



American Journal of Clinical Hypnosis

Publication details, including instructions for authors and subscription information:

<http://www.tandfonline.com/loi/ujhy20>

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Published online: 21 Sep 2011.

To cite this article: Scott D. Miller Ph.D. & Patrick J. Triggiano (1992) The Psychophysiological Investigation of Multiple Personality Disorder: Review and Update, American Journal of Clinical Hypnosis, 35:1, 47-61, DOI: [10.1080/00029157.1992.10402982](https://doi.org/10.1080/00029157.1992.10402982)

To link to this article: <http://dx.doi.org/10.1080/00029157.1992.10402982>

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The Psychophysiological Investigation of Multiple Personality Disorder: Review and Update

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In 1984 Putnam reviewed the literature on the psychophysiological investigation of multiple personality disorder (MPD). Since his review, a large number of studies have been conducted and reported in the literature and at professional conferences. Currently, psychophysiologic differences reported in the literature include changes in cerebral electrical activity, cerebral blood flow, galvanic skin response, skin temperature, event-related potentials, neuroendocrine profiles, thyroid function, response to medication, perception, visual functioning, visual evoked potentials, and in voice, posture, and motor behavior. We review the new research on the psychophysiological investigation of MPD from published, unpublished, and ongoing studies, and we attempt to place current findings into a conceptual framework. We have noted findings from unpublished and ongoing studies, and, perhaps unfortunately, they represent a large amount of the data presently available. We conclude with a critical analysis of current research methodology and suggestions for future research.

Once thought to be "extremely rare" (American Psychiatric Association, 1980), multiple personality disorder (MPD) has recently become diagnosed, treated, and studied with increasing frequency (Kluft, 1987b). Despite this increase, clinicians' interest and belief in MPD seem to vacillate. The validity of MPD as a clinical psychiatric entity continues to be debated in the literature (Braun, 1984; Chodoff,

1987; French, 1987; Gruenewald, 1984; Hoff, 1987; Kluft, 1987a; Putnam, 1987; Rosenbaum, 1980; Ross, 1990; Spanos, Weekes, & Bertrand, 1985; Spanos, Weekes, Menary, & Bertrand, 1986). In a recent review, Fahy (1988) noted a poverty of evidence to suggest that MPD is a distinct diagnosis "rather than an intriguing symptom of a wide range of psychological disturbance." (p. 603)

One recent method that has been used to substantiate the disorder as a clinical entity, and that may be used in the future to make the diagnosis of MPD with more

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Received April 27, 1991; revised February 5, 1992;
second revision April 22, 1992; accepted for publication April 27, 1992.

¹The authors wish to gratefully acknowledge the encouragement and editorial suggestions of Daniel Dennett, Tufts University, and Colin A. Ross, M.D., the University of Manitoba.

accuracy, has been to test and measure physiologic differences that occur between personality states (or "alter personalities") within an individual suffering from MPD (Braun, 1983a, 1983b; Putnam, 1984). Observations of such psychophysiological differences between the personality states of persons with MPD have been noted from the earliest reported cases to the present (Alvarado, 1989; Carlson, 1989). For example, in 1817 Dr. S. L. Mitchell reported the now well-known case of Mary Reynolds in whom he had observed two distinct personality states that demonstrated differences in vision, audition, memory, and seizure-like activity (Greaves, 1980).

Prince and Petersen (1908) conducted the first scientific investigation of psychophysiological phenomena in MPD (e.g., see reviews of these reports contained in Carlson, 1981; Greaves, 1980; Kluft, 1984, 1985b; Taylor & Martin, 1944). In their pioneering investigation, Prince, a neurologist, and his colleague Peterson, a psychiatrist, both at Columbia University, found differences in the galvanic skin response of three personality states of an MPD patient.

In 1984, Putnam reviewed the literature on psychophysiological aspects of MPD and concluded that although many interesting phenomena had been observed, the "research into the physiology of this remarkable disorder [was] still in its infancy and [that] much basic work remain[ed] to be done." (p. 37) In the 8 years since his original review, much basic scientific research into MPD has been conducted. However, much of this research has been presented at conferences and workshops and, therefore, remains unpublished and unavailable to the practitioner who does not specialize in MPD. In this paper we review the recent research on

the psychophysiological investigation of MPD from published, unpublished, and ongoing studies within a psychophysiological conceptual framework. The paper concludes with a critical analysis of current research methodology and suggestions for future research.

Neurophysiologic Phenomena

Three measures have been used in a number of studies to assess neurophysiological phenomena in persons with MPD: electroencephalography (EEG), regional cerebral blood flow (rCBF), and evoked potentials (EP).

Neurophysiologic Measures

Electroencephalography. The EEG has been used in two types of studies: (1) to determine whether MPD patients have overall abnormal EEG tracings, and (2) to document any interpersonality differences in EEG tracings of persons with MPD. Studies in both areas have been contradictory, with an almost equal number of reports of abnormal or different interpersonality tracings (Benson, Miller, & Singer, 1986; Horton & Miller, 1972; Ludwig, Brandsma, Wilbur, Bendfeldt, & Jameson, 1972; Morselli, 1953; Schenk & Bear, 1981; Thigpen & Cleckley, 1950), and normal or similar interpersonality tracings (Bliss, 1980; Cocores, Bender, & McBride, 1984; Coons, Milstein, & Marley, 1982; Flor-Henry, Tomer, Kumpula, Koles, & Yeudall, 1990; Lipton, 1943 cited in Coons, 1988; Salama, 1980; Thigpen & Cleckley, 1957). Of those cases in which there were interpersonality differences, a number of researchers observed that the majority of such differences occurred in the alpha rhythm and can "be ascribed to normal changes seen in transitions from various states of alert-

ness" (p. 436, Cocores, Bender, & McBride, 1984).

Two recent studies illustrate the use of the sleep EEG to assess MPD. In a published study, Coryell (1983) studied the sleep recording of an MPD patient and found no evidence of temporal lobe dysfunction. In a study presented to the International Conference on Multiple Personality and Dissociation (ISSMPD), Jenkins, Radonjic, and Fraser (1987) measured the overall sleep patterns of MPD patients following the clinical observation of a high incidence of insomnia in the population. They reported finding no difference between the REM sleep of seven MPD patients and matched insomniac controls. However, they did report that MPD patients experienced significantly more slow-wave sleep (SWS) (e.g., stages 3 and 4) than their matched insomniac control counterparts.

In general, the neurophysiologic studies have suffered from methodological flaws that make generalization of their findings difficult. Such shortcomings include an overreliance on the single-subject, case-study design, as well as a lack of adequate experimental controls (e.g., control subjects, experimental blinds). Indeed, in the only controlled study using EEG tracings to date, Coons, Milstein, and Marley (1982) found more significant changes in EEG amplitudes in the control subject simulating MPD than in the two MPD patients (see also Coons, 1988).

Regional cerebral blood flow. There are three studies that used regional cerebral blood flow techniques (deVito, Braun, Karesh, Henkin, & Caniga, 1985; Lefkof, Lovitt, Bonte, Devous, Chehabi, Pook, Davidson, & Gipple, 1984; Mathew, Jack, & West, 1985). Measurement of cerebral blood flow has been used with increasing frequency in psychiatric research as an

index of brain function. Unfortunately, only one of the three studies has been published. In the only published study, Mathew et al. (1985) measured rCBF patterns in two preintegration personalities and the postintegration personality of a female MPD patient and three control subjects. The three control subjects were each measured twice at 30-minute intervals and did not simulate MPD while being tested. The researchers found that "personality changes were associated with no significant alterations in cerebral blood flow except right temporal hyperperfusion." (p. 504) They hypothesized that since the temporal lobe has long been associated with memory processes, the observed "increase in its activity in this case may [have been] related to the resurgence of affect-laden childhood memories." (p. 505)

In an unpublished study using a different rCBF method and research design, deVito et al. (1985) found that rCBF patterns among presenting personalities were abnormal and varied significantly between personality states. They presented these findings at the 1985 ISSMPD conference.

As in the case of EEG findings, however, studies on rCBF should be interpreted with caution as they rely on single-subject designs without the employment of adequate experimental controls (e.g., experimental blinds), and in the latter case are reported in an unpublished study.

Evoked potentials. One technique by which interpersonality differences in persons with MPD have been consistently demonstrated is evoked potentials. Simply stated, the studies measure the brain's response to light stimuli. All the studies reviewed found highly significant differences in evoked potentials between alter personalities of individuals with MPD (Braun, 1983b; Larmore, Ludwig, & Cain,

1977; Ludwig et al., 1972; Pitblado & Cohen, 1984; Pitblado & Densen-Gerber, 1986; Putnam, 1984). In their study of one subject with four personality states, Larmore et al. (1977) concluded: "The average visual evoked responses (AER) for each personality were quite different from each other . . . such as would be expected if four separate individuals had been tested." (p. 39)

In a unique study, Braun (1983b) not only found inter-personality differences in the visual evoked potentials of two MPD patients, but further showed differences between pre- and postintegration visual evoked potentials of the two patients.

A recent evoked-potential study provided preliminary evidence for shifts in cerebral dominance being associated with shifts in personality state. Ischlondsky (1955) first reported lateralized differences in two MPD patients. He observed a "specific relationship between the particular personality displayed by the patient at a certain time and the localization of the neurological manifestations on a specific side of the body." (p.10) Pitblado and Cohen (1984) measured the average evoked response of a 32-year-old female MPD patient with five personality states. The study found significant and longitudinally stable differences among the five personality states in amplitude, latency, and right-left asymmetries. The authors conclude that the results "give evidence of internal consistency in CNS processing in the different personalities tested . . . [and that] the measurement of evoked response patterns . . . presents an intriguing possible means of monitoring CNS function as therapeutic treatment progress." (p. 13)

Several unpublished studies have also reported findings using evoked potentials. Putnam (1982) replicated findings from Larmore et al. (1977) with a group of 11

multiples and controls simulating MPD. He found significantly larger interpersonality differences in the MPD sample than in the controls simulating the disorder. Pitblado and Densen-Gerber (1986) measured the pattern-evoked potentials of one female MPD with three personality states. The researchers found, like their predecessors, a significant personality effect on the evoked potentials ($p < .0005$). However, the researchers also found a significant personality by corrective lenses interaction ($p < .05$). This finding indicated that the evoked potentials were significantly different in only one of the three personalities when the participant wore her corrective lenses. This experimental finding verified the subject's preexperimentally reported preference for corrective lenses in only two of her three personalities. Finally, using event-related potentials, Ladle (1988) recently found significant interpersonality differences in the latencies (N100, N200, and P300) and amplitudes (0-N100, N100-P100, N200-P300) of the event-related potential components. He concluded that the "data indicate that an individual who has been diagnosed as MPD processes stimuli differently for each personality within that individual . . . This difference may depend on the role and functioning the personality maintains within the individual." (p. 14)

Psychophysiological research using evoked potentials has provided some of the most consistent and convincing experimental evidence for the existence of MPD as a clinical entity, as well as for the distinctness of the personality states in persons with the disorder. Coons (1988) has suggested that evoked potentials might be useful in attempts to "distinguish between MPD and non-MPD patients . . . [and] especially useful in ruling out malin-

gering or factitious disorder.” (p. 49) The studies have overcome some of the limitations inherent in the single-subject design by using single-subject designs with measures repeated over time and in multiple subject designs by the use of control subjects simulating MPD. However, similar to the studies reviewed earlier, these studies suffer from a lack of adequate experimental controls (e.g., experimental blinds).

Electromyography. Electromyography (EMG) has also been employed but in a limited number of studies. In 1977, Larmore et al. published the only research to date using electromyography in their uncontrolled study of one MPD subject. The researchers found changes in EMG recordings but noted that “no definite conclusions [could] be drawn.” (p. 39) In a report to a workshop at the American Psychiatric Association, Braun (1981) also noted observing EMG differences.

Brain electrical activity mapping. In 1988 Coons reported that a number of studies using the technique of creating computerized topographical maps of brain electrical activity, known as BEAM (brain electrical activity mapping), were in progress. In the first published study, Hughes, Kuhlman, Fichtner, and Gruenfeld (1990) found that some of the brain maps of the alternate personalities of a single female patient with multiple personality disorder were different from each other, although others were similar. These findings were replicated in a second session of mapping occurring 2 months later. Moreover, these researchers found that differences in the brain maps between the alternate personalities corresponded to differences in the characteristics of these personalities as assessed by a psychiatrist dealing with the patient. Differences between brain maps were *not* observed when the subject was asked to role-play her

alternate personalities or in a subject simulating multiple personality disorder.

Seizure disorder

While not a psychophysiological measure, seizure disorders have been associated with cases of MPD from the earliest reports of the disorder (Braun, 1983b). Several authors have reported cases of MPD with EEG abnormalities and epilepsy (Allison, 1978; Benson, Miller, & Signer, 1986; Braun, 1983b; Braun & Braun, 1979; Cutler & Reed, 1975; Drake, 1986; Hyslop, 1899; Mesulam, 1981; Schenk & Bear, 1981; Wholey, 1933). However, Coons (1984, 1988) has warned that the majority of these reports are seriously flawed because the subjects did not meet the DSM-III criteria for MPD.

More recently, Coons, Bowman, and Milstein (1988) reviewed the histories of 50 cases of MPD and found seven patients with psychogenic seizures and five with organic seizures. They concluded that while “some ictal and interictal phenomena can mimic dissociation and depersonalization seen in MPD . . . [it] is unlikely to be a manifestation of chronic limbic epilepsy as has been suggested.” (p. 48) In his sample, Putnam (1986) observed that 11 MPD subjects with abnormal EEG tracings did not differ from 45 MPD subjects without EEG abnormalities in symptoms and phenomenology of MPD.

Loewenstein and Putnam (1988) administered the Dissociative Experiences Scale (DES) to 13 patients with severe chronic epilepsy to assess reported similarities between the dissociative experiences of epileptic and MPD patients. The authors concluded that there were “Few similarities . . . between MPD patients and seizure patients” as assessed by the DES (p. 113).

In another study, Ross, Heber, Ander-

son, Norton, Anderson, del Campo, and Pillay (1989) administered the Dissociative Disorders Interview Schedule (DDIS) and the DES to 20 subjects diagnosed as MPD, to 20 patients with partial complex seizures, and to a group of 28 neurology clinic control subjects without partial complex seizures. The research found no difference between the seizure subjects and the neurology clinic control subjects. However, MPD subjects and seizure patients were found to be significantly different in a number of ways. For example, MPD subjects had more histories of substance abuse, sleepwalking, trance states, imaginary playmates, physical abuse, sexual abuse, extrasensory experiences, Schneiderian first-rank symptoms, and higher scores on the DES. Additionally, MPD patients more frequently met diagnostic criteria for psychogenic amnesia, psychogenic fugue, depersonalization disorder, somatization disorder, major depressive episode, and borderline personality disorder. The authors concluded that "the empirical evidence to date, then strongly supports the contention that MPD and complex partial seizures are separate clinical entities." (Ross et al., 1989, p. 58)

Finally, in a recent study, Devinsky, Putnam, Grafman, Bromfield, and Theodore (1989) made intensive video EEG recordings of six MPD patients diagnosed as epileptic to determine whether epileptic phenomena were correlated with the dissociative symptoms experienced by the patients. Analysis of the data showed none of the subjects to have epileptiform discharges. However, the researchers did find an unusually high incidence of nonepileptiform abnormalities on the video EEGs. They concluded that while "epilepsy is not a primary pathophysiologic mechanism for developing dissociative symptoms . . . the high incidence of

nonepileptiform abnormalities . . . suggests that a neurophysiologic abnormality may contribute to the pathogenesis of MPD." (p. 839)

The researchers then administered the DES to 71 epileptic patients and age-matched controls. They found that patients with complex partial seizures had higher DES scores than the age-matched controls but significantly lower scores than the MPD patients. The researchers noted, however, that there was a 20% overlap between the DES scores of seizure patients and MPD patients. This finding is consistent with the observation that some seizure patients may have dissociative experiences but that "the dissociation in MPD is not due to ictal or interictal limbic system epileptic discharges." (p. 840)

It is evident from the foregoing that organic seizures and epilepsy are not present in the majority of MPD cases and, therefore, are not responsible for the complex presenting picture of the disorder. However, as has long been observed, some patients with epilepsy may have dissociative experiences. The present research suggests that the overlap of dissociative experiences between MPD and seizure patients is about 20%. Finally, several authors have pointed to a possible association between a childhood history of incest and the occurrence of "hysterical" seizures (Devinsky et al., 1989; Gilette, 1987; Goodwin, Simms, & Bergman, 1979; Gross, 1979; Putnam, 1984; Standage, 1957). Such an association may prove diagnostically useful for clinicians and would seem to warrant further research attention.

Autonomic Phenomena

A number of studies have reported interpersonality differences in the auto-

autonomic functioning of persons with MPD. Generally, these reports fall into two categories: (1) demographic studies of large numbers of MPD patients, and (2) experimental studies measuring various autonomically regulated functions.

Autonomically regulated vascular changes can result in migraine headache. A number of demographic and clinical case reports have noted a high incidence of headache in the MPD population, especially associated with the "switching" process. Braun (1983a) observed that headaches were a common phenomenon found in a large percentage of his patients. Subsequent demographic studies have confirmed that headache is one of the most common symptoms, occurring in 50-60% of reported cases (Bliss, 1984; Coons, 1988; Putnam, Guroff, Silberman, Barban, & Post, 1986). In the largest and most recent study, Ross, Norton, and Wozney (1989) found that 79% of 236 cases studied reported headache as a frequent symptom.

Other researchers have reported other changes in autonomic functioning, including shifts in heart rate (Bahnsen & Smith, 1975; Putnam, 1983, cited in Braun, 1983a; Putnam et al., 1986), respiration (Bahnsen & Smith, 1985), and blood pressure (Larmore et al., 1977).

As noted in the introduction section, the first known psychophysiological study of MPD employed a crude version of what is now known as the galvanic skin response technique (GSR) and found GSR differences in the three personality states of an MPD patient. Several more recent studies found similar results (Bahnsen & Smith, 1985; Ludwig et al., 1972). Brende (1984) found evidence of autonomic lability and lateralization in the GSR related to the specific functioning of three personality states of a male MPD. However, these results are contradicted by an earlier study

by Larmore et al. (1972) that also found changes in GSR but attributed them to subject habituation to testing conditions.

In a recent study, Putnam, Zahn, and Post (1990) assessed the independence and consistency of autonomic nervous system (ANS) activity as assessed by heart rate, respiration, and skin conductance across the alter personalities of nine individuals with MPD and five subjects simulating MPD. Eight of the nine MPD subjects consistently manifested physiologically distinct alter personality states supporting the hypothesis that the alter personalities of MPD subjects are "highly organized, discrete states of consciousness and have properties similar to other discrete states of consciousness." (pp. 256-257) Three of the five control subjects also produced physiologically distinct states. The nature of the arousal associated with these states was different, however, suggesting that MPD and control subjects produced the physiological differences through different mechanisms or were experiencing different states of consciousness. From the study, the researchers conclude that "ANS activity of MPD subjects may serve as important state markers for investigating differences among discrete states of consciousness." (p. 259)

In general, the reports and studies of differences in the autonomic functioning of MPD patients suffer from the same methodological flaws as the studies previously reviewed (e.g., single-subject design, lack of adequate experimental controls, etc.). Moreover, with few exceptions (see Ross, Heber, Norton, Anderson, Anderson, & Barchet, 1989a; Ross, Heber, Norton, & Anderson, 1989a, 1989b; Ross, Norton, & Wozney, 1989), the demographic studies of MPD have used "home-made" interview schedules with unknown reliability and validity. Without the ben-

efit of experimental rigor, it is difficult to determine the significance and generalizability of the findings to the general MPD population. In 1984, Putnam reported that new studies were underway at NIMH that attempted to correct for these potential sources of error. However, no reports have been published yet.

Sensory Phenomena

Vision

Another area in which physiologic differences between personality states of persons with MPD have been consistently reported is vision. In their review of 100 cases of MPD, Putnam et al. (1986) found that 25% of their sample reported visual disturbances of some kind. In another review of 14 cases, Bliss (1980) also found a significant frequency ($p < .01$) of visual problems.

Although not published, the first truly experimental study was conducted by Shepard and Braun (1985). In a presentation to the 1985 ISSMPD conference, these researchers reported finding clinically significant differences between personality states in visual acuity, manifest refraction, color vision, muscle balance, pupil size, corneal curvature, keratometry, and intraocular pressure in a preliminary study of seven cases of MPD. They concluded that their research "clearly provide[d] support for the notion that changes in visual functioning are observable when MPD patients switch from one personality state to another." (p. 8)

Miller (1989) replicated this research in a study with 10 MPD patients and matched controls simulating MPD and found changes in corrected and uncorrected visual acuity, manifest refraction, eye-muscle balance, and visual fields, but not in pupil size as had been found in the

earlier research by Shepard and Braun. Measures of color vision, keratometry, and intraocular pressure were not included in the study. These results were replicated in a follow-up study by Miller, Blackburn, Scholes, White, and Mamalis (1991) with a sample of 20 MPD subjects and matched controls simulating MPD.

Given the research on visual evoked potentials reviewed earlier, the findings in the area of vision are not surprising. For example, in their remarks to the 1987 ISSMPD conference, Pitblado and Densen-Gerber (1986) concluded that "one of the physiological changes that accompany personality shifts involves control of some visual processes." (p. 1) However, because of the research designs employed in the studies to date, it is not clear whether observed and measured interpersonality changes simply indicate that MPD patients experience more variability in visual functioning or whether each personality state has unique optical characteristics. While reporting their initial findings to ISSMPD, Miller, Morgan, and Hales (1987) suggested that the latter is unlikely and that ophthalmological measures of visual functioning may be too inconsistent to provide evidence for the distinctness or uniqueness of individual personality states.

Voice

Changes in voice have also long been reported in cases of MPD (Coons, 1980, 1988; Ischlonsky, 1955; Rosse, 1892). In his review of 14 cases of MPD, Bliss (1980) found that 36% of the patients had experienced aphonia. Anecdotal reports of mute personalities, personalities with different accents, and so forth are not uncommon. In 1984 Putnam reported that research into voice differences was currently underway at the National Institute of

Communicative Disorders and Stroke, using a technique known as voice spectral analysis. However, no results are currently available (Coons, 1988).

Audition

Alterations in hearing have also been anecdotally reported in cases of MPD (Taylor & Martin, 1944; Ischlondsky, 1955). Such changes range from the complete loss of hearing (Bliss, 1980) to auditory hallucinations (Bliss, 1984; Putnam et al., 1986). In his review of 14 patients with MPD, Bliss (1980) found that 18% had experienced a complete loss of hearing at one time or another. However, in a comparison study of 20 MPD patients, 20 panic disorder patients, 20 eating disorder patients, and 20 schizophrenic patients, Ross et al. (1989b) did not find statistically significant differences in reports of deafness among the four groups.

With the exception of the studies on vision, the findings on differences in sensory phenomena result from anecdotal and demographic reports. Although these reports provide information on phenomena associated with MPD and may suggest areas for future research, the nature of the studies seriously limits the generalizability of their findings to the overall MPD population. For example, in general, the demographic studies have gathered data with questionnaires and instruments of unknown validity and reliability (e.g., "home-made" questionnaires). The use of "home-made" instruments and questionnaires makes it difficult to determine whether the reported findings accurately reflect phenomena associated with the disorder or are merely artifacts of the instruments used in the studies. Instruments that have demonstrated reliability and validity are currently available (Bernstein & Putnam, 1986; Frischholz et al., 1990; Ross et al., 1987, 1989; Steinberg, Rounsaville, &

Cicchetti, 1990), and the use of such instruments in future demographic research would increase the reliability and generalizability of the findings.

Endocrine Phenomena

Two unpublished studies have reported differences in the endocrine functioning of MPD patients. In the first of these, Hunter (1986) reported finding consistent differences in thyroid functioning (T4) of the personality states of MPD patients that were not present in control subjects. In a second study, Gilette and Garbutt (1987) reported results on the neuroendocrine profiles of four female MPD patients. The researchers found "markedly" abnormal neuroendocrine profiles on the dexamethasone suppression test and the thyrotropin releasing hormone test. Gilette (personal communication, 1988) reports that new research is currently underway but that no results are currently available.

Other Psychophysiological Phenomena

A number of other psychophysiological phenomena have been reported in the literature to be associated with MPD in general, or with the emergence of particular personality states in persons with the disorder. These reports are mostly anecdotal and have *not* been subject to experimental verification.

For example, researchers have reported personality specific allergic reactions in MPD patients. For example, Braun (1983b) reported on three cases in which certain personality states were allergic to citrus juice, smoke, and cats, but other states were unaffected. Other clinicians have observed personality specific responses to medication in MPD patients (Kluft, 1984, 1987b).

In an unpublished 1986 report, Densen-

Gerber presented data on two patients who developed physical stigmata associated with the emergence of particular personality states. In one case, a female MPD patient, a former intravenous heroin addict, developed "symbolic" needle track marks when she switched to a drug-addicted personality state. In a second case, a male MPD, victim of severe physical abuse, developed welts and marks on his back and legs when he switched to a particular child personality state. The researcher further reported on MPD patients heavily addicted to heroin who did not evidence signs of withdrawal when switching to nonaddicted personalities for extended periods of time.

Demographic studies to date indicate that such personality specific differences are present in a significant number of these patients (Bliss, 1984; Putnam et al., 1986).

Discussion

To date, the primary focus of psychophysiological research has been to document the physical symptoms and interpersonality differences of persons with MPD (Putnam, 1984; Ross et al., 1989b). Generally, this research falls into one of three categories: (1) anecdotal reports of clinical observations, (2) demographic studies of large cohorts of MPD patients, and (3) experimental studies. As pointed out in the present review, as well as in previous reviews (Putnam, 1984; Coons, 1988), the research in this area continues to be characterized by studies lacking appropriate experimental rigor (e.g., control subjects, cohort studies, experimental blinds, valid survey instruments, etc.). At best, such methodological short-comings limit the generalizability of the present findings. At worst, they provide a confusing and contradictory psychophysiological picture

that might ultimately undermine the original purpose for which the research was designed, that is, to provide valid and reliable physiologic criteria capable of establishing MPD as a clinical entity and eventually aiding diagnosis and treatment.

In the 8 years since Putnam's (1984) review, advances have been made in the design of research in the area. However, suggestions for future research by Putnam (1984) and others (Coons, 1988; Miller, 1988) continue to be valid. These suggestions include the employment of (1) matched control subjects; (2) control subjects composed of normals, other psychiatric populations, deep trance subjects, etc.; and (3) experimental designs with double blinds, cohorts of MPD subjects, and repeated measures with MPD subjects serving as their own controls.

The present review further suggests that future demographic studies use questionnaires and/or instruments with established validity and reliability. For example, some recently developed instruments that have demonstrated reliability and validity include the Dissociative Disorders Interview Schedule (Ross, Heber, Norton, Anderson, Anderson, & Barchet, 1989), the Dissociative Experiences Scale (Bernstein & Putnam, 1986; Frischholz, Braun, Sachs, Hopkins, Shaeffer, Lewis, Leavitt, Pasquotto, & Schwartz, 1990), and the Structured Clinical Interview for DSM-III-R: Dissociative Disorders (Steinberg, Rounsaville, & Cicchetti, 1990). Where appropriate instruments are not available, the "home-made" questionnaires or inventories should be published along with the future studies to aid in later replication, reliability, and validity research.

Finally, as noted earlier, the focus of the research to date has been to document the physical symptoms and interpersonality

differences of persons with MPD. No research has been conducted with a direct focus on the underlying processes by which MPD patients develop such differences. Indeed, as reviewed above, most studies have been conducted without adequate experimental rigor to control for the underlying processes popularly thought to account for MPD (e.g., spontaneous self-hypnosis, hypersuggestibility). Despite the lack of studies in this area, numerous theoretical papers have been published suggesting possible etiological processes (e.g., Bliss, 1986; Braun, 1984, 1988a; Gruenewald, 1984; Putnam, 1988; Spanos et al., 1985; Spanos et al., 1986). Experimental studies of psychophysiologic phenomena that control for such processes through the application of appropriate experimental methods (e.g., experimental blinds, repeated measures studies, matched control groups) or through the inclusion of the processes within the experimental design will increase the reliability and generalizability of the findings.

Such studies will certainly advance the present scientific understanding of the dissociative disorders, as well as the psychophysiological aspects of other disorders. For example, such research may provide new insight into the physiologic correlates of conditions thought to be primarily psychosomatic in nature. In addition, experimental investigation of the processes by which persons with MPD accomplish such changes may eventually aid the understanding of normal mind-body processes. For example, Putnam (1984) has pointed out that MPD presents a unique opportunity to study separately various elements of the mind such as consciousness, learning, and memory in combination with their physiologic parameters in a manner that is not possible when persons with only a single personality are

studied.

At present, the findings are clearly too disparate to suggest any conclusions about the possible physiologic parameters of the disorder or to make any recommendations for using physiologic markers for standardized diagnostic purposes. Perhaps the best outcome of the research at this time, therefore, is the increased awareness of MPD by clinicians and consequent widening of study by researchers.

References

- Allison, R. (1978). A rationale psychotherapy plan for multiple personality. *Svensk Tidskrift for Hypnosis*, 3-4, 9-16.
- Alvarado, C. S. (1989). Dissociation and state-specific psychophysiology during the nineteenth century. *Dissociation*, 2, 160-168.
- American Psychiatric Association (1980). *Diagnostic and Statistical Manual of Mental Disorders*. Washington, DC: American Psychiatric Association Press.
- Bahnsen, C. B. & Smith, K. (1975). Autonomic changes in a multiple personality patient. *Psychosomatic Medicine*, 37, 85-86.
- Benson, D. F., Miller, B., & Signer, S. F. (1986). Dual personality associated with epilepsy. *Archives of Neurology*, 43, 471-474.
- Bernstein, E. M. & Putnam, F. W. (1986). Development, reliability, and validity of a dissociation scale. *The Journal of Nervous and Mental Disease*, 174, 12, 727-735.
- Bliss, E. L. (1980). A report of 14 cases with implications for schizophrenia and hysteria. *Archives of General Psychiatry*, 37, 1388-1397.
- Bliss, E. L. (1984). A symptom profile of patients with multiple personalities--with MMPI results. *Journal of Nervous and Mental Disorders*, 172, 197-202.
- Bliss, E. L. (1986). *Multiple personality, allied disorders, and hypnosis*. New York: Oxford University Press.
- Braun, B. G. (1981). *Psychophysiologic prob-*

- lems of multiple personality. Paper presented at the American Psychiatric Association Annual Meeting, New Orleans, Louisiana.
- Braun, B. G. (1983a). Psychophysiological phenomena in multiple personality and hypnosis. *American Journal of Clinical Hypnosis*, 26, 124-137.
- Braun, B. G. (1983b). Neurophysiologic changes in multiple personality due to integration: A preliminary report. *American Journal of Clinical Hypnosis*, 26, 84-92.
- Braun, B. G. (1984). Towards a theory of multiple personality and other dissociative phenomena. *Psychiatric Clinics of North America*, 7, 171-193.
- Braun, B. G. (Ed.) (1988). *Proceedings of the Fifth International Conference on Multiple Personality and Dissociation*. Chicago: Rush-Presbyterian-St. Luke's Medical Center.
- Braun, B. G. & Braun, R. (1979). *Clinical aspects of multiple personality*. Paper presented at the American Society of Clinical Hypnosis Annual Meeting, San Francisco, California.
- Brende, J. O. (1984). The psychophysiological manifestations of dissociation. *Psychiatric Clinics of North America*, 7, 1, 41-50.
- Carlson, E. T. (1981). The history of multiple personality in the United States: I. The beginnings. *American Journal of Psychiatry*, 138, 5, 666-668.
- Carlson, E. T. (1989). Multiple personality disorder: The first one hundred years. *Journal of the History of the Behavioral Sciences*, 25, 315-322.
- Chodoff, P. (1987). More on multiple personality disorder (letter). *American Journal of Psychiatry*, 144, 1, 124.
- Cocores, J. A., Bender, A. L., & McBride, E. (1984). Single case study: Multiple personality, seizure disorder, and the electroencephalogram. *The Journal of Nervous and Mental Disease*, 172, 436-438.
- Coons, P. M. (1980). Multiple personality: Diagnostic considerations. *Journal of Clinical Psychiatry*, 41, 330-336.
- Coons, P. M. (1984). The differential diagnosis of multiple personality. *Psychiatric Clinics of North America*, 7, 1, 51-67.
- Coons, P. M. (1988). Psychophysiological aspects of multiple personality disorder. *Dissociation*, 1, 1, 47-53.
- Coons, P. M., Bowman, E. S., & Milstein, V. (1988). Multiple personality disorder: A clinical investigation of 50 cases. *Journal of Nervous and Mental Disease*, 176, 519-527.
- Coons, P. M., Milstein, V., & Marley, C. (1982). EEG studies of two multiple personalities and a control. *Archives of General Psychiatry*, 39, 823-825.
- Coryell, W. (1983). Multiple personality and primary affective disorder. *Journal of Nervous and Mental Disease*, 171, 388-390.
- Cutler, B. & Reed, J. (1975). Multiple personality: A single case study with 15 year follow-up. *Psychological Medicine*, 5, 18-26.
- Densen-Gerber, J. (1986). *The occurrence of stigmata in multiple personality/dissociative states*. Paper presented at the 1986 Conference on Multiple Personality and Dissociative Disorders, Chicago, Illinois.
- Devinsky, O., Putnam, F. W., Grafman, J., Bromfield, E., & Theodore, W. W. (1989). Dissociative states and epilepsy. *Neurology*, 39, 835-840.
- deVito, R. A., Braun, B. G., Karesh, S., Henkin, R. E., & Caniga, C. (1985). *Regional cerebral blood flow in multiple personality*. Paper presented at the 1986 Conference on Multiple Personality and Dissociative Disorders, Chicago, Illinois.
- Drake, M. (1986). Epilepsy and multiple personality: Clinical and EEG findings in 15 cases. *Epilepsia*, 27, 635.
- Ellenberger, H. F. (1970). *The discovery of the unconscious*. New York: Basic Books.
- Fahy, T. A. (1988). The diagnosis of multiple personality disorder: A critical review. *British Journal of Psychiatry*, 153, 597-606.
- 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.
- French, O. (1987). More on multiple personality disorder (letter). *American Journal of Psychiatry*, 144, 124.
- Frischholz, E. J., Braun, B. G., Sachs, R. G., Hopkins, L., Shaeffer, D. M., Lewis, J., Leavitt, F., Pasquotto, J. N., & Schwartz, D. (1990). The dissociative experiences scale: Further replication and validation. *Dissociation*, 3, 3, 151-153.
- Gillette, G. M. (1987). *EEG documented pseudoseizures and multiple personality*. Paper presented at the Fourth International Conference on Multiple Personality and Dissociative States, Chicago, Illinois.
- Gillette, G. M. & Garbutt, J. C. (1987). *Abnormal neuroendocrine profiles in multiple personality*. Paper presented at the Fourth International Conference on Multiple Personality and Dissociative States, Chicago, Illinois.
- Goodwin, J., Simms, M., & Bergman, R. (1979). Hysterical seizures: A sequel to incest. *American Journal of Orthopsychiatry*, 49, 698-703.
- Greaves, G. B. (1980). Multiple personality: 165 years after Mary Reynolds. *Journal of Nervous and Mental Disease*, 168, 557-596.
- Gross, M. (1979). Incestuous rape: A cause for hysterical seizures in four adolescent girls. *American Journal of Orthopsychiatry*, 49, 704-708.
- Gruenewald, D. (1984). On the nature of multiple personality: Comparisons with hypnosis. *International Journal of Clinical and Experimental Hypnosis*, 32, 170-190.
- Hoff, J. (1987). Multiple personality disorder? (letter) *Journal of Clinical Psychiatry*, 48, 174.
- Horton, P. & Miller, D. (1972). The etiology of multiple personality. *Comprehensive Psychophysiological Aspects of MPD*, 13, 151-159.
- Hughes, J., Kuhlman, D., Fichtner, C., & Gruenfeld, M. (1990). *Clinical Electroencephalography*, 21, 4, 200-209.
- Hunter, M. (1986). *Variations in thyroid function levels in multiple personality alters*. Paper presented at the 1986 Conference on Dissociative Disorders and Multiple Personality, Chicago, Illinois.
- Hyslop, T. (1899). Double consciousness. *British Medical Journal*, 2, 782-786.
- 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.
- Jenkins, D., Radonjic, D., & Fraser, G. (1987). *Sleep EEG in Multiple Personality Disorder*. Paper presented at the Fourth International Conference on Multiple Personality and Dissociative States, Chicago, Illinois.
- Kluft, R. P. (1984). An introduction to multiple personality disorder. *Psychiatric Annals*, 14, 19-24.
- Kluft, R. P. (1985). Childhood multiple personality disorder: Predictors, clinical findings, and treatment results. In R. Kluft (Ed.), *Childhood antecedents of multiple personality*. Washington: American Psychiatric Press, Inc.
- Kluft, R. P. (1987a). Dr. Kluft replies (letter). *American Journal of Psychiatry*, 144, 1, 124-125.
- Kluft, R. P. (1987b). An update of multiple personality disorder. *Hospital and Community Psychiatry*, 38, 363-373.
- Ladle, B. L. (1988). *The use of event-related potentials in the study of multiple personality disorder*. Paper presented at the Fourth International Conference on Multiple Personality and Dissociative States, Chicago, Illinois.
- Larmore, K., Ludwig, A. M., & Cain, R. L. (1977). Multiple personality: An objective case study. *British Journal of Psychiatry*, 131, 35-40.
- Lefkoff, G. D., Lovitt, R., Bonte, F., Devous, M., Chehabi, H., Pook, K., Davidson, F., & Gipple, B. (1984). *Psychophysiological and personality aspects of multiple personality disorder*. Paper presented at the First International Conference on Multiple Personality and Dissociative States, Chi-

- cago, Illinois.
- Loewenstein, R. J. & Putnam, F. W. (1987). A comparison of dissociative symptoms in patients with complex partial seizures, multiple personality disorder, and posttraumatic stress disorder. *Dissociation*, 1, 17-23.
- Ludwig, A. M., Brandsma, J. M., Wilbur, C. R., Bendfeldt, F., & Jameson, D. (1972). The objective study of a multiple personality: Or are four heads better than one? *Archives of General Psychiatry*, 26, 298-310.
- 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.
- Mesulam, M. M. (1981). Dissociative states with abnormal temporal lobe EEG: Multiple personality and the illusion of possession. *Archives of Neurology*, 38, 176-181.
- Miller, S. D., Blackburn, T., Scholes, G., White, G., & Mamalis, N. (1991). Optical differences in cases of multiple personality disorder: A second look. *Journal of Nervous and Mental Disease*, 179, 132-135.
- Miller, S. D. (1989). Optical differences in cases of multiple personality disorder. *Journal of Nervous and Mental Disease*, 177, 480-486.
- Miller, S. D. (1988). *The psychophysiological investigation of multiple personality disorder: Review and update*. Paper presented at the Fifth International Conference on Multiple Personality and Dissociation, Chicago, Illinois.
- Miller, S. D., Morgan, J. A., & Hales, R. (1987). *Visual differences in cases of multiple personality disorder*. Paper presented at the 1987 Conference on Multiple Personality and Dissociative Disorders, Chicago, Illinois.
- Morselli, G. E. (1953). Personalities alternate e pathologia affectiva. *Arch. Psicol. Neurol. Psichiatria*, 14, 579-583. Cited in Putnam, F. (1984). The psychophysiological investigation of multiple personality disorder. *Psychiatric Clinics of North America*, 7, 31-39.
- Pitblado, C. & Cohen, J. (1984). State-related changes in amplitude, latency, and cerebral asymmetry of average evoked potentials in a case of multiple personality. *International Journal of Clinical Neuropsychology*, 6, 69.
- Pitblado, C. & Densen-Gerber, J. (1986). *Pattern-evoked potential differences among the personalities of a multiple: Some new phenomena*. Paper presented at the 1986 Conference on Multiple Personality and Dissociative Disorders, Chicago, Illinois.
- Putnam, F. W. (May, 1982). *Evoked potentials in multiple personality disorder*. Paper presented at the American Psychiatric Association.
- Putnam, F. W. (1984). The psychophysiological investigation of multiple personality disorder. *Psychiatric Clinics of North America*, 7, 31-39.
- Putnam, F. W. (1986). The scientific investigation of multiple personality disorder. In J. Quen (Ed.). *Split Minds-Split Brains*. New York: New York University Press.
- Putnam, F. W. (1987). Dr. Putnam replies (letter). *Journal of Clinical Psychiatry*, 48, 174.
- Putnam, F. W. (1988). The switch process in multiple personality disorder and other state-change disorders. *Dissociation*, 1, 1, 24-32.
- 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. *Psychiatric Research*, 31, 251-260.
- Rosenbaum, M. (1980). The role of the term schizophrenia in the decline of the diagnosis of multiple personality disorder. *Archives of General Psychiatry*, 37, 1383-1385.
- Ross, C. A. (1990). Twelve cognitive errors about multiple personality disorder. *American Journal of Psychotherapy*, 44, 348-355.

- Ross, C. A., Heber, S., Anderson, G., Norton, G. R., Anderson, B., del Campo, M., & Pillay, N. (1989). Differentiating multiple personality disorder and complex partial seizures. *General Hospital Psychiatry*, 11, 54-58.
- Ross, C. A., Heber, S., Norton, G. R., & Anderson, G. (1989a). Differences between multiple personality disorder and other diagnostic groups on structured interview. *Journal of Nervous and Mental Disease*, 177, 487-491.
- Ross, C. A., Heber, S., Norton, G. R., & Anderson, G. (1989b). Somatic symptoms in multiple personality disorder. *Psychosomatics*, 30, 154-160.
- Ross, C. A., Heber, S., Norton, G. R., Anderson, D., Anderson, G., & Barchet, P. (1989). The dissociative disorders interview schedule: A structure interview. *Dissociation*, 2, 169-189.
- Ross, C. A., Norton, G. R., & Wozney, K. (1989). Multiple personality disorder: An analysis of 236 cases. *Canadian Journal of Psychiatry*, 34, 413-418.
- Rosse, A. (1892). Triple personality. *Journal of Nervous and Mental Disease*, 19, 186-191.
- Salama, A. (1980). Multiple personality. *Canadian Journal of Psychiatry*, 25, 569-572.
- Schenk, L. & Bear, D. (1981). Multiple personality and related dissociative phenomena in patients with temporal lobe epilepsy. *American Journal of Psychiatry*, 60, 1311-1316.
- Shepard, K. R. & Braun, B. G. (1985). *Changes in visual functioning of the multiple personality patient*. Unpublished paper presented at the 1985 Conference on Multiple Personality and Dissociative Disorders.
- Spanos, N. P., Weekes, J. R., & Bertrand, L. D. (1985). Multiple personality: A social psychological perspective. *Journal of Nervous and Mental Disease*, 94, 362-376.
- Spanos, N. P., Weekes, J. R., Menary, E., & Bertrand, L. D. (1986). Hypnotic interview and age regression procedures in the elicitation of multiple personality symptoms: A simulation study. *Psychiatry*, 49, 298-311.
- Standage, K. F. (1957). The etiology of hysterical seizures. *Canadian Psychiatric Association Journal*, 20, 67-73.
- Steinberg, M., Rounsaville, B., & Cicchetti, D. V. (1990). The structured clinical interview for the DSM-III-R dissociative disorders: Preliminary report on a new diagnostic instrument. *American Journal of Psychiatry*, 147, 76-82.
- Taylor, W. S. & Martin, M. F. (1944). Multiple personality. *Journal of Abnormal Psychology*, 39, 281-300.
- Thigpen, C. H. & Cleckley, H. (1950). A case of multiple personality. *Journal of Abnormal Social Psychology*, 49, 135-151.
- Thigpen, C. H. & Cleckley, H. (1957). *The three faces of Eve*. New York: McGraw-Hill.
- Wholey, C. (1933). A case of multiple personality. *American Journal of Psychiatry*, 12, 653-688.