of the memory to related memories (see Figure 3).

Figure 3.
Mean MCO Score on Shared and Unshared Memories



Looking only at shared memories, the student group ($M = 125.62$, $SD = 17.65$) scored higher than did the DID group ($M = 99.45$, $SD = 23.24$) on the total MCQ score, $F(1, 22) = 9.82$, $p < .01$, with a large effect size of $d = 1.27$. The difference between the

two groups for MCQ total was smaller on the unshared memories than on the shared memories. For the unshared memories, the student group (M = 122.62, SD = 20.01) scored higher than did the DID group (M = 106.59, SD = 26.90), $F(1, 22) = 2.80$, p = .109. Although this finding was not statistically significant, the effect size was still moderate, d = .68. The interaction of group by sharing was not statistically significant, $F(1, 22) = 1.15$, p = .296. Because the observed power was .176, a larger sample size might better illuminate this possible interaction.

The DID group reported memories from longer ago than did the student group, but the participants were also older. After accounting for age using repeated measures ANOVA, the two groups did not differ significantly on how long ago their memories took place, $F(1, 20) = .005$, p = .943. However, observed power was low, .051. Across groups, the shared and unshared memories did not differ significantly in how long ago they took place [paired samples $t(23) = .66$, p = .514, d = .15]. This finding is not surprising given that how long ago the shared and unshared memories took place were correlated (r = .41, $p < .05$). Within the DID group, shared and unshared memories also did not differ statistically in how long ago they took place [paired samples $t(10) = .74$, p = .476]. Again, the shared and unshared memories were correlated on how long ago they took place (r = .53, p = .090).

Across both the DID and student groups, shared and unshared memories were not statistically different on emotional valence (positive or negative), χ^2 (1, N = 41) = 3.06, $p > .05$. Looking within the DID group only, the shared and unshared memories also did not differ on emotional valence, χ^2 (1, N = 21) = .04, $p > .05$. Across shared and unshared memories, the two groups did not differ on emotional valence, χ^2 (1, N = 47) = .03, $p > .05$.

Switching

All but one of the DID participants reported switching alters at least once during the first session of the experiment. Additionally, one participant reported being unaware of when switches occurred. Participants switched both as task demands changed and within tasks in response to perceived difficulty or emotionally triggering stimuli. Some

switches were obvious to the experimenter, consisting of visibly different posture, differing use of language, different tone of voice, visible moments of inattention, etc. Other switches were perceived by the participants, either at the time or in the second session when watching the videotape of session 1, but were not visible to the experimenter. Participants indicated that the alters who completed the tasks were a mixture of children, adolescents, and adults, both male and female. Ten of the 11 participants reported that during at least one task there were other alters watching or listening but not participating directly in the tasks.

Participants self-reported switching anywhere from 0 to 12 times during the first session, coded conservatively and not counting co-consciousness. The mean number of switches reported in Session 1 was 5.8 (*SD* = 3.60). The experimenter also observed some switching during Session 2, but this session was not coded for switching. Figure 4 displays the distribution of switching. Figure 5 displays the strong relationship (R^2 for a linear regression line = 0.57) between high levels of lifetime betrayal trauma and number of reported switches during the first session. This relationship is explored further in the last part of this chapter.

Figure 4.
Distribution of Number of Switches in Session 1

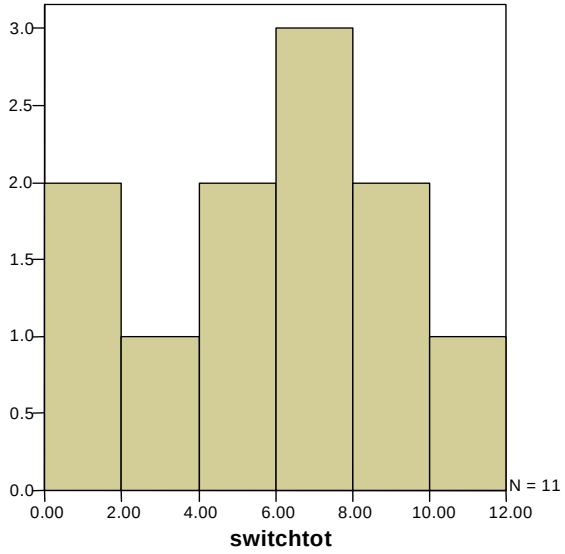
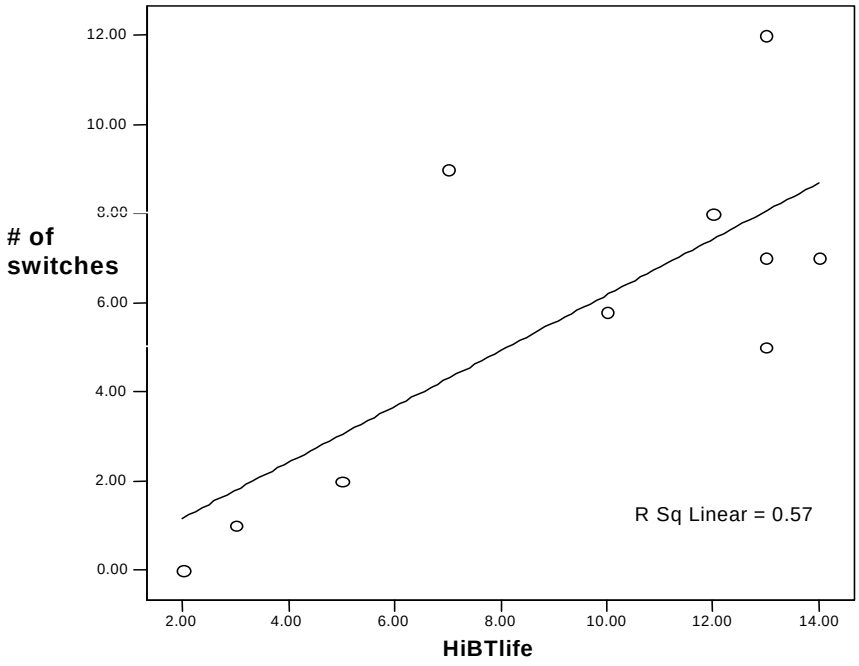


Figure 5.
Relationship Between Lifetime High Betrayal Trauma and Number of Switches in Session 1



Integration Measure (IM)

The Integration Measure (IM; see Appendix A), developed for this study with input from James Chu, is a first attempt at measuring the extent to which someone with DID is integrated or fragmented. Higher scores imply more co-consciousness, shared awareness, communication, and cooperation among the alters, and thus less fragmentation. Descriptive data are provided here. Future research, especially using factor analysis on larger and more diverse samples, should be aimed at refining this measure.

After examining responses to the scale, items 5 through 9 provided the clearest answers and the most coherent measure of integration itself, as opposed to measuring co-consciousness or executive control. These five items, called “integration”, were therefore the only ones analyzed for this dissertation. In Appendix A, the numbers written next to

each possible response indicate the scoring for these items. Possible integration scores therefore ranged from 0 to 20, with 0 indicating almost total fragmentation with little or no communication or awareness among alters, and 20 indicating almost total integration, with all parts aware of and cooperating with each other. This group of DID participants had a mean score of 6.54 on these items, with a standard deviation of 3.39.

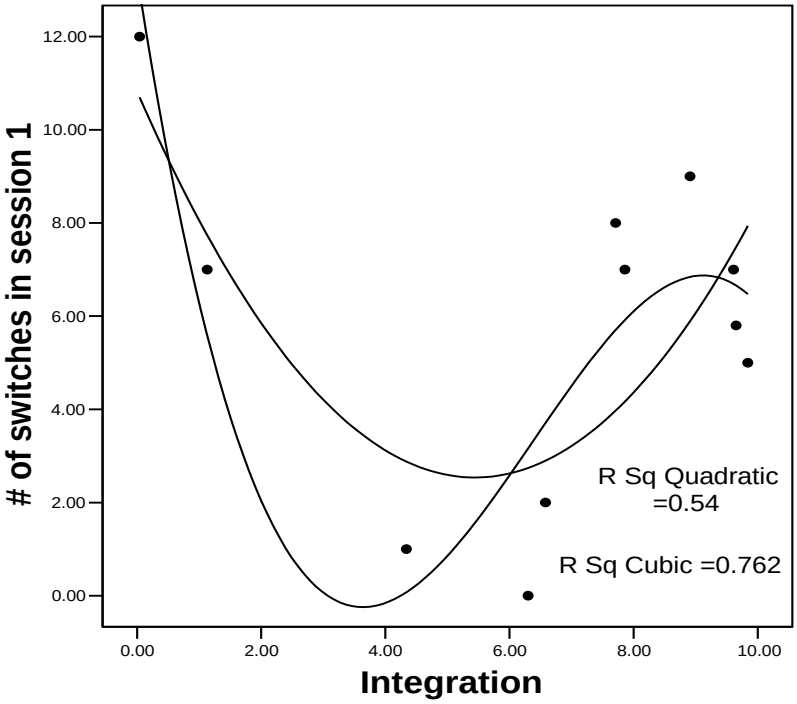
Based on their answers to the IM, two of the participants seemed noticeably more fragmented than the others. One of these two people reported only having been in therapy for three years, while the other reported 15 years of therapy, which is closer to the average for this group. The participant who had spent three years in therapy also was one of the participants most recently diagnosed with DID (one to three years ago) and had never been hospitalized. The other participant had been diagnosed more than six years ago, and had been hospitalized four times, which is approximately the average for this group. Of the participants with the two highest scores, one was the inpatient and the other had been in therapy for 11 years, diagnosed more than six years ago. This participant had been hospitalized for psychiatric reasons more often than any other participant: 15 times.

Scores on the integration scale were apparently related to number of reported switches in Session 1. Figure 6 is the scatterplot of this relationship with two fit lines overlaid, a quadratic and a cubic. The quadratic and cubic lines both fit the data well (R^2 are .54 and .76, respectively). Removing the two participants at the extreme left side of the graph produced a linear regression line that did not fit the data as well as either the quadratic or the cubic lines fit the whole data set. Although this plot is based on only 11 participants, possible implications and directions for future research will be discussed in the next chapter.

On the open-ended questions of the IM, DID participants reported a wide variety of ways that their alters communicated with them, such as journaling, hearing thoughts inside, sensing emotions, etc. Seven participants reported that more than one alter helped to fill out the IM. Participants reported that they had been working on developing communication and cooperation between their alters for anywhere from a few months (in

the case of one of the two least integrated participants) to 11 years (in the case of the two most integrated participants).

Figure 6.
Relationship Between Integration Score on IM and Number of Session 1 Switches



Correlations and Regression Analysis

Appendix B gives correlations among variables in the student group. For the DID group, Table 5 gives correlations among memory variables. MCQ scores on the shared and unshared memories were highly correlated, as would be expected from an individual differences perspective. Also note the pattern of correlations that shows that performances on the first (neutral) and third (happy) vignettes were related to each other, while the measures of the second vignette (fear) did not correlate highly with either Vignette 1 or Vignette 3. As in Figure 2, the DID participants seemed to be performing particularly badly on the fear vignette. Examining the correlations further, note that, for Vignettes 1 and 3, the number of multiple choice items correct was highly correlated with

the summaries for those vignettes. For the first story, the correlation between the two measures was .74, and for the third story it was .75. However, for the second story, the correlation between multiple choice items and summarizing was only .14. The 11 DID participants scored worse on the multiple choice measure for the second vignette than they did on the summarizing measure for that vignette. Constructing a 95% confidence interval around the difference between the correlations for the first and second story (.74 - .14 = .60) using Fisher's Z showed that the difference was within the confidence interval and so therefore the null hypothesis that the correlations were not different was retained. In other words, .74 was not statistically different from .14 at an alpha level of .05, so performances on the first versus the second story were not statistically different. Although sample size may have affected this result, possible interpretations will be discussed in the next chapter.

Table 5.
Pearson's Correlations Among Memory Variables in DID group

		Vig1 Sumry	Vig1 Crct	Vig2 Sumry	Vig2 Crct	Vig3 Sumry	Vig3 Crct	shared MCQ	unshared MCQ
Words Recalled	r	.533	-.002	.305	.138	.315	.113	.218	.413
	Sig .	.091	.996	.362	.685	.345	.741	.520	.207
Vignette 1 Summary (neutral)	r	1	.741(**)	.405	.043	.791(**)	.625(*)	.130	.272
	Sig .		.009	.216	.901	.004	.040	.704	.418
Vignette 1 Correct (neutral)	r		1	.172	-.082	.595	.438	.033	-.077
	Sig .			.612	.812	.053	.178	.924	.822
Vignette 2 Summary (fear)	r			1	.136	.269	-.049	-.175	.410
	Sig .				.689	.424	.886	.608	.210
Vignette 2 Correct (fear)	r				1	.010	.363	.260	.403
	Sig .					.977	.272	.441	.219
Vignette 3 Summary (happy)	r					1	.746(**)	.310	.496
	Sig .						.008	.353	.121
Vignette 3 Correct (happy)	r						1	.227	.309
	Sig .							.503	.355
shared MCQ	r							1	.738(**)
	Sig .								.010

Note: All reported significance levels (Sig .) are 2-tailed.
** Correlation is significant at the 0.01 level.
* Correlation is significant at the 0.05 level.

Table 6 gives correlations among trauma variables, integration, switching, and aspects of the shared and unshared memories in the DID group. The measures of trauma were highly correlated with each other but they were not highly correlated with the integration score. It is possible that the instrument is not a good measure of integration, and it is also possible that there is a complex relationship between these two variables, one that changes over time and from person to person. The correlations, though small, were in the anticipated direction. Arguably, integration should be related not to amount of experienced trauma within this sample, but rather related in a non-linear way to some measure of healing, for example, number of years of therapy. The Pearson's correlation between these two variables is .22, $p = .549$. Figure 7 demonstrates that the relationship of therapy to integration is far from a simple one. Future research should aim to more fully understand this relationship.

Figure 7.
Relationship Between Years in Therapy and Integration

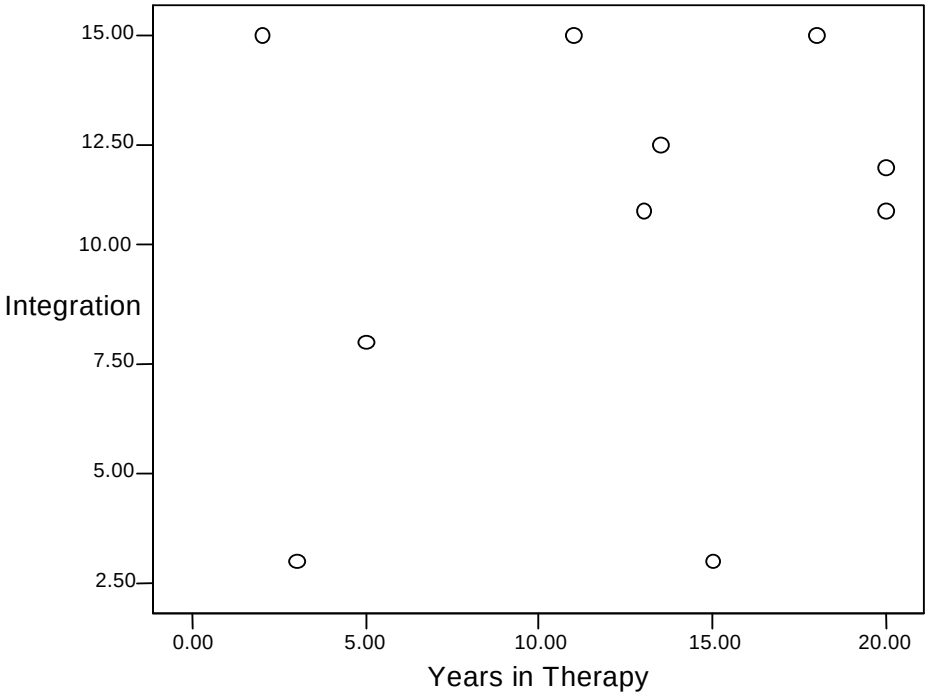


Table 6.
Pearson's Correlations Among Trauma, Integration, Switching, and Shared/Unshared Memories in DID Group

		adult trauma	HiBT child	HiBT adult	HiBT life	Integration	How long ago was shared memory	How long ago was unshared memory	% of alters who know about the shared memory	% of alters who know about the unshared memory	# of reported switches in session 1
childtma	r	.144	.855(**)	.226	.567	-.010	-.361	-.637(*)	.406	-.097	.281
	Sig .	.691	.002	.530	.087	.978	.305	.048	.367	.836	.432
adulttma	r	1	.359	.979(**)	.824(**)	.001	.568	-.259	-.494	.463	.696(*)
	Sig .	.	.308	.000	.003	.997	.087	.469	.260	.296	.025
HiBTchild	r		1	.499	.819(**)	-.241	-.062	-.309	.186	-.104	.523
	Sig .		.	.142	.004	.502	.864	.385	.690	.825	.121
HiBTadult	r			1	.906(**)	-.124	.534	-.233	-.460	.436	.758(*)
	Sig .			.	.000	.733	.112	.517	.299	.328	.011
HiBTlife	r				1	-.200	.323	-.305	-.403	.394	.758(*)
	Sig .				.	.580	.362	.391	.370	.382	.011
Integration	r					1	-.158	-.170	-.380	-.017	-.182
	Sig .					.	.643	.617	.353	.969	.593
How long ago was shared memory	r						1	.534	-.819(*)	-.165	.087
	Sig .						.	.090	.013	.697	.800

Table 6, continued.

								How long ago was unshared memory	% of alters who know about the shared memory	% of alters who know about the unshared memory	# of reported switches in session 1
How long ago was unshared memory	r							1	-.540	-.419	-.243
	Sig .							.	.167	.302	.472
% of alters who know about the shared memory	r								1	.251	-.010
	Sig .								.	.549	.981
% of alters who know about the unshared memory	r									1	.117
	Sig .									.	.782

Note: All reported significance levels (Sig .) are 2-tailed.

** Correlation is significant at the 0.01 level.

* Correlation is significant at the 0.05 level.

Within the DID group, another interesting finding was the correlation of -.82 ($p <$ .02) between how long ago the event that formed the shared memory took place and percentage of alters who knew about that memory. The longer ago the memory was formed, the fewer alters knew about it. This relationship is consistent with theories about how and why alters are formed. It may be that events from long ago took place before some of the alters came into existence. It may also be that memories from distant events were formed during a traumatic period of participants' lives, and therefore those memories are more isolated within the knowledge system than are more recent memories. Shared memories in this group recounted events that reportedly took place an average of over 14 years ago. Unshared memories that DID participants chose to write about took place an average of over 11 years ago. In most participants, most of their alters knew about the events they chose to report.

Finally, regression analyses were performed in order to understand more fully the observed correlation of .76 ($p <$ .02) between lifetime amount of high betrayal trauma and number of reported switches in the first session. Overall, lifetime high betrayal trauma emerged as the best predictor of switching. Childhood high betrayal trauma and adult high betrayal trauma were both highly correlated with each other and with lifetime incidence, so therefore only lifetime betrayal trauma was entered. Adding any other variables to the regression reduced its predictive ability (see Table 7). Several other variables were also correlated with switching, such as how long ago the unshared memory took place (r = -.24, p = .472), but these did not turn out to be helpful predictors. The mean time the DID participants took to produce memories in response to cue words during the Crovitz task had a correlation of .32 with switching (p = .599), but this variable could not be entered in regression equations because it was collinear with the trauma measures and because there were Crovitz RT data for only five participants. Switching was also positively related to RT in procedural learning, r = .66, p = .223. Because this relationship was based on only five participants, neither of the RT variables could be entered into a regression analysis. Nevertheless, together they imply that frequent switching slows reaction time.

Table 7.
Regression Models Predicting Number of Reported Switches in Session 1

Model Number	Adjusted R^2	F	Predictors	Zero-order *r*	Tolerances	Squared Semi-partial *r*
1	.52	10.77**	HiBTlife	.76**	1.00	.57**
2	.46	4.83*	HiBTlife	.76*	.96	.53*
			Integration	-.23	.96	.01
3	.37	2.76	HiBTlife	.76*	.85	.47*
			Integration	-.23	.93	.01
			Unshared Ago	-.22	.88	.00

Note: ** $p < .02$, * $p < .05$. All models include a constant as one of the predictors.

CHAPTER VII

DISCUSSION

Demographics

The participants in this study were 11 women with DID and 13 women who were university students. These students were not matched with the DID sample on age, psychiatric diagnoses, trauma history, or other demographic variables; they were included as a baseline measurement of "normal," non-dissociative responses to the experimental tasks. Participants were, however, matched on gender, which was important given the different rates of betrayal trauma and dissociative disorders between the genders.

Consistent with the etiological literature on DID, the DID group reported very high levels of all kinds of trauma that were measured, including trauma in childhood. Freyd's (1994, 1996) betrayal trauma (BT) theory proposes that for children who are abused and betrayed by the caregivers upon whom they depend for attachment relationships, it is adaptive to remain unaware of the abuse in order to preserve the relationship. Dissociation is one way to keep relationship-threatening information out of conscious awareness and memory. Betrayal trauma in childhood is a major contributor to the development of DID (e.g., Chu & Dill, 1990; Draijer & Langeland, 1999; Kisiel & Lyons, 2001), and the DID group did report much higher levels of childhood BT than did the student group. The effect sizes for trauma endorsement were very large, ranging from 2.30 to 4.52, with the largest effect size being the difference between the student and DID groups on amount of childhood BT.

Probably due to this extensive trauma history, participants with DID were unable to listen to two of the five stories that were originally written for the vignette memory task, and the stories had to be removed, leaving three that were analyzed for this dissertation. All five stories were approved by a university institutional review board

(IRB) and by a psychiatric hospital IRB for use in their DID population, and the stories had also been cleared with the director of the trauma and dissociation unit at the hospital, who was Chief of Hospital Clinical Services. All five stories had also been heard by a pilot group of university students, both male and female, whose data were not analyzed for this dissertation. However, the staff members who worked in the trauma and dissociation unit instantly vetoed one story that included both fear and betrayal because of its child abuse content. The other story, which included betrayal with sexual overtones but no fear, incurred debate and was piloted with a dissociative trauma survivor in order to ascertain its appropriateness. This person (whose data were not analyzed for this dissertation) became upset when she heard this story, and it was removed for all future participants.

Memory Results

Autobiographical Memory

In this study, data about reaction times (RTs) to produce autobiographical memories were collected from five DID participants (mean age = 41) and 13 university students (mean age = 23). The student participants were, on average, approximately 18 years younger than were the DID participants, yet the DID participants had faster RTs. This finding was unexpected both because RT generally increases with age, and because it contradicted a previous study.

Schacter and colleagues (1989) studied one 25-year-old woman, called I.C., who had been diagnosed with multiple personalities not long before the experiment. In the unconstrained version of the Crovitz task, in which participants could generate memories from any point in time, I.C. showed a very large recency bias. The authors speculate that one explanation for this bias could be the short amount of time that had elapsed since the life-changing event of being hospitalized due to multiple personalities for the first time (Schacter, et al., 1989). It is possible, moreover, that I.C. either was an atypical case of multiple personalities, or that she was merely displaying an individual difference in RT.

Importantly, Schacter and colleagues (1989) only tested memory in one alter, the host, because other alters would not appear for the experiment on command. The current study, in contrast, usually tested several alters for each DID participant, the choice of

switching being up to the participant. Also, while I.C. was slower than a college-age control group to produce memories both overall and in response to nouns, she was actually faster than controls at responding to affective cues in the unconstrained condition. In the present study, which was unconstrained, participants could generate memories from any period in their lives, but all the cues were affectively neutral nouns. Therefore it is impossible to compare RT results for affective cue words across these two experiments.

In addition, although I.C. was slower than her control group, Schacter and colleagues (1989) did cite a study in their paper that found that a control group had RTs very close to those of a DID participant. The Schacter study also found that both I.C. and the control group had RTs longer than were found for any participants in the current study. This effect was probably due to the greater number and specificity of cues used by Schacter and colleagues, and may also have been affected by the various constrained conditions that made that experiment more difficult. For example, in Schacter's condition where participants had to produce memories from before their 12th birthdays, only 86% of cues led to memories for the control group. I.C. was only able to produce memories from before age 12 in response to 21% of the cues. In this under-12 condition, 100% of IC's memories came from ages 10-12, while only 33% of controls' did. I.C. also reported that most of the memories she reported in the under-12 condition were ones she discovered for the first time when she heard the cue. In fact, I.C. could not recall anything at all from before age 10, and her first memory of her father was from age 16 (Schacter, et al., 1989). However, because I.C. was the only alter who participated in the experiment, these memories were most likely being held inaccessible by other alters; I.C. may not even have existed as an entity for some of the participant's childhood and would hence be unable to remember it.

Why were DID participants in this dissertation faster to produce memories than were the young adult students? Because data come from only five DID participants, the effect could be just noise in the data. However, the effect size was large. Within the DID group, RT to produce and share memories in response to cue words was highly correlated with total memory score on the MCQ for the shared memory (r = .81). In the student

control group, this correlation was smaller (r = .26). Previous research, discussed in chapter 3, has shown that under certain conditions, high dissociators have an advantage over low dissociators in allocating attention. Abuse survivors may also have an advantage over non-survivors in some memory situations (see Cloitre, Cancienne, Brodsky, Dulit, & Perry, 1996). Further research is necessary in order to untangle these possible relationships.

In the five members of the DID group for whom RT data were analyzed, RT to produce autobiographical memories was highly correlated with childhood high betrayal trauma (r = .93) and with DES score (r = .62). These findings are in accord with the general literature about how DID develops, and with betrayal trauma theory. The more high-betrayal events, such as abuse, that are experienced in childhood, the greater is the motivation to isolate autobiographical episodic memories from awareness. The fragmenting of memory that occurs in order to survive severe abuse can also affect memory performance in general. More betrayal and abuse in childhood therefore lead to more dissociation, which leads to more difficulty in accessing autobiographical episodic memories. Although the correlational nature of these results precludes causal inferences, this explanation is consistent with previous knowledge and findings about trauma, memory, and dissociation.

In the DID participants, RT to produce autobiographical memories was also highly correlated with percentage of alters who knew about the shared memory (r = .88). This result too is consistent with phenomenological reports from people with DID in general and from the participants of this study in particular. The more alters who know about an event, the more voices there are to contribute their points of view and the longer it takes to sort them all out and decide who will speak for the group.

Word List Recall

The DID group and the university student group did not differ on number of words recalled. Participants from both groups reported during the second session that they used similar techniques for remembering the words, such as constructing mental images of the objects and settings interacting with each other. The generally good performance on this task by the DID group is not surprising, given that all the stimuli

were neutral words and therefore there would be no motivation to separate awareness of them from consciousness.

Memory for Vignettes

Examining the story summaries, the DID participants overall performed slightly worse than the student participants, but the effect size was small. There were also no differences among the three stories for either group. On the multiple choice items, the DID group also did worse than did the student group, though again the effect size was small. For the multiple choice items, however, differential performance according to emotional valence emerged in the DID group. DID participants performed less well on questions about the fear vignette than they had on questions about the neutral vignette. Additionally, for the neutral and happy vignettes, the number of multiple choice items correct was highly correlated with the summaries for those vignettes. In contrast, for the second story the correlation between multiple choice items and summarizing was much lower. The 11 DID participants scored worse on the multiple choice measure for the second vignette than they did on the summarizing measure for that vignette. The dip in DID participants' multiple choice performance for the second vignette, which contained fear, was not present in the student participants. This evidence, taken together, suggests that although both groups were equally good at recalling the gist of all three stories, the DID participants had trouble remembering details, especially in the fearful story.

This pattern of results is consistent with the DID participants' verbal reports given during Session 2. They reported being more distracted during the second story and giving less attention to the details because they were either "spaced out," trying not to switch, actively switching, or having internal dialog in order for older alters to reassure younger ones. Putnam (1994) suggested that during the switch process, participants' abilities to observe stimuli, to learn, and to form new memories are impaired. Further research is needed in order to more fully understand the triggers and effect of switching. Future research should also explore a broader range of emotions and situations in the construction of memory stimuli.

Procedural Learning

Somewhat unexpectedly, the five DID participants improved more than did the student group on percentage of words read correctly, and the effect size was moderate, *d* = .65. Previous research has found that many kinds of procedural learning are spared in cases of amnesia (Cavaco, Anderson, J. S. Allen, Castro-Caldas, & Damasio, 2004). One other study found that in adolescent psychiatric inpatients, performance on the procedural task of the Tower of Toronto was unexpectedly related to scores on the adolescent version of the DES (Prohl, Resch, Parzer, & Brunner, 2001). This result cannot be taken with certainty though, because the measurement of procedural memory in that study may have been confounded with declarative memory (Prohl, et al., 2001).

Also confounding the study of procedural memory and dissociation, Dick-Barnes and colleagues (1987) reported transfer of learning among three alters in a pursuit rotor task, thereby conflating procedural learning and motors skills, in a study of a single participant who had integrated at least once before. Nissen and colleagues (1988) demonstrated transfer of learning across amnesic alters using a serial RT task, but did not statistically assess this result. Huntjens and colleagues also used a serial RT task, in which 27 DID participants, who had also participated in Huntjens' other experiments, pressed one of four computer keys in response to cues that followed an unobtrusively repeating sequence (Huntjens, Postma, Woertman, van der Hart, & Peters, 2005). The DID participants overall had longer RTs than did student participants and participants instructed to simulate DID. The pattern of RTs in DID participants did demonstrate inter-identity amnesia, but the authors concluded that this demonstration was unconvincing because simulators were able to mimic the pattern of results (Huntjens, Postma, et al., 2005).

In the current experiment, the procedural learning task was not confounded with motor skills. The stimuli included neutral words and mildly negative words, but overall the task was relatively affectively neutral. Some members of both the student and the DID group reported that they viewed the task as a challenge or game, and some members of both groups reported frustration with the task. It is possible that the DID group was more able than the student group to concentrate on the task or to allocate their attention.

Because these results are based on a small number of participants, and because very little research has empirically examined procedural learning in DID, more studies are necessary before definitive conclusions can be drawn.

Shareability Results

Shareability theory (Freyd, 1983) predicts that unshared memories would be more sensory than shared memories. This prediction was not supported. Across groups, the shared and unshared memories did not differ on amount of visual detail, sound, smell, touch, or taste. Looking only within the DID group, however, the unshared memories did include significantly more taste imagery than did the shared memories, with a large effect size.

Shareability theory would also predict that, compared to unshared memories, shared memories might be less confusing or more comprehensible, and better connected with surrounding memories. Neither of these predictions was supported in either the total sample or within the DID group only. As in other analyses, observed power was very low, at best less than a 50% chance of detecting an effect. Further research with a larger sample size would increase the effectiveness of these analyses.

The student group had higher total MCQ scores than did the DID group on both shared and unshared memories, indicating better memory, more vividness, and better connection of the memory to related memories. The difference between the student participants and the DID participants was smaller for the unshared memories than for the shared memories. The interaction of group by sharing may need to be investigated in future research, as the power for this analysis was low. For both the shared and unshared memories, differences between the two groups had medium to large effect sizes. Further research should attempt to replicate or refine these results. No differences emerged between the groups or between the shared and unshared memories regarding whether the memories were emotionally positive or negative. This similarity was probably a function of participants' choice of unshared memories that they felt comfortable writing down in front of a stranger.

Within the DID group, another interesting finding was the strongly negative correlation between how long ago the event that formed the shared memory took place

and the percentage of alters who knew about that memory. The longer ago the memory was formed, the fewer alters knew about it. This relationship is consistent with theories about how and why alters are formed. It may be that events from long ago took place before some of the alters came into existence. It may also be that memories from distant events were formed during a traumatic period of participants' lives, and therefore those memories are more isolated within the knowledge system than are more recent memories. In most participants, most of their alters knew about the events they chose to report.

Switching

Switching between alters has been reported to take anywhere from a few seconds (Putnam, et al., 1986) to 30 seconds (Tsai, et al., 1999) to brief times less than two to five minutes (Huntjens, et al., 2003; Peters, et al., 1998; Putnam, et al., 1986) to ten minutes (Putnam, 1994). However, the switches that occurred during this study were rapid and appeared instantaneous. Some switches were readily apparent, while others were not, but for the most part the DID participants were able to identify when they had switched in the previous session.

Participants who can switch among alters at will provide unique opportunities to study memory and amnesia. People with DID who have more executive control over their switching than did these 11 participants will be more able to participate in memory studies such as those conducted by Eich and colleagues (1997a, 1997b). Although neither of the RT variables from this study could be entered into a regression analysis, the overall pattern of results also implies that frequent switching slows reaction time, which is in accord with some previous research. Very little research has explored reaction time in DID participants or compared these RTs with appropriate control participants for a variety of tasks (one exception is work by Dorahy and colleagues). Putnam (1994) suggested that during the switch process, participants' abilities to observe stimuli, to learn, and to form new memories are impaired. Therefore, future research using methods and stimuli similar to those in this study should employ an additional control group of non-clinical high dissociators in order to compare the results of dissociation without identity fragmentation or switching to the results obtained in this study and to future studies of switching and reaction time.

In this study, switching was closely related to lifetime high betrayal trauma. In regression analysis, lifetime high betrayal trauma emerged as the best predictor of switching, even better than integration. Childhood high betrayal trauma and adult high betrayal trauma were both highly correlated with each other and with lifetime incidence. Adding any variables besides trauma to the regression reduced its predictive ability.

Integration Measure (IM)

The author generated the items on the IM (see Appendix A) from a thorough knowledge of the DID literature and from the extensive clinical experience of Dr. James Chu, with some input from clinician Pamela Birrell, Ph.D. This study marks the first time that this or any measure has attempted to quantify or classify integration in a standardized fashion. Although only items 5 through 9 were analyzed for this dissertation, there is still much information to be gleaned from an examination of participants' answers to the open-ended questions.

The measures of trauma in this study were highly correlated with each other, but they were not highly correlated with the integration score, although the correlations were in the anticipated direction of more trauma leading to less integration. Arguably, integration should be related not to amount of experienced trauma within this sample, but rather related in a non-linear way to some measure of healing, for example, number of years of therapy. Figure 7 demonstrates that the relationship of therapy to integration is far from a simple one. The present study did not ask about type or quality of therapy, only length, and there is some evidence, as discussed in Chapter 1, that suboptimal therapy for DID clients leads to continuing fragmentation and even more distress.

Scores on the integration subscale of the IM were apparently related to number of reported switches in Session 1. Figure 6 is the scatterplot of this relationship with two fit lines overlaid, a quadratic and a cubic. The quadratic and cubic lines both fit the data well (R^2 are .54 and .76, respectively). Although this plot is based on only 11 participants, either a quadratic and a cubic relationship between these variables is plausible based on the previous literature about DID. The quadratic relationship would imply that there is a U-shaped curve such that very fragmented people report many switches exactly because they are so fragmented, while very integrated people with DID

report many switches because their increasing integration leads to an increasing ability to be aware of and remember the switches. People in the middle of the curve may have fewer switches than do these two groups because they are more controlled in their daily functioning than are the less integrated people, but do not have as much awareness of their switching as have the more integrated people. If this relationship between switching and integration is supported, it would also explain why the cubic curve fits so well. In a cubic relationship, the two variables would start with the quadratic relationship just described. The number of switches would then decrease towards zero as participants became more and more integrated, until eventually there were fewer alters to switch among, possibly leading to a single, fully-integrated personality.

Because these results are preliminary, this area is rich with opportunities for future research that will illuminate the relationship between these two complex variables. The scientific examination and measurement of switching and integration has just begun. It is clear from this and other studies that switching among alters in DID participants can affect functioning in many ways, and memory studies that do not address these variables cannot provide a complete picture of memory functioning in DID.

Limitations and Future Directions

One limitation of this study is its lack of a genuine control group. The student participants were essential to the research because their responses provided a baseline measure of "normal" performance on the memory tasks and enabled the procedure to be refined. Without this group, for example, it would have been impossible to know whether the observed decline in memory for details of the fearful story was to be expected of most people, or whether it was related to the characteristics of the DID participants only.

As previously noted, the students did differ from the DID participants in several ways. They were younger and more homogenous in age, education level, and physical location than were the DID participants, although they were matched on gender. The students were also all functioning at a high level because they were in college, while some of the DID participants were on disability leave. Further, the student participants reported no dissociative diagnoses. As previously noted, a few reported depression and

one reported PTSD, which had been treated. In contrast, the DID participants often had numerous diagnoses, and some of them were simultaneously taking several psychiatric medications. In addition to having lower dissociation scores, the student group also reported much less trauma history than did the DID participants. Trauma itself may affect information processing, but it is difficult to separate the contributions of trauma from those of dissociation. All people with DID have had significant trauma in their lives, and many people with significant amounts of trauma show at least some dissociation.

Other types of control groups are possible for this type of experiment. For example, including a group of highly traumatized participants with PTSD but not DID would be one step towards separating the effects of trauma from those of dissociation; however, it would not be a perfect solution to the problem because PTSD also includes dissociative symptoms. It is also important to note that specific trauma history may also vary widely between these two groups. High levels of betrayal may lead specifically to dissociation, while high levels of terror or fear of bodily harm may lead specifically to the intrusion symptoms of PTSD (e.g., Freyd, 1996).

Comparing the DID participants in this study to a hypothetical group of PTSD participants, I believe that the experimental results would be similar in some ways and different in others. Specifically, I hypothesize that PTSD participants' memory performance will be worse than normal, but their overall autobiographical memory will not be reduced compared to the student group, as was the DID group's. Unlike the DID group, the PTSD group probably would not display difficulty answering questions about the fearful story, unless the stories happened to relate to their personal experiences of trauma. A group of PTSD participants might, however, display differences between shared and unshared memories that the student group did not, as people with PTSD often have difficulty putting their experiences into words (van der Kolk, 1996).

Additional psychiatric control groups might include participants with a completely non-dissociative diagnosis such as major depression, participants with schizophrenia, which shares Schneiderian first-rank symptoms with DID (e.g., Kluft, 1987), or participants with other dissociative disorders such as simple dissociative

amnesia. With these additional groups, it would be possible to match the DID participants with controls on the basis of amount of impairment, psychiatric medication usage, length of therapy, number of hospitalizations, and possibly on amount of trauma. Ultimately, however, only the examination of DID participants will reveal knowledge of what the experience of DID is like.

This study bases its conclusions on data collected from 11 participants with DID. Much of the previous research on DID has used samples of one to five participants (e.g., Nissen, et al., 1988; Loewenstein, Hamilton, Alagna, Reid, & deVries, 1987; Peters, et al., 1998; Schacter, et al., 1989; Tsai, et al., 1999), so having a sample this size is not unusual in this field. However, an N of 11 does limit the amount of inferential statistical tests that can meaningfully be performed. The small number of participants meant that observed power was very low in many of the analyses, in some cases having less than a 50% chance of detecting a legitimate effect. Low power was a particular issue in the shareability analyses; no strong conclusions can be drawn from their results. In the future, dividing the concepts of interest into several smaller, more focused studies should alleviate some of these problems. Furthermore, if future studies also have small sample sizes, a replication of the current results in a different sample would support the interpretations made here even if the results of future studies were also not statistically significant.

Performing a large number of statistical analyses relative to the number of participants also raises the probability of a Type I error. Type I errors consist of incorrectly rejecting the null hypothesis by finding spuriously significant results. These errors are more likely to arise in exploratory than in narrowly hypothesis-driven studies. The Bonferroni statistical correction can correct for Type I errors, but unfortunately it also reduces power, which is already low in this study due. Therefore, rather than focusing on specific alpha levels to determine statistical significance, this study instead interprets trends and gives effect sizes as a guide to the magnitude of the effects found, independent of statistical significance. This interpretive approach is in line with recent thinking about the misuse of *p*-values and null hypothesis significance testing (e.g., Kline, 2004). Because this study was designed to be exploratory, its main objective is not

to achieve statistical significance but rather to assess general patterns of results, thereby opening the door for more focused research in the future.

Future research will further explore shareability and memory in DID participants. Planned modifications to the research design include more empirical control over sharing, by providing different types of stimuli to be shared in different ways among alters. Experimental control over sharing of information among alters will be enhanced by the use of a different sample of DID participants, who are more able to control their switching and to have specific alters appear at will. The process of increasing executive control over switching and information sharing is facilitated by competent psychotherapy. Although this process takes time and effort to develop, it is a key step towards a more functional system and perhaps towards eventual integration. Future research will also incorporate measurements of empathic accuracy and perspective-taking, as well as attachment relationships between alters.

This study also examined self-reported switching. One drawback to this approach is that it was not an on-line measure of switching; that is, reports of switching relied on participants' memory and awareness of their own switching. At least two of the participants reported that they were not always sure of when they had switched or of which alter was present. Ideally, measures of switching and integration must be able to distinguish the construct being measured from meta-awareness of the phenomenon itself. Future research will assess more objective measures of switching, for example a combination of EEG measurements and reports from the participants' therapists. As Hopper and colleagues (2001) and other researchers have noted, there can be verifiable, robust differences among alters on physiological measurements, which would enable researchers to examine when switches occurred in a laboratory setting. Furthermore, the second author of the Hopper and colleagues paper has reported that EEG readings fluctuate wildly at the moment of switching (personal communication). A case study from 1975 also demonstrated that switching between alters was associated with bradycardia and extremely slow breathing, as well as a temporary drop in skin conductance (Bahnson & Smith, 1975). Additionally, experienced therapists develop

sensitivity to switching in their DID clients who receive therapy for extended periods of time, and can often distinguish one alter from another before they are told.

Another promising technique is experience sampling, which has been used in other domains for years but has only once been applied to studying DID (Loewenstein, et al., 1987). Experience sampling uses a beeper or personal digital assistant to send signals to participants at random times over a period of several days as they go about their daily lives. Upon receiving the signal, participants fill out a questionnaire noting what they are doing at that moment. Loewenstein and colleagues (1987) used this technique to study switching in a female inpatient with DID. They found that the differences among alters in mood, handwriting, and motivation were as large and consistent as the differences found among different people. They further found that the experience sampling method of on-line assessment provided information that was at odds with the information the participant reported to her therapist (Loewenstein, et al., 1987). With improvements in technology and computer resources since the 1980s and 90s, this type of study has become easier to conduct. Although it would be somewhat resource-intensive, future studies of switching in DID should investigate the use of experience sampling.

This technique might also be one way to validate Putnam's (1994) statements that evidence of the internal hierarchical organization of the alters can be seen in the patterns of which alters tend to switch to each other. Almost without exception, people with DID report that their alters are organized into groups, that some groups communicate with each other while others do not, that some groups watch out for others, and that some alters are "gatekeepers" or "spokespersons" who control which alters are present. Putnam (1994) reported that certain alters are more likely to come out when preceded by specific others, and that some alters have a tendency to be followed by specific others. Moreover, Putnam (1994) also reported preliminary results showing that each alter's physiology may be affected by the alters that precede him or her, making it difficult to determine what should be regarded as a baseline measurement and therefore potentially confounding results. Putnam appears not to have followed up on this intriguing finding or methodological application, having published only one empirical paper about switching (Putnam, 1988).

The results of this dissertation research imply that frequent switching may slow reaction time for a variety of tasks. Switching may also affect the ability to allocate attention, and future research will examine this area further. Divided attention tasks can be stressful for participants, but there is some evidence that dissociative responses to stress may lower physiological arousal (e.g., Williams, Haines, & Sale, 2003). I propose a study of physiological and self-reported stress responses in low dissociators, high nonclinical dissociators, and people with diagnosed dissociative disorders, using a task that includes emotionally salient stimuli and requires divided attention. I hypothesize that the three groups will show distinctly different patterns of stress responses. As task difficulty increases, all three groups will show an initial increase in both self-reported and physiological stress, with the nonclinical high dissociators then showing a decrease in self-reported stress, and the diagnosed group showing a decrease in both measures of stress. This information about responses to stress has implications for other clinical conditions, as well as for the study of normal coping mechanisms.

Further physiological techniques may provide a bridge between cognitive measures of dissociation and social assessments of the self. Gray and colleagues (2004) found that the P300 evoked potential can measure how self-relevant a stimulus is: attention to one's own name buried in a list of other names, for example, or other self-relevant stimuli such as one's high school. This effect occurs even when one's self is not relevant to the current task. I propose that, in future research, event-related potentials should be used to investigate dissociative barriers and interconnections among alters in DID. That is, will this P300 self-relevance effect occur if the stimulus is relevant to a self that is not present? I hypothesize that, unlike non-diagnosed participants, participants with DID will show augmented P300 responses to both self-relevant and other-relevant stimuli, when the other-relevant stimuli are self-relevant for a closely related alter. Based on the closeness of the organizational relationship, the effect should be smaller for alters that are more fragmented from each other, and larger for alters that share some amount of co-consciousness. A pilot study can assess the robustness of the published effect by testing trained actors performing as themselves and as other characters.

The current study is also groundbreaking in its development of the Integration Measure. Planned research in the future will attempt to revise and refine this measure, and to acquire norms that will enable the IM to distinguish among polyfragmented multiples, multiples with only a few alters, fully integrated multiples, and people with other clinical conditions involving some degree of dissociation, such as dissociative disorder not otherwise specified, dissociative fugue, and borderline personality disorder. At least one large-scale study is necessary for robust item analysis, and further replications will employ factor analysis techniques. Table 8 summarizes the main findings of this dissertation, and the next chapter will examine how to apply the insights gained from conducting this study to future research with DID samples.

Table 8.
Summary of Main Findings.

• DID participants reported very high levels of trauma, including betrayal trauma in childhood.
• DID participants were faster than student participants to produce autobiographical memories in response to cue words, and RT in the DID group was highly correlated with childhood betrayal trauma.
• DID participants performed just as well as did student control participants on the number of words recalled from a list, and outperformed students on the number of words read correctly in a procedural learning task.
• In memory for stories, the DID participants recalled the gist of all three stories equally well, but were less able to answer detailed questions about the story containing fear.
• This study was the first to examine shareability in DID, although predictions were not supported with the current methods. The longer ago a shared memory was formed, the fewer alters knew about it.
• The methodology of this study was unique with regard to switching among alters. DID participants switched freely during both sessions. Switching was related to lifetime experience of betrayal trauma. Frequent switching may slow RT, and future research should investigate switching in more detail.
• This study also introduced the IM, which is the first standardized measure of integration in DID. It provided preliminary results about integration and its potentially complex relationship with switching.

CHAPTER VIII

ADVICE FOR RESEARCHERS NEW TO THE FIELD OF DISSOCIATION

This section addresses the ethics and logistics involved in selecting and implementing research methodology with dissociative identity disorder (DID) samples. It is based on the experience of conducting this research project. Some of the information included in this section would have been helpful to know before the experiment was designed, rather than having to discover it during the course of the study. The advice contained herein is necessarily a snapshot in time, created from situations encountered or considered during this research project. However, the section has also benefited greatly from the insights and suggestions of the Freyd Dynamics Lab at the University of Oregon. This section is written for an audience that has conducted research in psychology, but whose members may not have much experience studying DID. The situations discussed pertain most directly to research in a university, clinic, or hospital setting, rather than a facility such as a prison, which brings additional restrictions. All of the advice pertains to research with adult participants.

Designing and Implementing the Study

As in any fieldwork conducted in a population of which one is not a member, it may be useful to have consultants or collaborators from that population. If possible, researchers should have someone with DID aid in the process at the conceptualization/design phase, or speak with a consultant who had DID in the past. Researchers who lack experience in the areas of childhood sexual abuse, trauma, and/or dissociation may seek an experienced collaborator who will know how to get around many potential pitfalls and who can help institutional review boards (IRBs) and granting

agencies feel that the researchers are qualified to conduct the study. Working carefully with collaborators from the site where data collection will occur can enable researchers to better estimate which stimuli and techniques work best in that particular population. IRBs may not be well educated about research on sexual abuse survivors, and it may be necessary to provide information about such topics as prevalence of sexual abuse and trauma, as well as normal or commonly accepted research methods in dissociation research. Below is an excerpt that was used in two full-review IRB applications, one for a university IRB and one for a psychiatric hospital IRB. Its definition of trauma and dissociation as public health issues is also attractive to granting agencies.

> Benefits to science and humanity: Highly dissociative individuals often have an extensive history of traumatic experiences. Therefore, the research also has the potential to affect how science understands human responses to emotional trauma, how we define "normal" responses to trauma, and the study of individual differences in responses to trauma. Given the high rates of trauma experienced by the general U.S. population, a more thorough understanding of its effects is vital.

The protocols that used this text were both conditionally approved on their first review, which speaks highly of the effectiveness of including education about basic principles of trauma and dissociation. The university protocol application also included information about research practices such as chart review that were common in the hospital setting. An additional step that researchers can take in order to smooth the IRB approval process is attending an IRB meeting. For example, by attending the meeting of the university IRB at which this protocol was reviewed, I was able to answer questions raised by the IRB members. This practice may save time-consuming rounds of revisions.

Clear and frequent communication with IRBs is essential during and after the application phase, especially in multi-site studies. IRB members may need reassurance of researchers' qualifications to work with this population. They may also have questions about the population itself, and they may need explanations of how DID appears in real life as opposed to in the movies. IRBs also need to know that people with DID are more likely to hide than to flaunt their condition, and that it is difficult if not impossible to

malinger this condition for long (Kluft, 1986, 1987). As with any IRB communication, using non-specialist language is essential. It is also important to explain how DID relates to other areas of psychology and medicine, and why it is important and useful to study. Having a collegial relationship with the human subjects compliance officer will greatly aid the approval process and may also help researchers avoid potential pitfalls in submitting their protocol applications.

In designing a research project with DID participants, multiple measures are essential. As noted in Chapter 3, concepts such as "inter-identity amnesia" can be shown to exist, or not exist, in various forms, depending on how they are assessed. As researchers learn from their participants, they may decide to analyze the data differently than originally planned, or to analyze different variables.

The ability of participants to complete various laboratory paradigms also depends on individual differences, including how long participants have been in therapy and how much executive control they have over their alters. Measures of memory and information transfer may also be affected by how integrated participants are. Alters that are willing and able to come out in a laboratory or hospital setting, in front of a stranger and possibly on demand, comprise only a subset of the total DID system of alters. Researchers should carefully consider how these and other complex issues will affect their results, and should not assume the timing or presence of switching if it is not being verified, at the very least by self-report. Because participants with DID have differing levels of ability to complete laboratory tasks, it is helpful to design the data-gathering session with "graceful degradation," in which useful data can still be acquired if the procedure must be modified or tasks left out. The more types of data that can be gathered within a reasonable time frame, the better.

Potential participants also differ in other ways. The perspective of this chapter is grounded in research within the North American mental health system, and most participants were Caucasian. It is important to assess diversity of the participants when collecting any data, and this guideline applies to DID research as well. The Western concept of dissociative disorders does not include experiences that are common worldwide, such as religious possession, animism, or communication with ancestor

spirits. Depending on what aspect of dissociation or diagnosis one is interested in studying, this conceptualization may or may not prove limiting to participant recruitment.

It is undeniably difficult and time-consuming to recruit participants with a diagnosis of DID, especially in sparsely populated areas or areas without large psychiatric hospitals focused on research and teaching. Recruitment techniques will depend on the aims of the study, but the snowball method may prove surprisingly effective when combined with recruitment through therapists, clinics, and support agencies. When obtaining referrals from clinicians, it is even more imperative to maintain confidentiality and to make the non-coercive nature of the study abundantly clear both during recruitment and in the informed consent process. Some research questions can be answered with the comparatively easy task of chart review, and require no further contact with participants.

When conducting chart review, researchers should bear in mind that charts may have inconsistent, incorrect, or incomplete information, especially about this diagnosis. Patients with DID are highly polysymptomatic, presenting with almost every other disorder in the DSM. Because of this factor, they often receive many comorbid diagnoses (e.g., Arbour, 1998; Maldonado, et al., 1998; Ross, Norton, & Wozney, 1989), such as posttraumatic stress disorder, substance abuse disorders, borderline personality disorder, or dissociative disorder not otherwise specified. Depending on their insurance policies, some patients may want DID kept off their charts. It is also important to ask questions about medications, other drugs, and alcohol use when conducting reaction time or physiological research. Researchers should make clear what relationship, if any, the research has to the participant's treatment, chart notations, or diagnosis.

Assessing Risk

Research on abuse survivors who have a diagnosis like DID, and who may be hospitalized, requires extra sensitivity to potential participant risks. The IRB standard for psychological "minimal risk" includes stimuli that could be encountered in everyday life, for example, by viewing the nightly news. However, trauma researchers may be interested in studying participants' responses to potentially distressing questions or information. Therefore it is important to include, as do members of our lab, information

in an IRB protocol about whether the proposed techniques and stimuli have been used in previous studies and how participants responded. Below is an excerpt that was used in two full-review IRB applications, one for a university IRB and one for a psychiatric hospital IRB, both of which were conditionally approved on their first review.

> Psychological risks: Minimal. The questionnaire about trauma could potentially be upsetting. However, participants do not report distress when using this questionnaire in other research; in fact, they often report that the questions are important and valuable ones to include in research. Research indicates that asking these types of questions is not significantly distressing to participants, even those who have experienced traumatic events (e.g., Carlson, Newman, Daniels, Armstrong, Roth, & Loewenstein, 2003; Kassam-Adams & Newman, 2002; Martin, Perrott, Morris, & Romans, 1999; Newman, Walker, & Gefland, 1999; Walker, Newman, Koss, & Bernstein, 1997). The questions asked are similar to frequently-encountered descriptions on the news and in other media. Carlson and colleagues (2003) studied the effects of asking about trauma in a sample of psychiatric inpatients. According to their findings, "70% experienced relatively low levels of distress, and 51% found participation to be useful in some way. […] perceived usefulness was not significantly related to any experiences or symptoms." (p. 132).

These and other studies demonstrate that ethical and valuable research can be conducted on trauma survivors and highly dissociative participants. In order to minimize the risks to this population, research assistants and experimenters should be well trained for a variety of situations. Researchers should know what to expect in the experimental session with highly dissociative participants. Before the study enters data collection, there should be a plan regarding what the experimenter will do in a session if a participant suddenly becomes a five-year-old alter. Will the procedure stop? Will age-appropriate language be used? Will additional verbal consent be necessary? What if an angry protector alter comes out? What will the experimenter do if one alter withdraws consent, but another wants to continue? What if a participant becomes nonverbal or has a flashback? Will experimenters reassure participants, and if so, how? Training should also focus on instilling in experimenters an attitude of participants' competence in dealing with upsetting situations, and on emphasizing the normalcy of their responses.

Consent

As far as possible within institutional guidelines, consent forms should be simple and easy to understand. Our laboratory has found an FAQ style to be effective at communicating the required information in a relatively painless manner. A consent form written as an FAQ can also be easily adapted to an actual FAQ page on a recruitment website. Below is an excerpt that was modified from the standard language used on consent forms in our laboratory. This text is from a consent form that was used for both college students and community participants in this study.

> **Do I have to be here?** No. Your participation is totally voluntary and it will not affect the services you receive. Your doctor won't even know whether you participate, unless you choose to tell him or her.
> **Will anyone know which results are mine?** Confidentiality is strictly maintained; data collected during this experiment are coded by number, not by name, in order to assure anonymity. Your name should only be on this consent form itself. Although your responses on the testing materials are confidential, if you tell us verbally that you have abused a child or plan to abuse a child, we may report this to the appropriate agency.

Although the consent process already includes the information that participants may withdraw their participation at any time during the experiment, it may be necessary to reinforce this message throughout the experimental session. Highly dissociative people may be adept at camouflaging distress, and it is helpful to include a brief check-in periodically. A question as simple as, "How are you doing?" or "You doing ok?" after potentially stressful or triggering tasks demonstrates the researcher's respect and concern for the participant's wellbeing. Allow participants to take breaks as needed during the experimental session if they need to calm themselves.

If researchers will be videotaping or audiotaping participants, they must follow IRB guidelines for explaining confidentiality and/or anonymity, who will have access to the tapes, and what the uses of the tapes will be. In the current study, one of my participants in particular was reassured to hear that her videotape would not be shown to groups of people or used as a training aid. Allow participants the opportunity to view their own videotapes. Be aware that some DID participants find viewing a videotape of

themselves to be very helpful for learning to recognize and communicate among alters, while others find the viewing to be extremely upsetting, so do not require it. This population may be uncomfortable being videotaped, especially if they were used for pornography in childhood. Experimenters can make it clear when they are turning the camera on and off, and be aware that some participants may request that the camera be turned off or the tape erased if it covers topics that are uncomfortable for them to talk about. If a participant does request that the camera or tape recorder be turned off, be sure to take excellent notes about what goes on during that time.

Respect and Power in the Experimental Setting

Respect for participants can be demonstrated in ways beyond what is strictly required by IRB guidelines. For example, on the forms for the current study as well as in my words and attitude, I did my best to convey to my participants my conceptualization of DID as a "condition" rather than a "disorder". It is undeniably a "diagnosis," but it need not necessarily be called an "illness," mental or otherwise. While not downplaying the serious and potentially debilitating effects of DID, I attempted to emphasize the adaptive nature of DID symptoms and my interest in my participants' experiences. I also made sure that I thanked participants for their time and did not pathologize their behaviors, even (or especially) within the pathologizing hospital environment. In fact, Participant 4 explicitly stated her appreciation of research that did not regard her DID as "freakish". If participants asked about switching, I always explained that switching or not switching was totally up to them, and that the experiment would work either way. I did not ask for certain kinds of switches, although I did remain alert for possible participant distress.

Going to participants' locations rather than asking them to come to a lab, if it is feasible to do so, appears to be a good way to increase their comfort level. I originally expected that participants would be uncomfortable letting a stranger into their homes, but my participants reported that being in their own homes made them feel comfortable and secure. Gendered power dynamics may have been in play here. My name in my emails and my voice on the phone are both obviously female, as were all of my participants, several of whom freely gave me their unlisted phone numbers as well as their addresses.

Participants may or may not have been more reluctant to admit an unknown man into their homes. Offering participants a choice of locations, at least for an initial meeting, may have helped participants see me as someone who was respectful of their privacy, safety, and space. This option also reduces the burden of transportation for participants, which is especially important if they are low-income or on disability leave, as were several of my participants. Several participants also found that having a pet or stuffed animal with them during the session helped them stay calm. Another option is to conduct the experiment in the offices of the participants' therapists, or to ask the participants whether they would like their therapists to be present during testing.

When working with DID participants, it is important to be aware of the demand characteristics inherent in the experimental situation, and of the power dynamics of the researcher-participant interaction. These dynamics are extremely salient when conducting research with abuse survivors, and researchers should be aware of how the multiple identities of doctor/patient, male/female, ethnic majority/minority, older/younger, sick/well, and scientist/subject interact. Jody Miller (1997) writes, "Although we are not dispassionate researchers who distance ourselves from our values and emotions, we continue to objectify our research subjects through the very power we employ as researchers" (p. 149). By designing a project and deciding how to analyze the data, researchers define what they will accept as "real" evidence and what variables they will study.

A small way for researchers to convey the importance of participants' experience is through the language they use. For example, compare these two statements about filling out questionnaires: "Take as much time as you need" versus "Spend as much time as you want." The former implies that participants are taking valuable time away from the researcher, and that they should take only as much as necessary. The latter implies that the session's time belongs to the participants, to do with as they wish. This verbal cue is a subtle way to show that researchers respect participants and value their time, and that participation is always the choice of the participants themselves.

Researchers must not assume that there is only one perspective inside each person, or only one way that multiples act. Throughout the course of the experiment,

treat participants as the experts on their own internal experience. Researchers should provide ample room on questionnaires for lengthy, disjointed, or multiple answers to each question. Tolerate ambiguity by allowing participants to skip questions, to guess, or to answer "don't know". Treat gender as an open-ended question with an item that reads, "what is your gender? _____" rather than forcing a choice between two options. Some participants will want to write in the margins to explain why they answered the way they did or how they understood the question, so large margins or one-sided questionnaires will provide room for these comments. Experimenters may also need to allow extra time to respond to questions and forms so that participants can sort out their internal voices. On a final questionnaire, researchers can ask about the experience of participating and give participants a chance to write down what was good and bad about the experiment, and what they wish researchers would study about DID.

Additionally, survivors of abuse as severe as that which people with DID have lived through may have difficulties with writing and questionnaires. For example, in this study Participant 2 had not learned to read until she was a teenager, and Participant 4 found writing difficult because she had not been allowed to write as a child. Participant 8 experienced stress and headaches when filling out any sort of forms. Participants who switch into child alters may be temporarily unable to write. Researchers should create alternate procedures to have in place if needed.

In designing experiments, researchers should also be especially sensitive to potential triggers, such as feeling watched or judged, or restrictive apparatus such as MRI or EEG equipment. Arrange the experimental room so that participants do not have their backs to the door, and so that experimenters do not have to walk behind the participants. As with any participants, researchers should always get permission before touching participants, for example to attach electrodes or to put on headphones.

Conclusions

The study of dissociation is a small but growing field. It may seem complex and difficult for new investigators to initiate a study on participants with DID, and indeed it is. However, there are many enigmas to this fascinating condition that have yet to be empirically examined, and there are numerous areas for potential studies to explore.

Researchers who are invested in the well-being of their participants can begin the process of conducting sensitive research by educating and communicating with IRBs. Researchers in this area should also be aware of individual differences and design studies to accommodate them. Further, training is essential so that both the principal investigators and the research assistants on these studies are able to deal sensitively with trauma survivors. This sensitivity is enhanced by clear and non-coercive recruitment and consent procedures. Psychology researchers have a unique ability to be aware of hierarchy and power in the experimental setting, and to take these issues into account. Finally, participants are always the experts on their own internal experience. Recognizing this fact will facilitate ethical and respectful research with traumatized and highly dissociative participants.

APPENDIX A

INTEGRATION MEASURE

IM (Barlow & Chu, Fall 2004) Participant #_____

The part or identity that generally occupies the body and manages day-to-day events should fill out this questionnaire. Check off the best answer to each question. If you are unsure of an answer or don't know, just take your best guess. You can also write on the back of this questionnaire. Thank you.

1. Are you aware of there being other parts/identities within yourself?
_____ No, I'm not aware of other parts
_____ I sometimes believe that there are other parts
_____ I often believe that there are other parts
_____ I know there are other parts most of the time
_____ I always know there are other parts

Approximately how many parts do you think there are? _____

2. Do you think there might be any parts that you don't know about?
_____ I don't know
_____ No, I know about most or all the parts
_____ There might be, but I don't like to think about it
_____ I think so, but I'm not sure
_____ Yes, I know there are

3. Do the other parts/identities communicate with you?
_____ No they don't
_____ They occasionally communicate with me
_____ They sometimes communicate with me
_____ They often communicate with me

How do the parts communicate with you (voices, thoughts, other ways)?

Is there more than one part helping to fill out this questionnaire?

4. How do you feel about other parts/identities communicating with you?
_____ I don't want to know about them
_____ I usually don't want communication
_____ I sometimes feel I might want communication
_____ I'm often open to communication
_____ I'm comfortable with most or all of their communication

In what way do you perceive other identities/parts, for example, do you hear their voices, visualize them, or some other ways?

***for items 5-9, scoring information is next to each response**

5. Are you able to communicate with other parts/identities in general?
___0___ I don't communicate with any of them
___1___ I occasionally communicate with only a few of them
___2___ I sometimes communicate with some of them
___3___ I often communicate with many of them
___4___ I communicate easily with all of them

Approximately how many parts are you able to communicate at least a little with? _____
(not analyzed at this time)
Approximately how many parts are you able to communicate very well with? _____
(not analyzed at this time)
In what ways do you communicate with other parts (talking out loud, talking inside, thinking, other ways)?
(not analyzed at this time)

6. Do you share co-consciousness with other parts, that is, are you aware of what they are thinking and/or doing?
___0___ Never, or with none of the parts
___1___ Rarely, or with only a few parts
___2___ Sometimes, or with some parts
___3___ Often, or with many parts
___4___ Always, or with all of the parts

7. When other parts are out (in the body), are you aware of what happens, for example, watching or listening or both being out at once?
___0___ Never, or with none of the parts
___1___ Rarely, or with only a few parts
___2___ Sometimes, or with some parts
___3___ Often, or with many parts
___4___ Always, or with all of the parts

8. Is there cooperation between you and other parts/identities, for example about the times/places when other parts come out?
___0___ None, or with none of the parts
___1___ A little, or with only a few parts
___2___ Some, or with some parts
___3___ Quite a bit, or with many parts
___4___ A great deal, or with all of the parts

9. How would you describe how you feel about the other parts/identities?
___0___ I don't want to know anything about them
___1___ I understand a little about a few of them, but can't deal with most of them
___2___ I understand some of them, but have a hard time with others
___3___ I understand many of them, and am trying to learn about others
___4___ I understand and value them

10. Approximately how long have you been working on developing communication and cooperation between your parts?

11. Overall, how often do you feel you communicate and work together with your identities/parts?
(Please make a mark somewhere along this line)

|_____|
0% 100%

APPENDIX B

Pearson's Correlations Among Variables for Student Group (N = 13)

		DES	Word Rec	Vig1 Sumry	Vig1 Crct	Vig2 Sumry	Vig2 Crct	Vig3 Sumry	Vig3 Crct	Procedural Learn	shared ago	unshard ago	shared MCQ	unshr MCQ
HiBT life	r	-.013	.121	.187	.540	-.019	.229	-.087	.047	.060	.720(**)	.083	-.131	.623(*)
	Sig.	.965	.693	.541	.057	.950	.453	.777	.880	.845	.005	.787	.670	.023
DES	r	1	-.392	-.335	.236	-.612(*)	-.502	-.529	.269	-.027	-.320	-.128	.058	-.044
	Sig.	.	.185	.263	.437	.026	.080	.063	.373	.930	.286	.678	.850	.888
Words Recalled	r		1	.636(*)	.057	.643(*)	.457	.544	.116	.021	.402	-.356	-.225	-.155
	Sig.		.	.019	.852	.018	.116	.055	.705	.944	.173	.232	.459	.613
Vignette 1 Summary (neutral)	r			1	.258	.721(**)	.522	.613(*)	.040	-.245	.456	.148	-.305	-.118
	Sig.			.	.394	.005	.068	.026	.896	.420	.118	.629	.310	.701
Vignette 1 Correct (neutral)	r				1	.067	.248	.077	.137	-.335	.320	.141	-.061	.060
	Sig.				.	.829	.415	.802	.655	.263	.286	.647	.842	.845
Vignette 2 Summary (fear)	r					1	.476	.568(*)	-.040	-.235	.354	-.193	-.131	-.115
	Sig.					.	.101	.043	.896	.440	.235	.527	.670	.707
Vignette 2 Correct (fear)	r						1	.628(*)	.227	-.142	.189	-.149	-.010	.004
	Sig.						.	.022	.457	.644	.537	.626	.974	.989
Vignette 3 Summary (happy)	r							1	.258	-.583(*)	.085	-.077	-.052	-.163
	Sig.							.	.396	.037	.783	.804	.865	.595
Vignette 3 Correct (happy)	r								1	-.433	-.360	-.333	.644(*)	.152
	Sig.								.	.139	.227	.266	.018	.620
Procedural Learn	r									1	.162	-.083	-.307	.042
	Sig.									.	.597	.787	.307	.893

continued on next page

		DES	Word Rec	Vig1 Sumry	Vig1 Crct	Vig2 Sumry	Vig2 Crct	Vig3 Sumry	Vig3 Crct	Procedural Learning	shared ago	unshard ago	shared MCQ	unshr MCQ
shared ago	r										1	.160	-.610(*)	.300
	Sig.										.	.601	.027	.320
unshared ago	r											1	-.006	-.209
	Sig.											.	.985	.492
shared MCQ	r												1	.026
	Sig .												.	.933

Note: All reported significance levels (Sig .) are 2-tailed.

** Correlation is significant at the 0.01 level.

* Correlation is significant at the 0.05 level.

BIBLIOGRAPHY

Akyüz, G., Dogan, O., Sar, V., Yargiç, L. I., & Tutkun, H. (1999). Frequency of dissociative identity disorder in the general population in Turkey. *Comprehensive Psychiatry, 40,* 151-159.

Arbour, S. E. (1998). In Sybil's shadow: The challenge of living with dissociative identity disorder. *Dissertation Abstracts International Section A: Humanities & Social Sciences, 59*(12-A), 4530. (UMI No. AAM9916108).

Bahnson, C. B., & Smith, K. (1975). Autonomic changes in a multiple personality. *Psychosomatic Medicine, 37,* 85-86.

Barach, P. M. M. (1991). Multiple personality disorder as an attachment disorder. *Dissociation, 4,* 117-123.

Barlow, M. R., & Cromer, L. D. (in press). Trauma-relevant characteristics in a University Human Subjects Pool population: Gender, major, betrayal, and latency of participation. *Journal of Trauma and Dissociation.*

Becker, K. A., Deater-Deckard, K., Eley, T., Freyd, J. J., Stevenson, J., & Plomin, R. (2004). A genetic analysis of individual differences in dissociative behaviours in childhood and adolescence. *Journal of Child Psychology and Psychiatry, 45,* 522-532.

Bernstein, E. M. & Putnam, F. W. (1986). Development, reliability, and validity of a dissociation scale. *Journal of Nervous & Mental Disease, 174,* 727-735.

Birnbaum, M H., & Thomann, K. (1996). Visual function in multiple personality disorder. *Journal of the American Optometric Association, 67,* 327-334.

Blizard, R. A. (1997). The origins of dissociative identity disorder from an object relations and attachment theory perspective. *Dissociation, 10,* 223-229.

Bower, G. (1994). Temporary emotional states act like multiple personalities. In R. M. Klein & B. K. Doane (Eds.), *Psychological Concepts and Dissociative Disorders* (pp. 207-234). Hillsdale, NJ: Lawrence Erlbaum Associates.

Bowman, E. S. (2002). Sex composition and sex differences in the dissociative disorders: Relationship to trauma and abuse. In F. Lewis-Hall, T. S. Williams, J. A. Panetta, & J. M. Herrera (Eds.), *Psychiatric Illness in Women: Emerging Treatments and Research* (pp. 535-555). Washington, DC: American Psychiatric Publishing, Inc.

Bowman, E. S., Blix, S., & Coons, P. M. (1985). Multiple personality in adolescence: Relationship to incestual experiences. *Journal of the American Academy of Child Psychiatry, 24*, 109-114.

Braun, B. G. (1983a). Neurophysiologic changes in multiple personality due to integration: A preliminary report. *American Journal of Clinical Hypnosis, 26*, 84-92.

Braun, B. G. (1983b). Psychophysiologic phenomena in multiple personality and hypnosis. *American Journal of Clinical Hypnosis, 26*, 124-137.

Braun, B. G. (1985). The transgenerational incidence of dissociation and multiple personality disorder: A preliminary report. In R. P. Kluft (Ed.), *Childhood Antecedents of Multiple Personality* (pp. 127-150). Washington, DC: American Psychiatric Press, Inc.

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

Brende, J. O. (1984). The psychophysiologic manifestations of dissociation: Electrodermal responses in a multiple personality patient. *Psychiatric Clinics of North America, 7*, 41-50.

Briere, J. (1997). *Psychological assessment of adult posttraumatic states*. Washington, DC: American Psychological Association.

Bryant, R. A. (1995). Autobiographical memory across personalities in dissociative identity disorder: A case report. *Journal of Abnormal Psychology, 104*, 625-631.

Cardeña, E. (2001). The doctor doth protest too much! *Journal of Trauma and Dissociation, 2*, 39-42.

Carlson, E. B., & Putnam, F. W. (1993). An update on the Dissociative Experiences Scale. *Dissociation: Progress in the Dissociative Disorders, 6*, 16-27.

Carlson, E. T. (1989). Multiple personality and hypnosis: The first one hundred years. *Journal of the History of the Behavioral Sciences, 25*, 315-322.

Cavaco, S., Anderson, S. W., Allen, J. S., Castro-Caldas, A., & Damasio, H. (2004). The scope of preserved procedural memory in amnesia. *Brain, 127*, 1853-1867.

Chu, J. A., & Dill, D. L. (1990). Dissociative symptoms in relation to childhood physical and sexual abuse. *American Journal of Psychiatry, 147,* 887-892.

Cloitre, M., Cancienne, J., Brodsky, B., Dulit, R., & Perry, S. W. (1996). Memory performance among women with parental abuse histories: Enhanced directed forgetting or directed remembering? *Journal of Abnormal Psychology, 105*, 204-211.

Cocores, J. A., Bender, A. L., & McBride, E. (1984). Multiple personality, seizure disorder, and the electroencephalogram. *Journal of Nervous and Mental Disease, 172*, 436-438.

Coons, P. M. (1988). Psychophysiologic aspects of multiple personality disorder: A review. *Dissociation, 1*, 47-53.

Coons, P. M. (1994). Confirmation of childhood abuse in child and adolescent cases of multiple personality disorder and dissociative disorder not otherwise specified. *Journal of Nervous and Mental Disease, 182*, 461-464.

Coons, P. M. (2001). On changing the diagnostic criteria for dissociative identity disorder. *Journal of Trauma and Dissociation, 2*, 43-46.

Coons, P. M., & Bowman, E. S. (2001). Ten-year follow-up study of patients with dissociative identity disorder. *Journal of Trauma and Dissociation, 2*, 73-89.

Coons, P. M., Milstein, V., & Marley, C. (1982). EEG studies of two multiple personalities and a control. *Archives of General Psychiatry, 39,* 823-825.

Dalenberg, C. J., & Palesh, O. G. (2004). Relationship between child abuse history, trauma, and dissociation in Russian college students. *Child Abuse & Neglect, 28*, 461-474.

Dell, P. F. (2001a). Why the diagnostic criteria for dissociative identity disorder should be changed. *Journal of Trauma and Dissociation, 2*, 7-37.

Dell, P. F. (2001b). Should the dissociative disorders field choose its own diagnostic criteria for dissociative identity disorder? *Journal of Trauma and Dissociation, 2*, 65-72.

DePrince, A. P., & Freyd, J. J. (1999). Dissociative tendencies, attention, and memory. *Psychological Science, 10*, 449-452.

DePrince, A. P., & Freyd, J. J. (2001). Memory and dissociative tendencies: The roles of attentional context and word meaning in a directed forgetting task. *Journal of Trauma and Dissociation, 2,* 67-82.

de Ruiter, M. B., Phaf, R. H., Veltman, D. J., Kok, A., & van Dyck, R. (2003). Attention as a characteristic of nonclinical dissociation: an event-related potential study. *NeuroImage, 19,* 376-390.

de Ruiter, M. B., Phaf, R. H., Elzinga, B. M., & van Dyck, R. (2004). Dissociative style and individual differences in verbal working memory span. *Consciousness and Cognition, 13,* 821-828.

Deweer, B., Pillon, B., Michon, A., & Dubois, B. (1993). Mirror reading in Alzheimer's disease: Normal skill learning and acquisition of item-specific information. *Journal of Clinical and Experimental Neuropsychology, 15,* 789-804.

Dick-Barnes, M., Nelson, R. O., & Aine, C. J. (1987). Behavioral measures of multiple personality: The case of Margaret. *Journal of Behavioral Therapy and Experimental Psychiatry, 18,* 229-239.

Dorahy, M. J. (2001). Dissociative identity disorder and memory dysfunction: The current state of experimental research and its future directions. *Clinical Psychology Review, 21,* 771-795.

Dorahy, M. J., Irwin, H. J., & Middleton, W. (2002). Cognitive inhibition in dissociative identity disorder (DID): Developing an understanding of working memory function in DID. *Journal of Trauma and Dissociation, 3,* 111-132.

Dorahy, M. J., Irwin, H. J., & Middleton, W. (2004). Assessing markers of working memory function in dissociative identity disorder using neutral stimuli: A comparison with clinical and general population samples. *Australian and New Zealand Journal of Psychiatry, 38,* 47-55.

Dorahy, M. J., Middleton, W., & Irwin, H. J. (2004). Investigating cognitive inhibition in dissociative identity disorder compared to depression, posttraumatic stress disorder and psychosis. *Journal of Trauma and Dissociation, 5,* 93-110.

Dorahy, M. J., Middleton, W., & Irwin, H. J. (2005). The effect of emotional context on cognitive inhibition and attentional processing in dissociative identity disorder. *Behaviour Research and Therapy, 43,* 555-568.

Draijer, N., & Langeland, W. (1999). Childhood trauma and perceived parental dysfunction in the etiology of dissociative symptoms in psychiatric inpatients. *American Journal of Psychiatry, 156,* 379-385.

Eich, E., Macaulay, D., Loewenstein, R. J., & Dihle, P. H. (1997a). Implicit memory, interpersonality amnesia, and dissociative identity disorder: Comparing patients with simulators. In J. D. Read & D. S. Lindsay (Eds.), *Recollections of Trauma: Scientific Evidence and Clinical Practice* (pp. 469-474). New York: Plenum.

Eich, E., Macaulay, D., Loewenstein, R. J., & Dihle, P. H. (1997b). Memory, amnesia, and dissociative identity disorder. *Psychological Science, 8,* 417-422.

Elzinga, B. M., de Beurs, E., Sergeant, J. A., van Dyck, R., & Phaf, R. H. (2000). Dissociative style and directed forgetting. *Cognitive Therapy and Research, 24,* 279-295.

Elzinga, B. M., Phaf, R. H., Ardon, A. M., & van Dyck, R. (2003). Directed forgetting between, but not within, dissociative personality states. *Journal of Abnormal Psychology, 112,* 237-243.

Fagan, J., & McMahon, P. (1984). Incipient multiple personality in children: Four cases. *Journal of Nervous and Mental Disease, 172,* 26-36.

Fine, C. G. (1996). Models of helping: The role of responsibility. In J. L. Spira (Ed.), *Treating Dissociative Identity Disorder* (pp. 81-98). San Francisco: Jossey-Bass.

Flor-Henry, P., Tomer, R., Kumpula, I., Koles, Z. J., & Yeudall, L. T. (1990). Neurophysiological and neuropsychological study of two cases of multiple personality syndrome and comparison with chronic hysteria. *International Journal of Psychophysiology, 10,* 151-161.

Forrest, K. A. (2001). Toward an etiology of dissociative identity disorder: A neurodevelopmental approach. *Consciousness & Cognition, 10,* 259-293.

Freyd, J. J. (1994). Betrayal trauma: Traumatic amnesia as an adaptive response to childhood abuse. *Ethics & Behavior, 4,* 307-329.

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

Freyd, J. J., DePrince, A. P., & Zurbriggen, E. L. (2001). Self-reported memory for abuse depends upon victim-perpetrator relationship. *Journal of Trauma and Dissociation, 2,* 5-16.

Freyd, J. J. & Goldberg, L. R. (2004). Gender difference in exposure to betrayal trauma. Presentation at the 20th Annual Meeting of the International Society for Traumatic Stress Studies, New Orleans, LA, November 14-18, 2004.

Freyd, J. J., Martorello, S. R., Alvarado, J. S., Hayes, A. E., & Christman, J. C. (1998). Cognitive environments and dissociative tendencies: Performance on the Standard Stroop Task for high vs. low dissociators. *Applied Cognitive Psychology, 12*, S91-S103.

Gleaves, D. H., May, M. C., & Cardeña, E. (2001). An examination of the diagnostic validity of dissociative identity disorder. *Clinical Psychology Review, 21*, 577-608.

Gray, H. M., Ambady, N., Lowenthal, W. T., & Deldin, P. (2004). P300 as an index of attention to self-relevant stimuli. *Journal of Experimental Social Psychology, 40*, 216-224.

Haines, J., Williams, C. L., Brain, K. L., & Wilson, G. V. (1995). The psychophysiology of self-mutilation. *Journal of Abnormal Psychology, 104*, 471-489.

Heineman, T. V. (1998). Looking outward: Externalization and dissociation. Chapter 6 of *The Abused Child: Psychodynamic Understanding and Treatment* (pp. 113-133). New York: Guilford.

Hesse, E., & Main, M. (2000). Disorganized infant, child, and adult attachment: Collapse in behavioral and attentional strategies. *Journal of the American Psychoanalytic Association, 48*, 1097-1127.

Hopper, A., Ciorciari, J., Johnson, G., Spensley, J., Sergejew, A., & Stough, C. (2002). EEG coherence and dissociative identity disorder: Comparing EEG coherence in DID hosts, alters, controls and acted alters. *Journal of Trauma and Dissociation, 3*, 75-88.

Hughes, J. R., Kuhlman, D. T., Fichtner, C. G., & Gruenfeld, M. J. (1990). Brain mapping in a case of multiple personality. *Clinical Electroencephalography, 21*, 200-209.

Huntjens, R. J. C., Peters, M., Postma, A., Woertman, L., Effting, M., & van der Hart, O. (2005). Transfer of newly acquired stimulus valence between identities in dissociative identity disorder (DID). *Behaviour Research and Therapy, 43*, 243-255.

Huntjens, R. J. C., Postma, A., Hamaker, E. L., Woertman, L., van der Hart, O., & Peters, M. (2002). Perceptual and conceptual priming in patients with dissociative identity disorder. *Memory & Cognition, 30*, 1033-1043.

Huntjens, R. J. C., Postma, A., Peters, M., Woertman, L., & van der Hart, O. (2003). Interidentity amnesia for neutral, episodic information in dissociative identity disorder. *Journal of Abnormal Psychology, 112*, 290-297.

Huntjens, R. J. C., Postma, A., Peters, M., Woertman, L., & van der Hart, O. (under review). Memory transfer for trauma-related words between identities in dissociative identity disorder.

Huntjens, R. J. C., Postma, A., Woertman, L., van der Hart, O., & Peters, M. (2005). Procedural memory in dissociative identity disorder: When can inter-identity amnesia be truly established? *Consciousness and Cognition, 14*, 377-389.

International Society for the Study of Dissociation (ISSD; 1997). Guidelines for treating dissociative identity disorder (multiple personality disorder) in adults. Chicago: Author.

Irwin, H. J. (1998). Affective predictors of dissociation II: Shame and guilt. *Journal of Clinical Psychology, 54*, 237-245.

Ischlondsky, N. D. (1955). The inhibitory process in the cerebro-physiological laboratory and in the clinic. *Journal of Nervous and Mental Disease, 121*, 5-18.

Jang, K. L., Paris, J., Zweig-Frank, H., & Livesley, W. J. (1998). Twin study of dissociative experience. *Journal of Nervous and Mental Disease, 186*, 345-351.

Johnson, M. K., Foley, M. A., Suengas, A. G., & Raye, C. L. (1988). Phenomenal characteristics of memories for perceived and imagined autobiographical events. *Journal of Experimental Psychology: General, 117*, 371-376.

Kisiel, C. L., & Lyons, J. S. (2001). Dissociation as a mediator of psychopathology among sexually abused children and adolescents. *American Journal of Psychiatry, 158*, 1034-1039.

Klein, R. B. (2004). *Beyond significance testing: Reforming data analysis methods in behavioral research.* Washington, DC: American Psychological Association.

Klest, B. K. (2002). Trauma, dissociation, and attention: Memory for neutral and traumatic stimuli. Unpublished thesis, University of Oregon.

Kluft, R. P. (1985a). Childhood multiple personality disorder: Predictors, clinical findings, and treatment results. In R. P. Kluft (Ed.), *Childhood Antecedents of Multiple Personality* (pp. 167-196). Washington, DC: American Psychiatric Press, Inc.

Kluft, R. P. (1985b). The natural history of multiple personality disorder. In R. P. Kluft (Ed.), *Childhood Antecedents of Multiple Personality* (pp. 197-238). Washington, DC: American Psychiatric Press, Inc.

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

Kluft, R. P. (1987). The simulation and dissimulation of multiple personality disorder. *American Journal of Clinical Hypnosis, 30*, 104-118.

Kluft, R. P. (1993a). Basic principles in conducting the psychotherapy of multiple personality disorder. In R. P. Kluft & C. G. Fine (Eds.), *Clinical Perspectives on Multiple Personality Disorder* (pp. 19-50). Washington, DC: American Psychiatric Press, Inc.

Kluft, R. P. (1993b). Clinical approaches to the integration of personalities. In R. P. Kluft & C. G. Fine (Eds.), *Clinical Perspectives on Multiple Personality Disorder* (pp. 101-134). Washington, DC: American Psychiatric Press, Inc.

Kluft, R. P. (1996). Hospital treatment. In J. L. Spira (Ed.), *Treating Dissociative Identity Disorder* (pp. 275-336). San Francisco: Jossey-Bass.

Krystal, J. H., Bennett, A., Bremner, J. D., Southwick, S. M., & Charney, D. S. (1996). Recent developments in the neurobiology of dissociation: Implications for posttraumatic stress disorder. In L. K. Michelson & W. J. Ray (Eds.), *Handbook of Dissociation: Theoretical, Empirical, and Clinical Perspectives* (pp. 163-190). New York: Plenum Press.

Ladle, B. L. (1987). The use of event related potentials in the study of multiple personality disorder. *Dissertation Abstracts International, 48*(8-B), 2459. (UMI No. 8725031).

Larmore, K., Ludwig, A. M., & Cain, R. L. (1977). Multiple personality – An objective case study. *British Journal of Psychiatry, 131*, 35-40.

Li, D., & Spiegel, D. (1992). A neural network model of dissociative disorders. *Psychiatric Annals, 22*, 144-147.

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

Lipsanen, T., Lauerma, H., Peltola, P., & Kallio, S. (1999). Visual distortions and dissociation. *Journal of Nervous and Mental Disease, 187,* 109-112.

Loewenstein, R. J. (1994). Diagnosis, epidemiology, clinical course, treatment, and cost effectiveness of treatment for dissociative disorders and MPD: Report submitted to the Clinton Administration Task Force on Health Care Financing Reform. *Dissociation, 7,* 3-11.

Loewenstein, R. J., Hamilton, J., Alagna, S., Reid, N., & deVries, M. (1987). Experiential sampling in the study of multiple personality disorder. *American Journal of Psychiatry, 144,* 19-24.

Loewenstein, R. J., & Putnam, F. W. (1990). The clinical phenomenology of males with MPD: A report of 21 cases. *Dissociation, 3,* 135-143.

Ludwig, A. M., Brandsma, J. M., Wilbur, C. B., Bendfeldt, F., & Jameson, D. H. (1972). The objective study of a multiple personality: Or, are four heads better than one? *Archives of General Psychiatry, 26,* 298-310.

Macfie, J., Cicchetti, D., & Toth, S. L. (2001). The development of dissociation in maltreated preschool-aged children. *Development & Psychopathology, 13,* 233-254.

Main, M., & Morgan, H. (1996). Disorganization and disorientation in infant strange situation behavior. In L. K. Michelson & W. J. Ray (Eds.), *Handbook of Dissociation: Theoretical, Empirical, and Clinical Perspectives* (pp. 107-138). New York: Plenum Press.

Maldonado, J. R., Butler, L. D., & Spiegel, D. (1998). Treatments for dissociative disorders. In P. E. Nathan & J. M. Gordon (Eds.), *A Guide to Treatments that Work* (pp. 423-446). New York: Oxford University Press.

Markowitsch, H. J., Fink, G. R., Thöne, A., Kessler, J., & Heiss, W. (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. (1998). Psychic trauma causing grossly reduced brain metabolism and cognitive deterioration. *Neuropsychologia, 36,* 77-82.

Mathew, R. J., Jack, R. A., & West, W. S. (1985). Regional cerebral blood flow in a Patient with multiple personality. *American Journal of Psychiatry, 142*, 504-505.

McElroy, L. P. (1992). Early indicators of pathological dissociation in sexually abused children. *Child Abuse & Neglect, 16*, 833-846.

Merckelbach, H., Devilly, G. J., & Rassin, E. (2002). Alters in dissociative identity disorder: Metaphors or genuine entities? *Clinical Psychology Review, 22*, 481-498.

Miller, J. (1997). Researching violence against street prostitutes: Issues of epistemology, methodology, and ethics. In M. D. Schwartz (Ed.), *Researching Sexual Violence Against Women: Methodological and Personal Perspectives* (pp. 144-156). London: SAGE Publications.

Miller, S. D. (1989). Optical differences in cases of multiple personality disorder. *Journal of Nervous and Mental Disease, 177,* 480-486.

Miller, S. D., Blackburn, T., Scholes, G., White, G. L., & Mamalis, N. (1991). Optical differences in multiple personality disorder: A second look. *Journal of Nervous and Mental Disease, 179,* 132-135.

Miller, S. D., & Triggiano, P. J. (1992). The psychophysiological investigation of multiple personality disorder: Review and update. *American Journal of Clinical Hypnosis, 35,* 47-61.

Nijenhuis, E. R. S. (2003, November). The emerging psychobiology of trauma-related dissociation. *Presentation at the 19th annual meeting of the International Society for Traumatic Stress Studies, Chicago, IL.*

Nijenhuis, E. R. S., Spinhoven, P., van Dyck, R., van der Hart, O., & Vanderlinden, J. (1998). Degree of somatoform and psychological dissociation in dissociative disorder 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: From anesthesia to pain. In J. Goodwin & R. Attias (Eds.), *Splintered Reflections: Images of the Body in Trauma* (pp. 39-65). New York: Basic Books.

Nijenhuis, E. R. S., van der Hart, O., & Steele, K. (2002). The emerging psychobiology of trauma-related dissociation and dissociative disorders. In H. D'haenen, J. A. den Boer, and P. Pillner (Eds.), *Biological Psychiatry* (pp. 1079-1098). New York: John Wiley & Sons, Ltd.

Nissen, M. J., Ross, J. L., Willingham, D. B., MacKenzie, T. B., & Schacter, D. L. (1988). Memory and awareness in a patient with multiple personality disorder. *Brain and Cognition, 8,* 117-134.

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 & Psychopathology, 9,* 855-879.

Pasquini, P., Liotti, G., Mazzotti, E., Fassone, G., Picardi, A., & The Italian Group for the Study of Dissociation. (2002). Risk factors in the early family life of patients suffering from dissociative disorders. *Acta Psychiatrica Scandinavica, 105,* 110-116.

Peters, M. L., Uyterlinde, S. A., Consemulder, J., & van der Hart, O. (1998). Apparent amnesia on experimental memory tests in dissociative identity disorder: An exploratory study. *Consciousness and Cognition, 7,* 27-41.

Peterson, G. (1990). Diagnosis of childhood multiple personality disorder. *Dissociation, 3,* 3-9.

Peterson, G. (1991). Children coping with trauma: Diagnosis of "Dissociation Identity Disorder" [sic]. *Dissociation, 4,* 152-164.

Pitblado, C., & Cohen, J. (1984). State-related changes in amplitude, latency, and cerebral asymmetry of averaged evoked potentials in a case of multiple personality. *The International Journal of Clinical Neuropsychology, 6,* 70.

Prince, M., & Peterson, F. (1908). Experiments in psycho-galvanic reactions from co-conscious (sub-conscious) ideas in a case of multiple personality. *Journal of Abnormal Psychology, 3,* 114-131.

Prohl, J., Resch, F., Parzer, P., & Brunner, R. (2001). Relationship between dissociative symptomatology and declarative and procedural memory in adolescent psychiatric patients. *Journal of Nervous and Mental Disease, 189,* 602-607.

Putnam, F. W. (1984). The psychophysiologic investigation of multiple personality disorder: A review. *Psychiatric Clinics of North America, 7,* 31-39.

Putnam, F. W. (1988). The switch process in multiple personality disorder and other state-change disorders. *Dissociation, 1,* 24-32.

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

Putnam, F. W. (1994). The switch process in multiple personality disorder and other state-change disorders. In R. M. Klein & B. K. Doane (Eds.), *Psychological Concepts and Dissociative Disorders* (pp. 283-304). Hillsdale, NJ: Lawrence Erlbaum Associates.

Putnam, F. W. (1995). Development of dissociative disorders. In D. Cicchetti & D. J. Cohen (Eds.), *Developmental Psychopathology, Volume 2: Risk, Disorder, and Adaptation* (pp. 581- 608). New York: Wiley.

Putnam, F. W. (1996). Child Development and Dissociation. *Child & Adolescent Psychiatric Clinics of North America, 5*, 285-301.

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

Putnam, F. W., Carlson, E. B., Ross, C. A., Anderson, G., Clark, P., Torem, M., et al. (1996). Patterns of dissociation in clinical and nonclinical samples. *Journal of Nervous and Mental Disease, 184*, 673-679.

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.

Putnam, F. W., Zahn, T. P., & Post, R. M. (1990). Differential autonomic nervous system activity in multiple personality disorder. *Psychiatry Research, 31*, 251-260.

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.

Richardson, S. (2002). Will you sit by her side?: An attachment-based approach to work with the dissociative conditions. In V. Sinason (Ed.), *Attachment, Trauma and Multiplicity: Working with Dissociative Identity Disorder* (pp. 149-165). New York: Taylor & Francis Inc.

Rivera, M. (1989). Linking the psychological and the social: Feminism, poststructuralism, and multiple personality. *Dissociation, 2*, 24-31.

Ross, C. A. (1996). Short-term, problem-oriented inpatient treatment. In J. L. Spira (Ed.), *Treating Dissociative Identity Disorder* (pp. 337-366). San Francisco: Jossey-Bass.

Ross, C. A. (1997). Cognitive therapy of dissociative identity disorder. In P. S. Appelbaum, L. A. Uyehara, & M. R. Elin (Eds.), *Trauma and Memory: Clinical and Legal Controversies* (pp. 360-377). New York: Oxford University Press.

Ross, C. A., Norton, G. R., & Wozney, K. (1989). Multiple personality disorder: An analysis of 236 cases. *Canadian Journal of Psychiatry, 34,* 413-418.

Sahakyan, L., & Kelley, C. M. (2002). A contextual change account of the directed forgetting effect. *Journal of Experimental Psychology: Learning, Memory, and Cognition, 28,* 1064-1072.

Sar, V., Unal, S. N., Kiziltan, E., Kundakci, T., & Ozturk, E. (2001). HMPAO SPECT study of regional cerebral blood flow in dissociative identity disorder. *Journal of Trauma and Dissociation, 2,* 5-25.

Saxe, G. N., Vasile, R. G., Hill, T. C., Bloomingdale, K., & van der Kolk, B. A. (1992). SPECT imaging and multiple personality disorder. *Journal of Nervous and Mental Disease, 180,* 662-663.

Schacter, D. L., Kihlstrom, J. F., Kihlstrom, L. C., & Berren, M. B. (1989). Autobiographical memory in a case of multiple personality disorder. *Journal of Abnormal Psychology, 98,* 508-514.

Schore, A. N. (2001a). Effects of a secure attachment relationship on right brain development, affect regulation, and infant mental health. *Infant Mental Health Journal, 22,* 7-66.

Schore, A. N. (2001b). The effects of early relational trauma on right brain development, affect regulation, and infant mental health. *Infant Mental Health Journal, 22,* 201-269.

Schultz, T. M., Passmore, J., & Yoder, C. Y. (2003). Emotional closeness with perpetrators and amnesia for child sexual abuse. *Journal of Child Sexual Abuse, 12,* 67-88.

Siegel, D. J. (1996). Cognition, memory, and dissociation. *Child and Adolescent Psychiatric Clinics of North America, 5,* 509-536.

Silberg, J. L. (1998). Dissociative symptomatology in children and adolescents as displayed on psychological testing. *Journal of Personality Assessment, 71,* 421-439.

Silberman, E. K., Putnam, F. W., Weingartner, H., Braun, B. G., & Post, R. M. (1985). Dissociative states in multiple personality disorder: A quantitative study. *Psychiatry Research, 15,* 253-260.

Simeon, D., Guralnik, O., Hazlett, E. A., Spiegel-Cohen, J., Hollander, E., & Buchsbaum, M. S. (2000). Feeling unreal: A PET study of depersonalization disorder. *American Journal of Psychiatry, 157,* 1782-1788.

Sinason, V. (Ed). (2002). *Attachment, trauma and multiplicity: Working with dissociative identity disorder*. New York: Taylor & Francis Inc.

Smith, S. G. (1989). Multiple personality disorder with human and non-human subpersonality components. *Dissociation, 2*, 52-56.

Southgate, J. (2002). A theoretical framework for understanding multiplicity and dissociation. In V. Sinason (Ed.), *Attachment, trauma and multiplicity: Working with dissociative identity disorder* (pp. 86-106). New York: Taylor & Francis Inc.

Spiegel, D. (2001). Deconstructing the dissociative disorders: For whom the Dell tolls. *Journal of Trauma and Dissociation, 2*, 51-58.

Spitzer, C., Willert, C., Grabe, H., Rizos, T., Möller, B., & Freyberger, H. J. (2004). Dissociation, hemispheric asymmetry, and dysfunction of hemispheric interaction: A transcranial magnetic stimulation approach. *Journal of Neuropsychiatry and Clinical Neurosciences, 16*, 163-169.

Squire, L. R., Cohen, N. J., & Zouzounis, J. A. (1984). Preserved memory in retrograde amnesia: Sparing of a recently acquired skill. *Neuropsychologia, 22*, 145-152.

Steele, H. (2002). Multiple dissociation in the context of the Adult Attachment Interview. In V. Sinason (Ed.), *Attachment, Trauma and Multiplicity: Working with Dissociative Identity Disorder* (pp. 107-122). New York: Taylor & Francis Inc.

Steinberg, M. (2001). Updating diagnostic criteria for dissociative disorders: Learning from scientific advances. *Journal of Trauma and Dissociation, 2*, 59-64.

Sternlicht, H. C., Payton, J., Werner, G., & Rancurello, M. (1989). Multiple personality disorder: A neuroscience and cognitive psychology perspective. *Psychiatric Annals, 19,* 448-455.

Szostak, C., Lister, R., Eckardt, M., & Weingartner, H. (1994). Dissociative effects of mood on memory. In R. M. Klein & B. K. Doane (Eds.), *Psychological Concepts and Dissociative Disorders* (pp. 187-206). Hillsdale, NJ: Lawrence Erlbaum Associates.

Talbot, J. A., Talbot, N. L., & Tu, X. (2004). Shame-proneness as a diathesis for dissociation in women with histories of childhood sexual abuse. *Journal of Traumatic Stress, 17,* 445-448.

Taylor, M. (1999). *Imaginary companions and the children who create them.* New York: Oxford University Press.

Taylor, W. S., & Martin, M. F. (1944). Multiple personality. *Journal of Abnormal and Social Psychology, 39,* 281-399.

Tillman, J. G., Nash, M. R., & Lerner, P. M. (1994). Does trauma cause dissociative pathology? In S. J. Lynn & J. W. Rhue (Eds.), *Dissociation: Clinical and Theoretical Perspectives* (pp. 395-414). New York: The Guilford Press.

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.

van der Hart, O., Bolt, H., & van der Kolk, B. A. (2005). Memory fragmentation in dissociative identity disorder. *Journal of Trauma and Dissociation, 6,* 55-70.

van der Kolk, B. A. (1996). The body keeps the score: Approaches to the psychobiology of posttraumatic stress disorder. In B. A. van der Kolk, A. C. McFarlane, & L. Weisaeth (Eds.), *Traumatic Stress: The Effects of Overwhelming Experience on Mind, Body, and Society* (pp. 214-241). New York: The Guilford Press.

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 IJzendoorn, M. H., & Schuengel, C. (1996). The measurement of dissociation in normal and clinical populations: Meta-analytic validation of the Dissociative Experiences Scale (DES). *Clinical Psychology Review, 16,* 365-381.

Veltman, D. J., de Ruiter, M. B., Rombouts, S. A. R. B., Lazeron, R. H. C., Barkhof, F., van Dyck, R., et al. (2005). Neurophysiological correlates of increased verbal working memory in high-dissociative participants: A functional MRI study. *Psychological Medicine, 35,* 175-185.

Waller, G., Quinton, S., & Watson, D. (1995). Dissociation and the processing of threat related information. *Dissociation, 8,* 84-90.

Waller, N. G., & Ross, C. A. (1997). The prevalence and biometric structure of pathological dissociation in the general population: Taxometric and behavior genetic findings. *Journal of Abnormal Psychology, 106,* 499-510.

Waters, F. S., & Silberg, J. L. (1998). Promoting integration in dissociative children. In J. Silberg (Ed.), *The Dissociative Child: Diagnosis, Treatment, and Management* (pp. 167-190). Lutherville, MD: Sidran.

Watson, D. (2001). Dissociations of the night: Individual differences in sleep-related experiences and their relation to dissociation and schizotypy. *Journal of Abnormal Psychology, 110,* 526-535.

Watson, D. (2003). Investigating the construct validity of the dissociative taxon: Stability analyses of normal and pathological dissociation. *Journal of Abnormal Psychology, 112,* 298-305.

Williams, C. L., Haines, J., & Sale, I. M. (2003). Psychophysiological and psychological correlates of dissociation in a case of dissociative identity disorder. *Journal of Trauma and Dissociation, 4,*101-117.

Zahn, T. P., Moraga, R., & Ray, W. J. (1996). Psychophysiological assessment of dissociative disorders. In L. K. Michelson & W. J. Ray (Eds.), *Handbook of Dissociation: Theoretical, Empirical, and Clinical Perspectives* (pp. 269-287). New York: Plenum Press.

Zlotnick, C., Begin, A., Shea, M. T., Pearlstein, T., Simpson, E., & Costello, E. (1994). The relationship between characteristics of sexual abuse and dissociative experiences. *Comprehensive Psychiatry, 35,* 465-470

Zlotnick, C., Shea, M. T., Pearlstein, T., Begin, A., Simpson, E., & Costello, E. (1996). Differences in dissociative experiences between survivors of childhood incest and survivors of assault in adulthood. *Journal of Nervous and Mental Disease, 184,* 52-54.