Chapter 14

Functional Disorders of Autobiographical Memory

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INTRODUCTION

The memory disorders most commonly encountered in the clinic are those associated with some form of damage to brain tissue. The amnesic syndromes linked to lesions of the medial portions of the temporal lobes, or the diencephalon, are classic examples of the type; so is the retrograde amnesia observed following a concussive blow to the head. In other cases, however, a clinically significant amnesia appears in the absence of any obvious defect in brain structure or function. These include episodes of amnesia or fugue following emotional trauma; amnesia is also observed in cases of multiple personality disorder. Functional amnesia may be defined as a memory loss that is attributable to an instigating event or process that does not result in insult, injury or disease affecting brain tissue, but that produces more forgetting than would normally occur in the absence of that instigating event or process (Schacter & Kihlstrom, 1989).

The functional amnesias may be further divided into pathological and non-pathological types. The pathological functional amnesias are those in which amnesia is either a diagnostic symptom of mental disorder, or occurs in the context of a diagnosable mental disorder. Psychogenic amnesia, psychogenic fugue, depersonalization and derealization, and multiple personality are of this

type. Nonpathological functional amnesias are those which can be induced by psychological procedures in individuals who are free of any diagnosable mental disorder. The chief example of this category is posthypnotic amnesia, which may be induced in normal hypnotized subjects by means of a verbal suggestion (for reviews, see Kihlstrom, 1985; Kihlstrom & Barnhardt, 1993). This chapter is confined to those instances of functional amnesia most likely to be encountered in the clinic (for alternative surveys of this material, see Kihlstrom, Tataryn & Hoyt, 1993; Kopelman, 1987; Schacter & Kihlstrom, 1989; Spiegel, Frischholz & Spira, 1993).

FUNCTIONAL AMNESIA IN THE DISSOCIATIVE DISORDERS

Functional amnesia impairing autobiographical memory is a pathognomic sign in a major class of mental illnesses known as the dissociative disorders. According to the fourth edition of the *Diagnostic and Statistical Manual for Mental Disorders* (DSM-IV; American Psychiatric Association, 1994; see also Cardena et al., 1993), the dissociative disorders consist of a group of related disorders that share symptoms reflecting a disturbance in the integrative functions of memory, consciousness, and/or identity. This category of mental illness began its existence, in the first edition of the *Diagnostic and Statistical Manual* (DSM; 1952) as *dissociative reaction*, a form of psychoneurotic disorder; in the second edition (DSM-II, 1968), dissociative disorder was classified as a subtype of *hysterical neurosis*, itself a type of neurosis; the third edition (DSM-III, 1980) and its revision (DSM-III-R, 1987) abandoned reference to both neurosis and hysteria, and listed the *dissociativ2ee disorders* as a major category of mental illness. DSM-III de-emphasized the importance of amnesia in the diagnosis of dissociative disorder, but DSM-III-R returned amnesia to its rightful place. DSM-IV renames some of the syndromes (for example, the psychogenic amnesia of DSM-III-R is now dissociative amnesia, multiple personality disorder is now dissociative identity disorder), and recognizes nonpathological phenomena of dissociation, such as trance and possession states, which are encountered in non-western cultures). As an aid to clinical practitioners, this chapter adopts the diagnostic labels of DSM-IV; Kihlstrom (1994) has provided a detailed summary of the history of this diagnostic category.

Historically, three distinct forms of dissociative disorder have been widely recognized: dissociative amnesia, dissociative fugue, and dissociative identity disorder. Amnesia for all or part of one's personal history is the hallmark of each of these syndromes. In dissociative amnesia, the core symptom is an inability to remember important personal information, typically a traumatic experience. In dissociative fugue, the core symptom is confusion about one's identity, loss of identity, or the assumption of a new identity. This amounts to forgetting who one is, not just what one has done. Interestingly, the change in identity is typically accompanied by a loss of memory for events and experiences

associated with the former identity; and when the fugue state resolves, and the person reverts to his or her original identity, access to these memories is restored while autobiographical memories associated with the newly assumed identity are lost. Dissociative identity disorder resembles fugue, except that the shift between identities, and associated sets of autobiographical memories, is cyclical. It appears as if two or more separate identities exist within the same individual, alternating in control over experience, thought and action. Each of these identities (sometimes called *alter egos*, or simply *alters*) has its own fund of autobiographical memories, covering events and experiences that occurred while it was in control. Finally, the alter egos are separated by a symmetrical or asymmetrical amnesia, which may prevent one personality from knowing the actions, experiences, or even the existence of another.

Amnesia is also featured in several other forms of dissociative disorder, including those that are recent additions to the nomenclature. For example, in *ataque de nervios*, a culture-specific form of trance and possession disorder observed in Latin America, an individual under stress experiences somatic symptoms resembling panic followed by such behaviors as breaking objects or attacking other people; there is an amnesia for the episode after it has ceased (Lewis-Fernandez, 1994). Depersonalization disorder involves the sense that one's body or one's self is unreal; the person may also feel that his or her surroundings, or other people, are unreal—in which case we speak of derealization (Steinberg, 1991). The person retains his or her sense of identity in depersonalization and derealization, and presumably his or her fund of autobiographical memory as well (although this has not been systematically investigated); what is lost is the sense of familiarity—thus, as Reed (1974/1988; 1979) has noted, depersonalization and derealization are fundamentally anomalies of recognition.[1]

The importance of amnesia in the dissociative disorders is clearly indicated by the questions posed in structured clinical interviews, such as the Dissociative Disorders Interview Schedule (DDIS: Ross, 1989) and the Structured Clinical Interview for DSM-IV Dissociative Disorders (SCID-D: Steinberg, 1993; Steinberg, Rounsaville & Cicchetti, 1990) that have been developed to permit reliable diagnosis of these disorders.[2] The following extracts from the SCID-D indicate how dissociative disorders of memory and identity are assessed clinically. If the symptoms are not due to drugs, alcohol, or head trauma, positive answers contribute to the diagnosis of depersonalization, dissociative amnesia, dissociative fugue, or dissociative identity disorder. (For the full text of the structured interview and detailed instructions on scoring, see Steinberg (1993).)

> Have you ever felt as if there were large gaps in your memory? Have there ever been hours or days that seemed to be missing, or that you couldn't account for? Has there ever been a time in which you had difficulty remembering your daily activities?
>
> Have you ever found yourself in a place and been unable to remember how or why you went there? Have you ever traveled away from your home unexpectedly and been unable to remember your past?

Have you ever found yourself in a place away from your home and been unable to remember who you were? If so, did you experience any confusion or changes in your usual identity?

Have you ever been unable to remember your name, age, address, or other important personal information?

Have you ever felt as if there was a struggle going on inside of you? Have you ever felt as if there was a struggle going on inside you about who you really are? Have you ever felt confused as to who you are?

Have you ever felt as if, or found yourself acting as if, you were still a child? Have you ever acted as if you were a completely different person? Have you ever been told by others that you seem like a different person?

Have you ever referred to yourself (or been told by others that you referred to yourself) by different names? Have other people referred to you by different names?

Have you ever found things in your possession that seemed to belong to you, but you could not remember how you got them?

Have you ever felt as if you were possessed or controlled?

Has your mood ever changed rapidly, without any reason? Have you ever experienced (or been told of) rapid changes in your capabilities, or ability to function?

Have you ever felt as if you were living in the past, or reliving the past as though it were occurring in the present?

Do you ever talk to yourself or have ongoing dialogues with yourself? Are these dialogues similar to hearing voices or to thoughts? Does it feel as if they occur inside your head?

FUNCTIONAL AMNESIA AND THE STRUCTURE OF MEMORY

In view of these diagnostic questions, it is apparent that the memory impairment observed in the dissociative disorders covers a very broad spectrum. First and foremost, the dissociative disorders are marked by impairments in *episodic memory*. Episodic memory concerns people's knowledge of particular events that they themselves have experienced; it is inherently autobiographical (Tulving, 1983). A full-blown episodic memory describes an event that has occurred in the past, but it also makes reference to the spatiotemporal context—the time and place—in which that event took place; it also necessarily makes reference to the self as the agent or experiencer of the event in question. By contrast, *semantic memory* consists of generic knowledge about the world; with respect to oneself, it includes knowledge of one's own name, residence, occupation, family mem-

bers, and other information that is not contingent on its association with a particular time and place; this self-referent semantic memory is tantamount to one's identity (Kihlstrom & Klein, 1994).

Considerations of the episodic–semantic distinction help to organize the subtypes of dissociative disorder. In pure cases of dissociative amnesia, there is a loss of episodic, but not of semantic, memory, about oneself. People forget what they did, or what happened to them, during a specified period of time; but they do not forget who they are. In most cases the amnesia is reversible, and access to the autobiographical memories covered by the amnesia is eventually restored. In dissociative fugue, there is a loss of self-referent semantic memory as well as of episodic memory: these patients forget who they are, as well as what they have done. If the patient assumes a new identity, a new set of autobiographical memories becomes associated with the new mental representation of self. When the fugue is resolved, and the new identity is lost, the associated autobiographical memories are lost as well. Something similar happens in dissociative identity disorder, except that there is a kind of alternation or exchange of identities and associated autobiographical memories. While the dissociative disorders involve profound impairments of autobiographical memory, and of self-referent semantic memory, other knowledge stored in memory appears to be relatively unimpaired. The individual's fund of world knowledge (non-self-referent semantic knowledge), and repertoire of cognitive and motoric skills (procedural knowledge) remain intact.

The Case of Mary Reynolds

Occasional case reports of dissociative identity disorder suggest that procedural knowledge also shifts with identity and episodic memory. For example, in the case of Mary Reynolds (James, 1890, pp. 359–363; see also Carlson, 1984; Kihlstrom, Tataryn & Hoyt, 1993), the first shift from her usual identity (which we will call Mary 1) to an alter ego (Mary 2) was accompanied by a virtually complete loss of declarative and procedural memory:

> Memory had fled. To all intents and purposes she was as a being for the first time ushered into the world. "All of the past that remained to her was the faculty of pronouncing a few words, and this seems to have been as purely instinctive as the wailings of an infant; for at first the words which she uttered were connected with no ideas in her mind." Until she was taught their significance they were unmeaning sounds.

However, for the most part this knowledge was quickly reacquired:

> The first lesson in her education was to teach her by what ties she was bound to those by whom she was surrounded, and the duties devolving upon her accordingly. This she was very slow to learn, and "indeed, never did learn...." The next lesson was to re-teach her the arts of reading and writing. She was apt enough, and made such rapid progress in both, that *in a few weeks* she had readily re-learned to read and write...(emphasis in the original).

Interestingly, there was apparently no further loss of semantic or procedural knowledge upon later shifts between personalities.

Although Mary 2 was thoroughly ignorant of the experiences, activities and knowledge of Mary 1, occasionally this information seemed to leak through the amnesic barrier. On one instance, for example, Mary 2 was prevented by her family from attending church services (about which she displayed no knowledge, in any event). That night she had a dream in which her dead sister led her towards a crowd, to which another figure read from a large book. The verses which Mary 2 quoted from memory the next morning were, of course, familiar passages from the Bible (of which Mary 2 claimed complete ignorance). The dead sister also appeared in other dreams reported in the second state, although Mary 2 never recognized her or acknowledged that she had once had a sister.

The marked savings in relearning displayed by Mary Reynolds, and the appearance of scenes known to her first identity in dreams reported by her second, are both reminiscent of the distinction between explicit and implicit memory familiar in studies of the organic amnesic syndromes (Schacter, 1987; Schacter, Chiu & Ochsner, 1993). Explicit memory refers to the individual's conscious recollection of a past event, as reflected in recall and recognition, while implicit memory refers to changes in the person's experience, thought or action that are attributable to an event, independent of conscious recollection. The explicit–implicit distinction, originally formulated in the context of episodic memory, can be extended to other domains as well (e.g. Kihlstrom, Mulvaney & Tobia, in press; Kihlstrom, Barnhardt & Tataryn 1992; Schacter et al., 1990). In the case of Mary Reynolds, savings suggest that much of her nonepisodic knowledge, semantic and procedural, was retained in storage and expressed implicitly, even though it was temporarily inaccessible to conscious retrieval.

One of the most interesting features of the functional amnesias concerns discrepancies between explicit and implicit expressions of autobiographical memory. To what extent do the memories lost to conscious recollection remain dynamically active? Unfortunately, despite all the attention currently being paid to the dissociative disorders, little systematic experimental work has been performed to investigate the disruptions of memory and identity that lie at their core. The review that follows is gleaned from those relatively few cases that have been studied quantitatively from the point of view of memory: we wish to underscore that this area is ripe for collaboration between researchers and clinicians. As knowledge accumulates, many of the generalizations made here may have to be altered.

DISSOCIATIVE AMNESIA AND FUGUE

In principle, dissociative amnesia and dissociative fugue should be easy to distinguish. The defining feature of dissociative amnesia is the loss of episodic

memory; dissociative fugue also entails amnesia, but involves a change in identity (and sometimes physical relocation) as well.

In fact, however, the boundaries between amnesia and fugue are blurred. For example, Nemiah (1979) distinguished three forms of psychogenic amnesia: *systematized*, covering only specific events and related material; *localized*, covering a period of hours or weeks; and *generalized*, covering the person's entire life; in this last instance, amnesia obviously verges on fugue. For good measure, Fisher (1945; Fisher & Joseph, 1949) distinguished three types of fugues: amnesia with change in identity and relocation; amnesia with loss but no change in identity; and a reversion to an earlier period of one's life, with an amnesia covering one's life history subsequent to that period; this last type verges on amnesia, completing the circle.

Except for cases of very limited (and probably very transitory) amnesia, it appears that most psychogenic losses of autobiographical memory are associated with some alteration of identity. Of course, this is an empirical question, and deserving of systematic research in the future. For the present, amnesia and fugue are usually treated together, sometimes under the label of *functional retrograde amnesia* (Schacter & Kihlstrom, 1989; for other reviews, see also Keller & Shaywitz, 1986; Loewenstein, 1991).

Clinical Description

Dissociative amnesia, regardless of whether it is accompanied by fugue, is typically retrograde in nature, usually covering the precipitating incident and events that occurred previously. In the classic instance, the amnesia covers some traumatic event, such as physical or sexual assault, combat, or natural disaster. In other cases it covers an extended period of time leading up to the trauma. It has been claimed that dissociative amnesia frequently occurs in association with post-traumatic stress disorder (PTSD; see Herman, 1992); sometimes it is observed in the perpetrators as well as the victims of crimes (Schacter, 1986). There may be some element of anterograde amnesia as well, covering the period beginning with the trauma and ending about the time that the patient comes to clinical attention—perhaps it is at this point that the patient discovers he or she is amnesic, and seeks help. Continuous functional anterograde amnesias, resembling the organic amnesic syndromes, are rare—although Janet (1893) reported a case in which memory of the traumatic event was preserved intact, while the patient was unable to remember events that occurred subsequently.

Recovery from dissociative amnesia and fugue has not been well studied, but appears to proceed in stages. Typically patients are discovered when they spontaneously become aware of their memory deficit, or when they fail to respond appropriately to questions (e.g posed by police or medical personnel) about their identity, background and recent activities. Most dissociative amnesias and fugues resolve spontaneously, or when the patient is identified indepen-

dently and brought into contact with family and friends. In some cases the patient recovers his or her memory and identity suddenly; in other cases, memory returns more gradually, often with other people helping to fill in the gaps. Sometimes there is an intermediate stage where the person first comes to appreciate his or her loss of memory and identity, and then regains it. When the amnesia resolves, and the patient has recovered those memories that were previously lost, he or she is frequently left with an amnesia covering the episode itself.

The Case of Sharon

A representative case of amnesia and fugue is that of Sharon, a 34-year-old woman who was found lying unconscious, naked, and near starvation in a park, her skin covered with sores and rat bites (Eisen, 1989). She could not identify herself, nor could she give an account of how she came to be in the park. After seven months of hospitalization, media exposure led to her identification by, and reunion with, her family, whom she accepted as her own but did not actually recognize. During subsequent hypnotherapy, Sharon recovered her identity and pre-fugue memory, as well as memories of the fugue state itself. After a difficult life with her family of origin, Sharon had graduated from high school and taken an office job. She was seduced by her supervisor, who was married, and eloped with him to live in another state. After eight years, all contact with her family ceased. Five years after that, a period in which she was held virtually a prisoner in her house, she apparently escaped—later to be found in the park.

Over the years, a number of case series of amnesia and/or fugue have been reported. Dissociative amnesia and fugue are rare, with a reported incidence ranging from less than 1% (Abeles & Schilder, 1935) to less than 2% (Kirshner, 1973) among psychiatric patients. Sometimes the episode is instigated by a clearly traumatic event, or an extremely stressful environment. For example, Sargent and Slater (1941) found amnesia in over 14% of a consecutive series of combat soldiers hospitalized during the Second World War. Fully 35% of those exposed to the most extreme combat stress had amnesia for their experiences, compared with 6% amnesic among those whose experiences had been "trifling". About 25% of the cases had suffered head injury, but this was deemed insufficient to account for the memory disorder. Trauma, abuse, deprivation, and neglect often figure prominently in the childhood histories of these patients, although it should be noted that this information is usually based on retrospective self-reports, and is therefore not necessarily valid.

Experimental Studies of Memory in Amnesia and Fugue

Although there are many vivid clinical descriptions of dissociative amnesia and fugue, few cases have been subject to formal analysis using experimental techniques developed in the laboratory. One of the reasons is the difficulty of

catching such cases before they have been resolved, and the amnesia has reversed. Still, a few attempts have been made, and these provide models of the sorts of investigations that should be attempted as the opportunity arises.

The Case of P.N.

This 21-year-old-male was hospitalized complaining of back pain (Schacter, Wang, Tulving & Freedman, 1982), at which time he realized that he could not identify himself or remember anything of his past. However, he knew where he was and the names of prominent persons in contemporary sports and politics; he also had an island of memory for a period when he had worked as a courier. The patient was identified through media coverage, although he did not immediately recognize his family members. Neurological examination was unremarkable, except that a myelogram revealed a herniated disk, which was successfully treated by laminectomy. The fugue episode, which had apparently begun four days earlier following the funeral of P.N.'s grandfather, resolved the next evening.

During the amnesic period, and again three weeks after recovery, P.N. completed two formal tests of memory function, and his performance was compared with that of a control subject matched for age, gender, education and IQ. In the first test, he was asked to recognize the faces of individuals who became famous during the decades from 1920 to 1979. His performance on this task was approximately equal to that of the control patient; most important, there was no change between testing sessions. In the second, P.N. was presented with a common English word, and asked to recall a personal experience related to that cue. When recall was unconstrained with respect to temporal epoch, only a small minority of P.N.'s memories came from the period of time prior to the onset of the fugue; by contrast, the vast bulk of the control subject's memories came from a comparable period. When forced to recall events from the period covered by the fugue, P.N. could do so, although most of these events came from his island of memory; his response latencies were much longer than the control subject's. After the fugue resolved, P.N.'s performance in both conditions was comparable to the control's, and there was no bias towards events located in his previous island of memory.

The Case of Patient K

Most dissociative amnesias are content-specific and time-general, affecting a broad swath of autobiographical memory and (at least sometimes) personal identity. Thus, the memory deficit typically covers material that is directly self-relevant. However, two very interesting cases have been reported in which the content of the amnesia is quite general, but the period of time covered by it is very specific (Treadway, Cohen, McCloskey & Gordon, 1992). Patient K, a 53-year-old-male, was electrocuted in a household accident in 1984; when he regained consciousness, he thought the year was 1945, and that he was 14 years

old and resided in his hometown. He did not recognize his wife and children, and he had no awareness that his father had died. His last memory was of being hit on the head with a baseball bat in August 1945. Eight years later, in 1992, the amnesia still had not remitted, and patient K still perceived himself as a 14-year-old boy (and was quite surprised when he saw himself in the mirror every morning!). In addition to his autobiographical memory, patient K also lost a number of adult skills, such as shaving, driving and operating various electronic devices. When tested with techniques similar to those employed with P.N., patient K showed excellent memory for famous people and public events up to 1945, but none for persons and events who became famous afterwards.

The Case of Patient F

Patient F, a woman also studied by Treadway et al. (1992), showed similar features. In 1976, at age 39, she suffered a large coronary aneurism; upon regaining consciousness, she thought the year was 1960 and she was 23 years old. She remembered that she was married and had three children, but she identified them as two to five years old when in fact they were aged 16 to 19; she had no knowledge of her fourth child, and she described as new the house in which she had lived for 16 years. Like patient K, patient F had excellent memory for famous persons and events up to 1960, but not afterwards. She did not know how to operate a dishwasher acquired sometime after 1960. There was little or no remission of this amnesia over the next 16 years. Interestingly, in both cases the amnesia effectively blotted out a stressful period in the patients' lives, and returned them to happier times. Patient K's personal and family life took a dramatic turn for the worse in September 1945, and again in 1984; patient F was under considerable stress in 1961, and went through a major family crisis in 1976.

These cases illustrate how the systematic application of techniques derived from the experimental laboratory can shed light both on the nature of the individual case and on general principles of memory organization and function.[3] For example, Treadwell et al. (1992) argue from patients F and K that autobiographical memory is organized around landmark events that define major epochs in a person's life. Loss of access to the landmark events entails loss of everything in between—much as in a verbal-learning experiment, where forgetting tends to occur within conceptual categories. P.N. illustrates another form of landmark: during the time of his fugue, he retained an island of memory defined by his employment as a courier. The importance of such landmarks in organizing autobiographical memory deserves further investigation, in both patients and normals.

Explicit and Implicit Memory During Fugue

By definition, amnesia and fugue entail impairments of explicit memory: these patients cannot consciously recollect who they are or what they have been doing.

The question arises, then, whether they have any implicit memory for such information. In other words, are there aspects of their experience, thought and action that are affected by events, and other information, which they cannot consciously remember? Of course, dissociations between explicit and implicit memory are commonly observed in cases of organic amnesia. Unfortunately, except for a few studies of dissociative identity disorder (discussed below), there is no experimental evidence on this question. However, several individual case reports of amnesia and fugue do suggest that the answer is affirmative: this is clearly a matter deserving more experimental attention.

An early illustration of an explicit–implicit dissociation is Janet's (1904) case of Madame D. She was treated for an amnesia (without fugue or loss of identity) whose onset followed a stranger's report, later proved false, that her husband had died (for a secondary account, see Prince, 1906, pp. 257 ff. and Appendix E). She had intact autobiographical memory up until Bastille Day of that year (perhaps another landmark forming a boundary between memory and amnesia), but no memory for the six weeks between the holiday and the hoax. Nevertheless, she had dreams about the episode at night—day residues that are clear evidence that memory for the episode was retained and dynamically active. Similar hints are found in James's (1890) famous case of Ansel Bourne, an itinerant preacher who during a fugue was known as A.J. Brown, a storekeeper (for an alternative account, see Kenney, 1986). First, note the similarity in first and last initials: A. Bourne and A. Brown. Moreover, A.J. Brown was a devoted churchgoer, a habit perhaps carried over from his life as Ansel Bourne; and once during services gave testimony about a religious conversion he had experienced as Bourne, while attributing it to his life as Brown.

More recent case studies also provide tantalizing evidence of explicit–implicit dissociations affecting identity and autobiographical memory. Thus, patient P.N. referred to himself as "Lumberjack", a nickname bestowed on him during the period covered by his amnesia, without any apparent awareness of the origins of the moniker (Schacter, Wang, Tulving & Friedman, 1982). Another man, who fell amnesic after murdering his wife, showed a specific deficit in recognizing women's names and faces (Gudjonsson & MacKeith, 1983). Patient Jane Doe, unable to identify herself or give any helpful information, was asked on several occasions to dial a telephone randomly: she dialed the same number consistently, which proved to be her mother's (Lyon, 1985). Patient M.R., a victim of homosexual rape, gave a large number of sexual responses to the Rorschach inkblots; he also became distressed, and attempted suicide, after viewing card 18BM of the Thematic Apperception Test, which can be interpreted as depicting one person attacking another from behind (Kaszniak, Nussbaum, Berren & Santiago, 1988). Patient C.M., a rape victim studied by Christianson and Nilsson (1989), became upset when returned to the scene of her assault (without recognizing its significance); she also reported the intrusion of the words "bricks" and "bricks and the path" into her stream of consciousness—again, without any awareness that she had actually been assaulted on a path constructed from crumbled bricks; her amnesia remitted when she went jogging on a road whose texture resembled that of the road on which she had been jogging

when attacked. In each case, the patient's behavior is clearly attributable to some feature of an event covered by his or her amnesia.

Implicit memory can also be expressed through psychophysiological responses. In a study of organic amnesics, Bentin, Moscovich and Heth (1992) found differential P300 components in the event-related potentials elicited by items from a studied wordlist, compared with controls, even though none of the list items was recalled. However, an early case study of dissociative amnesia revealed no such differences (Wiggins, Lombard, Brennan & Heckel, 1964). The patient was amnesic for a period beginning on New Year's Day (another landmark?), shortly before he resigned from his job and embarked on a financial venture of dubious legality. When questioned about his activities during the period covered by the amnesia (which had been uncovered independently), he showed no differential electrodermal responses to critical and neutral questions. On the other hand, Gudjonsson (1979) employed electrodermal responses to determine the month in which the amnesic patient P had been born, her age, primary school, and the road on which she had lived as a child; from this information the patient was tentatively identified. Although she rejected the identity as unfamiliar, she also gave differential electrodermal responses to that name, compared with other names selected from the records of her probable primary school. In a later account of this same patient, renamed Miss Blank, Gudjonsson and Hayward (1982) found elevated levels of voice stress when her Rorschach responses had death themes, even though she had no awareness that her fugue had followed a suicide attempt.

DISSOCIATIVE IDENTITY DISORDER

Dissociative identity disorder, more popularly known as *multiple personality disorder* (MPD), is one of the most dramatic of all psychopathological syndromes. Not only does the patient exhibit, in alternation, two or more radically different identities, with correspondingly different personalities and autobiographical memories; but these alter egos are also separated by an amnesic barrier such that one or more of the alter egos appears to be unaware of the experiences, thoughts and actions of the others. Once considered to be very rare (Sutcliffe & Jones, 1962; Taylor & Martin, 1944), this syndrome is now diagnosed with considerable frequency, raising concerns that many cases are the product of iatrogenesis and cultural suggestion (for other reviews, see Bliss, 1986; Kihlstrom, Tataryn & Hoyt, 1993; Kluft, 1991; Putnam, 1989; Ross, 1990; Schacter & Kihlstrom, 1989).

Clinical Description

Dissociative identity disorder resembles fugue in that the fate of autobiographical memory is closely related to the individual's identity, but there is an

alternation among identities, with corresponding changes in the accessibility of autobiographical memory. In a series of 100 cases (Putnam et al., 1986), the mean number of alter egos was 13—a figure that may be inflated by the application of DSM-III criteria for multiple personality disorder, which do not require evidence of interpersonality amnesia; evidence of interpersonality amnesia was obtained in 98 of the cases, but that does not mean that within every case, some form of amnesia separated every alter ego from at least one other alter ego. The situation is complicated, however, by the fact that the amnesia is often asymmetrical. For example, in the classic case of Miss Beauchamp (Prince, 1906; see also Rosenzweig, 1987, 1988), in which there were four identities, the alter ego known as BI (the original Miss Beauchamp, also called "the Saint" by Prince) was largely ignorant of BII (BI when hypnotized), BIII (Sally, "the Idiot"), or BIV ("the Realist"); BII knew about BI and BIV, but not BIII; and BIII knew about BIV but not BI or BII. BIV knew nothing about BI, BII or BIII.

Moreover, the amnesia may be incomplete. In examining Miss Beauchamp, Prince found that fragments, or abstract representations of certain memories seemed to leak through the amnesic barrier, allowing one alter ego to refer to events and experiences known to another. Prince (1906, pp. 253ff) described three classes of such intrusions, permitting BIII to access knowledge associated with BI, even though BIII was ordinarily unaware of BI's existence or autobiographical record:

- Spontaneous memory flashes, in which one alter ego remembered something that belonged to the autobiography of another (similar to A.J. Brown's reference to an event in the life of Ansel Bourne as if it were his, Brown's, own)
- Phenomena of abstraction, in which one personality employed a kind of self-induced hypnosis to access the memories of another
- Visions, apparently similar to flashbulb memories (Brown & Kulik, 1977; Winograd & Neisser, 1992), representing isolated scenes.

Similar phenomena breached the amnesia of BIV for the life of BI.

Experimental Studies of Memory in Dissociative Identity Disorder

As with dissociative amnesia and fugue, it is remarkable how seldom the amnesia in dissociative identity disorder has been studied with techniques derived from the laboratory study of memory. In the cases of dissociative identity disorder the absence of formal experimentation is particularly unfortunate, because the amnesic barrier between identities raises so many interesting questions about the organization of autobiographical memory. Can the clinical impression of symmetrical or asymmetrical amnesia be verified with laboratory techniques? To what extent is autobiographical memory and other knowledge

shared implicitly between personalities? To what extent are autobiographical memories linked to specific mental representations of the self as the agent or experiencer of the events in question? Only a few cases have received experimental analysis with these sorts of questions in mind.[4]

The Case of I.C.

One approach to these questions involves sampling autobiographical memory in each alter ego. The sole published example of this type is the experimental case study of patient I.C. reported by Schacter, Kihlstrom, Canter Kihlstrom and Birren (1989). This patient, who in ordinary life was an extremely high-functioning woman 24 years of age, married with one child, presented with four alter egos in addition to I.C., her normal personality: Heather, Joan, Gloria and Alpha. All four alter egos were aware of each other and of I.C.; I.C. had no awareness of any of the others. The experiment involved the recall of autobiographical memories cued by common words, in a manner similar to patient P.N., the case of functional retrograde amnesia studied by Schacter et al. (1982); she also completed a survey of early childhood recollections. In both instances, her performance was compared with that of control groups totaling 30 age-matched, normal women.

In an unconstrained version of the autobiographical cueing task, I.C. was presented with the cues and asked to recall related episodes from any time in her life. Like the controls, she showed a recency bias, preferring to recall events from the immediately past year; however, this bias was much stronger in I.C.: 67% of her memories were dated within the past year, compared with only 44% for the controls; and 96% of her memories were dated within the past 10 years, compared with only 64% for the controls.

I.C. recalled only a single memory more than 10 years old (i.e. dating from age 14 years or earlier). This memory came from when she was 12 years old. By contrast, the controls recalled more than 36% of their memories from a comparable period in their lives. In a second phase, the cues were repeated, with the constraint that the memories retrieved had to be of events occurring before age 12: in this case, she was able to produce memories to only 21% of the cues, compared with 86% for the controls; all of these memories were of events occurring between ages 10 and 12. In a third phase, employing a new set of cues, memory was constrained to the years prior to age 10: I.C. failed to produce even a single memory, whereas the controls produced memories to almost 90% of the cues. Her earliest recollection was dated at age 12, compared with age 4 for the controls (see also Kihlstrom & Harckiewicz, 1982).

When compared with age-matched controls, then, I.C. showed a striking recency bias, accompanied by a profound deficit in memory for her childhood experiences. The recency bias seems explicable in terms of the anchoring effect of a landmark event: her first hospitalization for MPD had occurred only a year earlier. The deficit in childhood memory is more puzzling. In line with recent speculations about the origins of dissociative disorder in childhood histories of physical and sexual abuse (for which, again, the primary evidence is retrospec-

tive self-report, and thus of uncertain validity), it is possible that this entire period of I.C.'s life had been repressed. On the other hand, while there was some evidence of sexual abuse in I.C.'s life, there were reasons to think it had begun in adolescence, not childhood. This raises the possibility that, contrary to appearance, I.C. was not the patient's original personality at all, but rather an alter ego that began to emerge in late childhood or early adolescence. Thus, there were no autobiographical memories associated with this particular mental representation of self. Evidence bearing on this speculation might have been provided by repeating the experimental procedures with other alter egos, but this was not possible at the time, and the patient has since been lost to follow-up.

The Case of Jonah

The pioneering experimental case study of amnesia in multiple personality was reported by Ludwig et al. (1972). In this case, a 27-year-old man presented with four personalities: Jonah, Sammy, King Young, and Usoffa Abdullah. Jonah was amnesic for the other three, each of whom had full knowledge of his experiences and limited awareness of each other. During Jonah's hospitalization, Ludwig et al. performed a series of laboratory tests to document and explore this pattern of amnesia. For example, Jonah could not recall paired associates taught to other personalities, although they could each remember items taught to Jonah; moreover, neither Sammy, King Young nor Usoffa were able to recall items taught to either of the other two alter egos. A similar pattern of performance was observed when measuring electrodermal responses to emotion-laden words selected as distinctly meaningful to each personality. Thus, Sammy, King Young and Usoffa responded differentially to their own words, and to Jonah's, but not to each other's; Jonah responded only to his own words.

In both of these procedures, the responses are consistent with the pattern of symmetrical awareness and memory evident on clinical examination. However, other tasks seemed to indicate that the amnesic barrier was to some extent permeable. Thus, when one personality was asked to learn (as opposed to merely recall) the paired-associates learned by another, the second personality showed considerable savings compared with the first one. Similar interpersonality savings were shown on the block-design subtest of the Wechsler Adult Intelligence Scale (Jonah, tested first, received the lowest score on this test; King Young, tested last, received the highest score), and on the logical memory subtest of the Wechsler Memory Scale (the first personality tested with a particular story remembered the fewest items, while the last personality tested remembered the most). Conditioned emotional responses (with shock US signalled by a different CS in each personality) established in one personality transferred to the others, with one major exception: Usoffa, the personality which showed the greatest difficulty in conditioning, showed the least transfer to and from the other personalities.

Ludwig et al. (1972) interpreted their results in terms of the emotional valence of the stimulus material: affectively neutral material generalized among

all the personalities, while affectively charged material transferred from Jonah to the others, but not the reverse. However, as the investigators themselves noted, this interpretation was somewhat strained, as it is hard to see the emotional significance of some tasks, such as paired-associate learning, logical memory and block design, where evidence of transfer was obtained. In retrospect, the pattern of results seems to indicate a set of dissociations between explicit and implicit memory: Jonah lacks conscious recollection of the experiences of the other personalities, although the other personalities have conscious recollection of Jonah's experiences—an asymmetrical amnesia; but when the memory task does not require conscious recollection, the amnesic barrier is breached, and one personality can show changes in behavior that are attributable to events experienced by another.

A Series of Cases

The distinction between explicit and implicit memory is also helpful in understanding the results of a study of nine patients reported by Silberman et al. (1985). The patients were selected in such a manner that each had at least two alter egos that were mutually amnesic; 10 normal subjects served as controls. Each individual was presented with four matched wordlists, two to each alter ego. The hypothesis was that within each alter ego the lists would show mutual interference, reducing recall; across alter egos, the amnesic barrier would reduce interlist interference. However, this was not the outcome: although each alter ego denied awareness of its counterpart's learning experiences, retroactive and proactive interference was not reduced between, as compared to within, alter egos (in fact it was increased, but that may have been an artifact of an anomaly in the procedure).

Interestingly, recognition was excellent in terms of the subjects' ability to distinguish between items that had been presented to any personality versus those that were entirely new; however, the alter egos were unable to discriminate between items that had been presented to themselves and those that had been presented to their counterparts; that is, each alter ego showed a form of source amnesia (Evans, 1979; Evans & Thorn, 1966; Schacter, Harbluk & McLachlan, 1984; Shimamura & Squire, 1987), in which they were able to remember items but unable to indicate the circumstances under which they had been encountered. Silberman et al. (1985) concluded that the dissociation between alter egos was incomplete, permitting memory to transfer from one to the other. However, since both interference effects and source amnesia are implicit expressions of memory, another interpretation is that the dissociation between alter egos affects explicit memory but not implicit memory.

The Case of Margaret

The explicit–implicit distinction is also relevant to a case reported by Dick-Barnes, Nelson & Aine (1987), in which there were three identities separated by

an asymmetrical amnesia: Margaret was unaware of either Rachel or Dee, though Rachel and Dee were both aware of each other and Margaret. Both a verbal learning task and a pursuit-rotor learning task showed evidence of interpersonality transfer. Pursuit-rotor learning, as an instance of skill acquisition, involves an implicit expression of memory: one does not require conscious recollection of the learning experience in order to display a cognitive or motor skill. In this study, the same pursuit-rotor task was learned by all subjects, and the savings in learning shown across alter egos were similar to the savings shown by Jonah on block-design.

Interpretation of the verbal-learning task in terms of explicit versus implicit memory must remain tentative. At the time of study, each alter ego was presented with a separate list of paired associates, until a criterion of learning had been reached; at the time of test, each alter ego was presented with the stimulus terms, and asked to provide the response. Ordinarily, such a test would count as explicit memory. However, it is now generally understood that every memory task has both explicit and implicit components to it. In particular, performance on paired-associate learning can be influenced by priming of the association between cue and target, independent of conscious recollection. In this case, the interpersonality transfer of learning may have been mediated by such priming effects. If so, the outcome would count as evidence of implicit, rather than explicit, memory.

The Case of Alice

Although the results of the foregoing studies are interpretable in terms of the distinction between explicit and implicit memory, none of them were designed with this distinction in mind. To date, the lone published study which has this feature was reported by Nissen et al. (1988). In this case, a woman presented with 22 alter egos, of which eight were subjected to formal testing. Although the pattern of interpersonality amnesia was somewhat complicated, most of the eight alter egos had no awareness of, or memory for, the others. This clinical observation was confirmed by two studies of explicit memory: the paired-associate learning test of the Wechsler Memory Scale and a test of Yes–No recognition for a list of words. In both cases, one alter ego failed to remember items that had been presented to another personality.

As expected, several tests of implicit memory gave evidence of interpersonality transfer: forced-choice recognition (which can be mediated by priming effects), repetition priming in perceptual identification and in word-fragment completion, sequence learning in serial reaction time, and proactive interference in paired-associate learning. Thus, when presented with a word quickly followed by a masking stimulus, one personality was more likely to identify the item if it had previously been presented to another personality. As another example, one personality found it easier to complete difficult word fragments (such as $a \_ \_ a$ $\_ \_ in$) when the target word had previously been studied by another personality. On the other hand, several other tests of implicit memory gave contrary

findings: successive story recall, repetition priming in stem completion, interpretation of ambiguous texts and sentences. For example, there were no priming effects when subjects were asked to complete three-letter stems with legal English words.

To some extent, the dissociation between explicit and implicit memory observed in this patient is consistent with inferences derived from the other cases; but the dissociation among measures of implicit memory is puzzling. Of course, there are differences in the cognitive requirements of the various tasks, even between such formally similar tasks as word-fragment completion (in which there is only one possible correct response) and word-stem completion (in which there are many possible correct responses). Such differences have been observed to affect the performance of normal subjects on implicit memory tasks (Roediger, 1990), and they probably affect the performance of dissociative disorder patients as well. For now, however, investigators interested in implicit memory between alter egos are advised to employ multiple measures of both explicit and implicit memory in their studies. They should also employ multiple patients, after the manner of Silberman et al. (1985), in order to assess the generalizability of experimental results.

The Case of Ms A

Although the report by Nissen et al. (1988) provides the clearest test to date of the hypothesis that implicit memory is spared in multiple personality disorder, all of the cases reviewed involve laboratory tests of memory, and thus lie at some distance from the problem of everyday autobiographical memory in these patients. This regrettable situation is perhaps necessary, insofar as proper experimental studies of memory require rigorous control over the conditions of encoding and retrieval. Even so, the possibility of conducting laboratory studies of explicit or implicit memory for events in the real world outside the laboratory is raised by a study conducted by Loewenstein and his colleagues, involving the technique of experiential sampling in a woman who initially presented with five, and later 21, alter egos (Loewenstein et al., 1987). In this study, the investigators outfitted the patient with an electronic pager which prompted her to fill out a diary recording such information as the time and place, which personality was in control at the moment, whether a switch in personality had occurred since the last signal, other individuals present, activities, and ratings of current mood and physical symptoms. These instructions were given to all 21 alter egos, although in the final analysis four of the personalities accounted for the bulk of responses to the pager. The resulting log provides a unique "online" record of the alternating personalities in dissociative identity disorder, and their activities and experiences. Unfortunately, none of this information was used in a study of interpersonality memory and amnesia—except that reports of lost time or amnesia were used to infer personality switches between signals. However, the potential value of such a study is obvious, and investigators with an interest in

this syndrome are encouraged to consider the experiential sampling technique when designing future memory experiments.

NONDISSOCIATIVE FUNCTIONAL AMNESIA

The functional amnesias are almost wholly identified with the dissociative disorders, a diagnostic category which itself is identified with a hypothetical process called dissociation.[5] The first theoretical explanation of dissociation was presented by Janet (1889, 1907) in his descriptive and theoretical accounts of hysteria (for a secondary account see Ellenberger, 1970; for updated versions of dissociation theory, see Hilgard, 1977/1986; Kihlstrom, 1992). Janet analyzed mental life into a large number of content-specific elementary structures, called psychological automatisms, which combine perception and action. Ordinarily, Janet believed, the individual's repertoire of psychological automatisms is bound together into a single unified stream of consciousness. But in periods of stress a particular automatism, or set of related automatisms, could be split off from the rest, continuing to function but isolated from conscious awareness and voluntary control. Thus, dissociated psychological automatisms continued to influence experience, thought and action, but did so subconsciously, as hysterical accidents.

Janet held that the essential characteristic, or stigma, of hysteria was a narrowing of the field of consciousness, construed as analogous to the distinction between central and peripheral visual fields. In dissociative amnesia and fugue, and in the amnesia of dissociative identity disorder, the memories in question have been barred from conscious access; nevertheless, the critical memories have been well encoded and remain available in storage. Accordingly, these amnesias may be reversible, and even if they are not memory for the events covered by amnesia may be expressed implicitly in the person's ongoing experience, thought, and action outside of awareness. As such, the classical functional disorders, whose underlying mechanism is described as dissociative, may be construed as disorders of memory retrieval.

It is important to note that the functional disorders of memory are not necessarily dissociative in nature, and they do not necessarily reflect a disruption of memory retrieval. For example, some functional amnesias may reflect a mechanism of repression rather than dissociation (Rapaport, 1942; for coverage of the recent literature, see Singer, 1990). Both repression and dissociation reflect a lack of conscious accessibility to certain memories; in principle, both are reversible, and thus would seem to reflect disruptions in retrieval. In the case or repression, however, the memories in question are affect-laden, and are excluded from consciousness for purposes of defense against anxiety; dissociation, by contrast, can affect any sort of memory, positive and neutral as well as negative, and is not defensive in nature. While repression is the cornerstone of

Freud's psychoanalytic theory, it is not associated with particular psychiatric syndromes as dissociation is: there is no group of "repressive disorders" listed in DSM-IV. But repression has been implicated in the memory disorders of individuals suffering from post-traumatic stress disorder (Herman, 1992), and certainly deserves further investigation as a memory mechanism.

Of course, traumatic stresses can induce amnesia by means other than repression—although the evidence from both field and laboratory studies indicates that memory for peripheral, rather than central, details of the episode will be lost (Christianson, 1992a; Christianson & Nilsson, 1989, 1992; for a review of the effects of emotion on memory, see Christianson, 1992b). Rarely does the amnesia cover the entire event. To the extent that the forgetting qualifies as amnesia, however, it is clearly functional in nature: the forgetting occurs in the absence of any insult, injury or disease affecting brain tissue. The commonest interpretation of these memory deficits is in terms of the Yerkes–Dodson Law or its updated version, the Easterbrook cue-utilization hypothesis (Anderson, 1990; Neiss, 1988, 1990; Christianson, 1992a). Yerkes and Dodson (1908) proposed that increases in arousal from low to moderate to high levels initially increase, and then decrease, performance. Easterbrook (1959) hypothesized that increasing arousal progressively decreased the amount of attention devoted to events, thus impairing the processing of first peripheral, and then central, information. In either case, very high levels of arousal would have the effect of decreasing the resources devoted to information-processing at the time of encoding, resulting in a permanent deficit in memory (one ambiguity in these proposals is that they would seem to predict amnesia for highly arousing *positive* as well as negative events).

Interestingly, it appears that while high arousal has deleterious effects on memory shortly after the target event, memory for that event may be improved over long retention intervals (Revelle & Loftus, 1992). This phenomenon, sometimes known as *reminiscence*, would appear to contradict the idea that arousal-induced amnesias are permanent, and deserves further study.

Emotional states other than fear can produce functional amnesias. For example, Ellis and Ashbrook (1988; see also Ellis, 1990) have argued that depressed mood prevents the deployment of adequate attentional resources at the time of encoding, resulting in a profound deficit in memory. Such an effect would be permanent instead of reversible, although it would not necessarily affect performance on implicit memory tasks that are insensitive to variations in encoding. (For a review of the effects of emotion on implicit memory, see Tobias, Kihlstrom & Schacter (1992).) Of course, insofar as depression reflects low levels of emotional arousal, this outcome might be predicted on the basis of the Yerkes–Dodson Law. Another form of emotionally induced functional amnesia is mood-dependent memory (Bower, 1981; Eich & Metcalfe, 1989). It has now been established that memories encoded in one emotional state (e.g. sadness) are more accessible if retrieval takes place in that same state, as opposed to its hedonic opposite (e.g. happiness) or a neutral state. The relative weakness and unreliability of these effects in the laboratory may be due to the

difficulty in inducing profound emotional states in such a setting. But in cases of major psychopathology encountered in the clinic, especially bipolar affective disorder (so-called manic–depressive illness), the amnesia induced by changes in emotional states may be profound. Again, the amnesias resulting from mania or depression count as functional in nature, because the instigating events do not result in any insult, injury or disease affecting brain tissue.

WHAT'S FUNCTIONAL ABOUT FUNCTIONAL AMNESIA?

Of course, both arousal and emotion are the products of underlying psychobiological processes that may affect memory more or less directly (LeDoux, 1992; McGaugh, 1992; Nilsson & Archer, 1992). Similarly, it should be noted that many episodes of functional amnesia, fugue and depersonalization begin with a physical injury involving the head. In addition, there is some evidence (admittedly controversial, and some as yet unpublished; for an overview, see Putnam, 1989, 1991) that patients with dissociative identity disorder show alterations in brain organization and neurochemistry that correspond to their changes in identity. If so, should these memory disorders still be labelled functional as opposed to organic (Spitzer et al., 1992)? Answering this question depends on what is meant by the very label *functional*, and in this respect there are at least three possibilities.

First, there is the formal neurological distinction between the structural or anatomical and the functional or physiological (Reynolds, 1990). This view distinguishes between those disorders that are due to lesions in brain tissue (presumably observable on autopsy, or by means of contemporary brain-imaging techniques) and those that result from anomalies of neurochemistry in a structurally intact brain. Obviously, in both cases the disease is organic in nature. The second, more colloquial, use refers to the distinction between those diseases whose organic basis is known and those whose organic basis, while presumed, has not yet been established. In this sense, the history of medicine is a chronicle of shifts from the functional to the organic, and psychopathology is no exception. In the same way that general paresis, or paralytic dementia, is now known to be caused by the syphilitic spirochete, schizophrenia—once labelled as a "functional" psychosis—is rapidly being traced to anomalies of neurotransmitter function.

The category *neurosis* (now banished, along with psychosis, from DSM) illustrates a third construal of the functional disorders: not only is no organic cause (e.g. brain insult, injury or disease) known; rather, the primary cause is presumed to be psychosocial rather than biological in nature. The functional amnesias, whether attributed to dissociation, repression or something else, lie squarely in the domain of the neuroses; and for more than 100 years their causes have been presumed to be mental rather than physical in nature: Breuer

and Freud (1893–95, p. 7) wrote that "Hysterics suffer mainly from reminiscences". In part, this version of the organic—functional distinction in psychopathology is an expression of Cartesian dualism, with its categorical distinction between mind and body. And, of course, it was abetted by the rise of Freudian psychoanalysis to dominance in psychopathology, which increased the alienation of psychiatry and clinical psychology from neurology. But in part, it also reflects the three levels at which any behavioral phenomenon can be analyzed: biological, psychological and social. By attributing hysterical symptoms to reminiscences, Breuer and Freud expressed a clear preference for a psychological explanation in terms of memory, conflict and anxiety.

In the final analysis, however, all construals involving the term *functional*—structure versus function, proven organic versus hypothetically organic, and somatogenic versus psychogenic—are fundamentally false. Neuroanatomical changes have neurophysiological consequences; neurological patients have problems in living that must be dealt with psychologically and socially; and the effects of the external environment are mediated by mental structures and processes that themselves have their physical basis in the structures and processes studied by neuroscience. We assume that the functional amnesias are associated with (correlated with) changes in brain state, and we can look forward to the day when we know as much about the psychobiology of fugue states and multiple personality as we do about the amnesic syndrome.

In the case of the functional amnesias, however, the most immediate causes do not lie in the nervous system, and the most direct and parsimonious explanations are not at the biological level. Perhaps the term *functional* is too vague, or has outlived its usefulness; but it still has value, in directing the attention of clinicians and researchers to the individual's social environment, and the cognitive structures and processes that mediate the individual's response to environmental events.

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NOTES

1. Depersonalization and derealization are psychopathological syndromes in their own right, but they are also nonspecific symptoms that are essentially independent of psychiatric diagnosis (Steinberg, 1991). Experiences of depersonalization and derealization are reported with some frequency in the normal population, and have been studied in survivors of disasters, violence, and other traumatic experiences: near-death

(Noyes & Kletti, 1977), building collapses (Wilkinson, 1983), tornadoes (Madakisira & O'Brien, 1987), airplane crashes (Sloan, 1988) and earthquakes (Cardena & Spiegel, 1993) are a few examples of a potentially rich area of research. This literature is not reviewed in this chapter, as it rarely deals with issues of memory *per se*.

2. There are also a number of instruments available for screening purposes, prior to a formal diagnostic interview (for a review, see Kihlstrom, Glisky & Angiulo, 1993; Steinberg, 1994). Of these, the Mini-SCID-D, an abbreviated version of the SCID-D, most closely conforms to the standard (DSM) diagnostic criteria for dissociative disorder; certainly it contains the most detailed assessment of memory functions.

3. Cases of dissociative amnesia are difficult to study—they occur unexpectedly, and they tend to resolve rapidly. However, researchers can be prepared to conduct case studies, or even more extensive investigations, as the occasion arises. For example, Cardena and Spiegel (1993) seized the opportunity to study dissociative symptoms in reaction to the 1989 Loma Prieta earthquake in California. One week after the earthquake, a sample of Bay Area residents who had experienced the earthquake showed high levels of depersonalization and derealization, which had abated on follow-up four months later. Interestingly, there was no evidence of partial or complete amnesia for the event; to the contrary, many respondents complained of detailed, intrusive memories of the event (perhaps similar to flashbulb memories?), as well as of everyday memory problems. It may be that levels of trauma experienced by these subjects were not sufficient to induce amnesia; or amnesia may have been prevented, or overcome, by accounts in the media and memories shared by friends and colleagues.

4. There have been experimental case studies of dissociative identity disorder which have focused on variables other than memory, such as responses to personality tests and psychophysiological assessments. For surveys, see Kihlstrom, Tataryn & Hoyt (1993) and Schacter & Kihlstrom (1989).

5. Other diagnostic categories sharing this property are the conversion disorders and the somatization disorders—which, along with the dissociative disorders, comprise what has been known as hysteria since the 19th century. For a history of the diagnosis of hysteria, and an argument for moving the conversion disorders from the somatoform to the dissociative category, see Kihlstrom (1992, 1994).

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