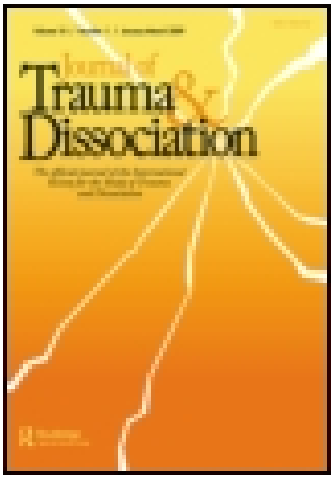

Journal of Trauma & Dissociation
Publication details, including instructions for authors and subscription information:
http://www.tandfonline.com/loi/wjtd20

Convergent Paradigms for Visual Neuroscience and Dissociative Identity Disorder

Mark L. Manning BSc (Hons) PhD [a] & Rana L. Manning BPsych (Hons) PhD [b]

[a] Faculty of Business , University of the Sunshine Coast , Queensland, Australia

[b] Faculty of Arts and Social Sciences , University of the Sunshine Coast , Queensland, Australia

Published online: 09 Oct 2009.

To cite this article: Mark L. Manning BSc (Hons) PhD & Rana L. Manning BPsych (Hons) PhD (2009) Convergent Paradigms for Visual Neuroscience and Dissociative Identity Disorder, Journal of Trauma & Dissociation, 10:4, 405-419, DOI: 10.1080/15299730903143683

To link to this article: http://dx.doi.org/10.1080/15299730903143683

Journal of Trauma & Dissociation, 10:405–419, 2009

ISSN: 1529-9732 print/1529-9740 online
DOI: 10.1080/15299730903143683

Routledge
Taylor & Francis Group

Convergent Paradigms for Visual Neuroscience and Dissociative Identity Disorder

MARK L. MANNING, BSc (Hons), PhD
Faculty of Business, University of the Sunshine Coast, Queensland, Australia

RANA L. MANNING, BPsych (Hons), PhD
Faculty of Arts and Social Sciences, University of the Sunshine Coast, Queensland, Australia

Although dissociative identity disorder, a condition in which multiple individuals appear to inhabit a single body, is a recognized psychiatric disorder, patients may yet encounter health professionals who declare that they simply "do not believe in multiple personalities." This article explores the proposal that resistance to the disorder represents a failure to apply an appropriate paradigm from which the disorder should be interpreted. Trauma and sociocognitive explanations of dissociative identity disorder are contrasted. The trauma hypothesis is further differentiated into paradigms in which trauma affects a defense mechanism, and one in which trauma serves to inhibit the normal integration sequence of parallel processes of the self in childhood. This latter paradigm is shown to be broadly consistent with current models of cortical processing in another system, the cortical visual system.

KEYWORDS dissociative identity disorder, multiple personality, consciousness, subconscious

INTRODUCTION

Although dissociative identity disorder (DID) is a legitimate diagnostic category within the *Diagnostic and Statistical Manual of Mental Disorders* (4th ed.; American Psychiatric Association, 1994), some patients may find themselves

Received 2 June 2008; accepted 18 December 2008.

Address correspondence to Mark L. Manning, PhD, Faculty of Business, University of the Sunshine Coast, Maroochydore DC, Queensland, 4558, Australia. E-mail: mark@legiontheory.com

dismissed with the simple statement "I don't believe in multiple personalities." As one chaplain dealing with survivors of trauma wrote,

> It's so common to have to deal not only with docs but psych staff in general who "don't believe" in [multiple personality disorder]. As clergy I find it strange that there is a consistent use of language of faith as the grounding for how people deal with the issue. It's more than an intellectual objection to a concept or data . . . there's a heat and intensity present that I haven't really encountered in other medical issues. (Mahoney, 1998)

This "heat and intensity" represents a clash of quite incompatible paradigms from which DID may be viewed. In this article we briefly review several such paradigms and take the novel approach of examining parallels between one paradigm and experts' growing knowledge of another system, the cortical visual system, which is believed to comprise several parallel processing streams in the occipital, temporal, and parietal cortex.

TRAUMA AND SOCIOCOGNITIVE EXPLANATIONS OF DID

Currently, two contrasting views exist regarding the genesis of DID. The first, the "trauma model," views DID as the result of childhood trauma often comprising, or encompassing, sexual abuse (Ross, 1997). For example, in a survey of 100 DID patients, Putnam, Guroff, Silberman, Barban, and Post (1986) found retrospective reports of significant childhood trauma in the majority (97%) of patients, with sexual abuse the most commonly reported (83%).

The second perspective views DID as a sociocognitive phenomenon in which patients fulfill the expectations of therapists and society—in some cases portrayed as therapists using hypnosis, expecting to discover evidence of childhood sexual abuse (e.g., McHugh, 1995; Merskey, 1992; Piper, 1997; Spanos, 1996). As McHugh wrote,

> Multiple personality disorder (MPD) is a form of hysteria induced by therapists by asking patients about alter personalities. Therapists resort to persuasion to influence patients to commit themselves to having MPD thus forcing them to act in a manner consistent with the role. (p. 957)

Support for this position often rests upon studies such as those of Spanos, Weekes, and Bertrand (1985), who showed that within hypnotic interviews college students may display symptoms of DID by adopting a different name, referring to their primary personality in the third person, and displaying amnesia for their "alter personality."

Such data serve to highlight the care with which therapists must guard against their own expectations shaping the behavior of the client and generating

symptoms. The data, however, do not exclusively support a particular paradigm. In isolation, the data are consistent with the iatrogenic view of DID. The data are also consistent with models stressing the power of social influence in the development of the self. And the data are consistent with models proposing the self to be composed of parallel streams of consciousness—with hypnosis revealing this underlying structure. Furthermore, college students responding "as though" they are multiple in an interview is not sufficient to conclude that a clinical patient's responses in an interview are the result of a common cause.

Overall, much better support can be found for DID being the result of trauma than for DID patients acting out to fulfill a role. For example, there is no evidence of differences in DID cases diagnosed and treated with or without hypnosis, and DID appears in many patients with no history of hypnotic intervention (Putnam et al., 1986; Ross, 1989). Similarly, characterizing therapists diagnosing DID as expecting to identify cases of repressed memories of childhood sexual abuse does not fit well with cases such as "Eve," for which the trauma was not sexual (Sizemore, 1989). Hopper et al. (2002) described EEG changes between host and alter personalities within DID patients that could not be replicated by professional actors fulfilling the roles of host and alter. Consistent with this result, Reinders et al. (2006) examined regional cerebral blood flow of host and alter personalities and showed that host personalities display a "broad pattern of brain areas that showed an increase in [regional cerebral blood flow]," whereas for alter personalities "only a few brain areas appear to be involved" (p. 737). Early stress has been shown to be associated with changes in the structure of the hippocampus, and, using MRI, Vermetten, Schmahl, Linder, Loewenstein, and Bremner (2006) found hippocampal volume to be 19.2% smaller and amygdalar volume 31.6% smaller in DID patients compared with healthy controls. Finally, sociocognitive explanations predict that DID should not be identified in societies (e.g., China) in which there is an absence of portrayal of DID in the media and a lack of expectation of finding the disorder by therapists (Xiao et al., 2006). Yet this has been shown not to be the case (Ross et al., 2008; Xiao et al., 2006). Ross et al., for example, comparing samples from Canada and China, reported similar levels of childhood sexual and physical abuse. Both samples displayed similar levels of dissociation, and the authors concluded that the "findings support a specific prediction of the trauma model of dissociation not tested in previous research, and are not consistent with the sociocognitive, contamination or iatrogenic models of dissociative identity disorder" (p. 36).

CHANGING PARADIGMS FOR DID

Generating an explanation of how trauma results in DID is dependent upon the paradigm from which one understands the structure and processes of the mind. Various alternative perspectives have existed.

The first systematic investigation of DID was conducted in France by Janet in 1883 (James, 1890a). Much of Janet's work was unfortunately not translated into English. His work and views on dissociation, however, were influential in the United States via both William James, who discussed Janet's work extensively (e.g., James, 1890a, 1890b), and Morton Prince, a friend and correspondent of Janet. In 1905 Prince published the case of Miss Beauchamp and described one alter personality, Sally, to represent a parallel rational subconscious co-consciousness—that is, a second consciousness operating rationally of which Miss Beauchamp was not directly aware. In 1906 Prince founded the *Journal of Abnormal Psychology*, and in his journal he further explored the notion of rational co-consciousness and subconsciousness in many articles (e.g., Janet & Prince, 1907; Prince, 1906, 1908; Prince & Peterson, 1908). Both Janet and Prince viewed DID as the result of trauma, but their views differed in one very important respect. Although both agreed that the self could not be considered an irreducible unity, but rather represented an integration of processes, Janet saw DID to be ultimately of biological cause. That is, Janet viewed DID as representing an innate weakness of cerebral function revealed by childhood trauma, whereas Prince viewed it as being the result of the impact of distressing experiences and hence, ultimately, as being psychological in origin (Rycroft, 1978, p. xx).

Janet and James argued the existence of parallel conscious activity, and Prince (1905/1978) presented data demonstrating that Sally was co-conscious with Miss Beauchamp. These data ranged from simple observations such as "I have often seen Sally, co-consciously, smile through Miss Beauchamp's tears, so to speak, producing a most curious effect" (p. 280) to situations in which Prince confirmed experimentally Sally's claim that she could observe objects in her peripheral vision of which Miss Beauchamp was unaware. Janet and Prince (1907) also reported observations of alters acting in parallel having simultaneous control of different parts of one body.

S. Freud's (1896) initial proposal for the importance of trauma was consistent with Janet (1889/1973); Freud wrote that "*one or more occurrences of premature sexual experience* . . . [provided the] . . . necessary traumatic force" (p. 203) for the formation of hysterical symptoms. Unlike Janet, however, Freud did not conceptualize alters as parallel streams of consciousness disaggregated as a *consequence* of trauma. Instead, he proposed them to be the result of an *active defense mechanism* in which memories of the trauma are "repressed," partitioned off from the self; alters represent the containment of these traumatic memories.

A major shift then occurred in Freud's thinking and he wrote of "the great secret of something that in the past few months has gradually dawned on me" (Freud, 1898, as cited in Jones, 1956, p. 292). Freud's biographer, Ernest Jones, wrote that it "was the awful truth that most, not all, of the seductions in childhood which his patients had revealed, and about which

he had built his whole theory of hysteria, had never occurred" (p. 292). Freud was to later write of his despair at this revelation:

> When this aetiology broke down under its own improbability and under contradiction in definitely ascertainable circumstances, the result at first was helpless bewilderment. Analysis had led by the right paths back to these sexual traumas, and yet they were not true . . . If hysterics trace back their symptoms to fictitious traumas, this new fact signifies that they create such scenes in phantasy, and psychical reality requires to be taken into account alongside actual reality. (Freud, 1914, as cited in Jones, 1956, p. 293)

Although retaining his earlier formulation, providing, for example, a model of the traumas of war (S. Freud, 1919), Freud now stressed the importance of psychical reality over actual reality. Some authors view his position to be so extreme as "to emphasize that neurotic symptoms emerged only as a result of unacceptable sexual and aggressive impulses and fantasies" (LaMothe, 2001, p. 546).

This theoretical emphasis had significant implications for the interpretation of nonconscious activity. Janet (1889/1973) believed all human activity to have a conscious component that, in cases of psychological automatism, represented consciousness not connected with personal perception and without a sense of self. Freud's reinterpretation of his client's reports of childhood sexual abuse as fantasy necessarily led him (1915/1995) to a position in which nonconscious mental activity was unconscious and irrational rather than subconscious and, potentially, rational. This theoretical position then led Freud to argue that DID did not represent a situation of alternative consciousnesses; rather, it was "a splitting of the mental activities into two groups, and . . . the same consciousness turns to one or the other of these groups alternately" (p. 576). From this point onward, Freud referred only to an unconscious as distinct from a subconscious (Ellenberger, 1970). Freud's work created a paradigm shift, and from this paradigm, rational subconscious activity was not possible, and so, similarly, Sally as described by Prince could not exist. Multiple personality became, for several decades, an increasingly rare diagnosis.

Further developments occurred in the psychoanalytic literature, including ego psychology (A. Freud, 1936), self-psychology (Kohut, 1971), object–relations theory (Fairbairn, 1954), and its elaboration, attachment theory (Bowlby, 1969). Bowlby proposed that the pattern of attachment with the primary caregiver, characterized as secure, anxious–resistant, or anxious–avoidant, became a template imposed upon all subsequent relationships. Attachment theory has provided several alternative interpretations of DID (e.g., Barach, 1991; Blizard, 1997; Liotti, 1992, 2006).

Blizard (1997), for example, described DID as a defense in situations in which the primary caretaker is alternately nurturing and abusive. In response, the child develops two separate models of the parent—"good" parent and "bad" parent—and "thus develops two separate senses of self, one which is attached to the 'good' parent, and one which is abused by the 'bad' parent" (p. 224).

Liotti (2006) proposed that "a disorganized child construes attachment interactions as shifting representations of both the attachment figure and the self as each other's persecutor, rescuer and victim" (p. 59), and these three internal models ultimately lead to the development of the three main types of alters: persecutor, protective, and child alters. In Liotti's view, this reflects not a defensive process but a failure of integrative processes that in normal development result in the creation of a unitary self in the first year of life—a unitary self that is absent at birth.

Different paradigms provide quite different interpretations of the phenomena of DID. A paradigm proposing that the normal mind comprises parallel rational streams (e.g., James, 1890a, 1890b; Manning & Manning, 2007; Oppenheimer, 2002; Prince, 1905/1978) will lead to an interpretation of DID as either a disintegration of parallel conscious systems or a developmental failure of the integration of parallel conscious systems. From such a paradigm, alters represent co-conscious entities. Interpreting DID from a classical psychoanalytical paradigm will view DID as an active process, a defense mechanism in response to trauma or unacceptable impulses. Alters will give the appearance of co-conscious entities, but this is only an appearance, as they represent the serial action of a single consciousness (S. Freud, 1915/1995). Attachment theory provides a paradigm from which arise several different interpretations of DID that are not necessarily incompatible with (at least part of) earlier interpretations. Blizard (1997), for example, interpreted DID as a defense mechanism, and Liotti proposed DID to be a failure of the integration of a unitary self.

We propose that indirect support exists for the interpretation of DID as a failure of the integration of parallel conscious streams, first, from knowledge of visual processes within the occipital, temporal, and parietal cortex; and second, from the apparent appearance of parallel consciousness as a consequence of *physical* trauma.

PARALLEL CORTICAL STREAMS

Brodman's (1909) cytoarchitectonic maps revealed that the human cortex was divided into many discrete areas. At the time it was unclear as to the functional meaning of this physical differentiation. Although experts have little understanding of cortical processes underlying personality and the self, which presumably rely upon processes within the frontal cortex, since the

seminal work of Hubel and Wiesel (1959) knowledge regarding the functional organization of the visual cortex has progressed forward from the occipital pole through the temporal and parietal cortex. The work of many researchers (e.g., Hubel & Wiesel, 1959; Maunsell & Newsome, 1987; Rodiek, 1979; Shapley & Perry, 1986; Van Essen & Maunsell, 1983; Wilson & Cragg, 1967; Zeki, 1975) has led to (a) the development of models of the visual cortex proposing the integration of separate parallel processing streams forming a seemingly unitary system, (b) an understanding that inappropriate stimulation in childhood can result in unintegrated systems, and (c) the development of laboratory techniques that reveal these parallel streams in normal adults. We present here a brief summary of this work for two reasons. First, it would not be unreasonable to assume that the cortical organization of processes underlying the self might, to some degree, reflect the organization of older (in an evolutionary sense) cortical systems. Second, current models of visual cortical processing provide strong parallels with one DID paradigm.

Single unit recordings reveal parallel visual processing streams beginning as early as the retina and extending through the occipital, temporal, and parietal cortex (Sincich & Horton, 2005). Van Essen and Maunsell (1983) proposed two functional streams—the *motion pathway* and the *color and form* pathway. Their motion pathway has poor spatial acuity, has good contrast sensitivity, and is both colorblind and blind to stationary objects. Livingstone and Hubel (1988) argued that color and form are distinct streams. The form stream is proposed to be colorblind and to display high spatial acuity (but with poorer contrast sensitivity than the motion stream), and the color stream is proposed to have poor spatial acuity and contrast sensitivity (Livingstone & Hubel, 1988).

Studies of brain trauma in humans have served to reinforce these models. For example, cerebral akinetopsia is a condition in which brain trauma selectively destroys the motion stream, so the individual experiences the world as if it were presented as a series of stationary snapshots (Zeki, 1991). In other cases, brain trauma may produce a "loss of color discrimination without impairment of form perception. . . . loss of face recognition without loss of the ability to recognize most other categories of objects or loss of color or depth perception" (Livingstone & Hubel, 1988, p. 740).

The existence of the streams is also revealed in intact individuals via specialized displays selectively stimulating one stream. Cavanagh, Tyler, and Favreau (1984), for example, presented observers with isoluminant sine-wave gratings defined by color but not contrast. Given that the motion stream is colorblind, when the gratings move across their display there is no subjective impression of movement, even though the observer can appreciate that the position of the grating has changed.

A more obvious illustration of parallel processing of visual information is immediately apparent, as we as human beings have two eyes. Although

we view the world from two slightly different perspectives afforded by our two eyes, our subjective experience is of a unitary *integrated* visual world. Information originating from the left and right eyes is integrated in the extrastriate cortex by cells responsive to stimuli when receptive fields in both retinae are stimulated (Pearlman, 1981). This integration relies upon appropriate conditions existing in childhood, when images fall on the two retinae in corresponding positions, so synapses form between neurons driven by the right eye and corresponding neurons driven by the left. Physical trauma or congenital defect may result in the two eyes not tracking together and images consequently failing to fall onto corresponding retinal positions—and so these synapses may fail to form, and the integration of the left and right systems fails to occur. Two quite independent and unintegrated systems may develop so that the adult sees at some times from the perspective of the right eye and at other times from the perspective of the left eye, but never experiences the visual world from an integrated perspective (Neill, 1984).

Models of the cortical visual system have evolved further from the proposal of separate parallel streams. Zeki and Bartels (1999), for example, proposed that

> visual consciousness consists of many, functionally specialized, micro-consciousnesses which are spatially and temporally distributed. . . . This leaves us with the grand problem of how, in physiological terms, the microconsciousnesses are bound together. Indeed, it raises the question of whether they are bound at all, given what appears to be the nonunitary nature of conscious experience. (p. 252)

In visual neuroscience, the existence of discrete parallel processes within the occipital, parietal, and temporal cortex is now well established. This knowledge has evolved from single unit recordings and physical brain trauma. Although we as researchers do not yet have single unit recordings that serve to underpin such models for human consciousness, we do have a substantial body of data from studies of brain trauma.

BRAIN TRAUMA AND THE SPLITTING OF CONSCIOUSNESS

In an effort to treat severe epilepsy, a team led by Roger Sperry deliberately cut the corpus callosum, destroying all major connections between the left and right cortical hemispheres (Bogen, 1997). In many respects, this *split-brain* surgery served to produce two consciousnesses.

Sperry's laboratory was organized so briefly presented images could be selectively presented to the left cortical hemisphere (presented in the right visual field) or the right cortical hemisphere (presented in the left field).

Patients' hands were shielded from view so objects could be placed in their right hands, and the sensation of that object would only be sent to the left hemisphere without the right hemisphere either feeling or seeing it (and vice versa). When images were flashed into the right field of patient W.J., the patient could correctly say what the image was—as the image was processed by his left hemisphere containing a speech center (Bogen & Vogel, 1975). When images were presented in W.J.'s left field, however, he claimed he had not seen anything. His right hemisphere did not have a Broca's area and so did not have the neural machinery to produce speech to say what was seen. W.J. had seen the images, however, as his left hand, controlled by his right hemisphere, would correctly press a key each time a stimulus was presented. The patient N.G., when presented with an image of a spoon to her right hemisphere, was similarly unable to verbally identify the item (Springer & Deutsch, 1989). She could, however, correctly identify a spoon from a set of items hidden from view by touching it with her left hand. In these patients, the right hemisphere therefore showed *an awareness independent and separate* from that of the left hemisphere. Moreover, these patients may act as though they have two conflicting consciousnesses, manifest in terms of *intermanual conflict*. Bogen (1997), for example, described patient R.Y. who was buttoning his shirt with one hand while the other hand followed along just behind undoing the buttons. He wrote,

> Almost all complete commissurotomy patients manifest some degree of intermanual conflict during the early postoperative period. . . . Even our youngest patient (L.B.) . . . While doing the block design test unimanually with his right hand, his left hand came up from beneath the table and was reaching for the blocks when he slapped it with his right hand and said, "That will keep it quiet for a while." (n. p.)

An even more compelling illustration of split-brain multiple consciousness is the case of Paul S. (Bogen, 1997). Paul is a rare individual with a Broca's area in both hemispheres, and so, postoperatively, both hemispheres could speak. Paul's left hemisphere wanted to be a draftsman, and his right wanted to be a racing driver.

More recently, a group of researchers described three patients with damage to the corpus callosum experiencing a conflict of separate consciousnesses, but not a conflict of one hemisphere against the other, which the researchers called a *conflict of intentions* (Nishikawa et al., 2001). Nishikawa et al. described a 41-year-old man who abruptly became aware of stuttering and displayed intermanual conflict. He would, for example, open a door with his right hand but immediately close it with his left. MRI revealed a degeneration of the corpus callosum. The stuttering gradually subsided, and intermanual conflict almost disappeared after 2 months. From about 8 weeks from the onset of the stuttering, however, other odd behavior

became evident. He would attempt to walk down a corridor but would stop and remain motionless for 10 to 20 min. On one occasion, he said, "I froze while ascending the stairs because a wish to descend came into my mind" (Nishikawa et al., 2001, p. 464). On another occasion he was seen walking back and forth in the hospital corridor carrying a washbowl. He explained that he wanted to take a bath and go to the toilet at the same time and could not choose between them.

Conceptualizing the brain as comprising two cerebral hemispheres that each operate internally in a unitary manner, and, in concert, in a parallel manner, serves to explain the intermanual conflict of commissurotomy patients. But such a paradigm does not explain this conflict of intentions. This led Nishikawa et al. (2001) to ask the following question: "If conflict of intentions represents part of the callosal disconnection syndrome, how can a callosal symptom manifest as a disturbance of whole body action rather than being confined to one half of the body?" (p. 462).

DISCUSSION

What can paradigms relating to the processing of visual information in the occipital, temporal, and parietal cortex reveal regarding the cortical processes underlying consciousness and the formation of DID? Perhaps nothing. Perhaps the processes of "higher" functions of consciousness may bear no resemblance to those of "lower" perceptual processes. It is possible, however, that the cortical processes of consciousness that developed later in evolution bear some resemblance to older processes in their organization. For this reason alone it would seem sensible, at least as an intellectual exercise, to consider a paradigm for cortical processes underlying consciousness that is an analogue of that of cortical visual processes. Such a paradigm would view the seemingly unitary self of the normal individual as comprising multiple parallel consciousnesses operating in an integrated manner. One would expect that, just as it is for the cortical visual system, it could be possible in laboratory settings or under extreme conditions to reveal this underlying structure in normally integrated adults. Just as the cortical visual pathways from the left and right eyes integrate in childhood, one would also expect that the parallel consciousnesses would increasingly integrate over many years in childhood. From this perspective, DID would represent a failure of the integration of these streams of consciousness. This failure of integration could be the result of several causes, including congenital defect, physical trauma, psychological trauma, or a failure to experience appropriate stimulation in childhood.

Such a paradigm provides a more adequate explanation of changes in consciousness following damage or degeneration of the corpus callosum compared with the simple left brain/right brain model commonly used to

interpret split-brain studies. If one takes the more complex view, that the brain comprises multiple consciousnesses acting in parallel, damage to the corpus callosum producing either intermanual conflict or the conflict of intentions described by Nishikawa et al. (2001) would represent a disruption of a complicated system of parallel conscious processes normally acting across both cortical hemispheres. Alternative paradigms from which DID is interpreted, such as the sociocognitive or classical psychoanalytic, provide no obvious basis of explanation for any of the phenomena relating to a splitting of consciousness associated with callosal damage.

The paradigm investigated here would see an interpretation of DID not primarily as a defense mechanism or as a disintegration of processes but as a failure of the integration of cognitive processes in childhood. This paradigm is consistent with Putnam et al. (1986), who reported that the mean age of first appearance of an alter in their sample was just under 6 years, and 89% of their sample reported the appearance of an alter personality to have occurred before the age of 12 years. The paradigm is also consistent with the regional cerebral blood flow study of Reinders et al. (2006), who found a broader pattern of brain areas associated with host personality compared with alters.

Specialized displays reveal the existence of parallel visual cortical processing streams in normal observers. Interpreting the data from Spanos et al. (1985) would suggest that the researchers were experimenting with individuals whose minds comprised integrated parallel streams of consciousness and that the use of hypnosis served to expose this underlying structure in a laboratory setting.

Not only is the cortical visual system divided into three gross parallel streams, but within these streams further parallel subdivisions exist with different spatial frequency channels and parallel processing of discrete areas of the visual field in retinotopically organized cortical areas. If this idea were extended to DID, alter personalities would also not represent irreducible unities but would themselves comprise parallel processes. The following description of the alter Mable is consistent with this notion:

> She can clean a whole house in forty minutes, from top to bottom . . . There are others behind Mable, each one with her own specialty. . . . Before you ask, I don't know their specific names, I only know that they are separate. (Chase, 1987, p. 318)

Attachment theory provides a paradigm from which several models of DID have emerged. At least some of these are not inconsistent with the paradigm proposed here. A failure of the integration of visual systems resulting in a lack of binocularity in an adult is essentially a lack of *appropriate visual experience*. If appropriate complementary stimulation of neurons in the extrastriate cortex does not occur in childhood, an integrated visual system

will not develop by adulthood. From the perspective of attachment theory, Liotti (2006) proposed an analogue of this in which the child does not receive the appropriate experience in attachment interactions producing "representations of both the attachment figure and the self as each other's persecutor, rescuer and victim" (p. 59), to ultimately produce persecutor, protective, and child alters. This process was described by Liotti not in terms of a defensive process but as a failure of integrative processes that in normal development result in the creation of a unitary self. This explanation is not inconsistent with the paradigm investigated here, although the critical period speculated by Liotti for this process may need to be extended.

Even with an appropriate environment and stimulation, integration of monocular visual systems does not occur for all individuals (Julesz, 1971), nor does a corpus callosum necessarily develop (Finlay et al., 2000). It would not be unreasonable, therefore, to suggest that it is possible in some individuals for congenital defects to produce DID despite appropriate attachment experience and an absence of trauma. The small percentage of DID patients described by Putnam et al. (1986) who report no childhood trauma may be indicative of this effect. However, further research is required to determine whether this phenomenon is the result of genetic predisposition, a lack of appropriate attachment experience, or some combination of both.

If we were to make the not unreasonable assumption that the organization of one cortical system might contain clues to another, then the large body of evidence from studies of the visual cortex (Sincich & Horton, 2005) would lead to the a priori expectation that the systems underlying human consciousness comprise independent parallel streams that in the normal individual are integrated so as to appear to act as a unitary whole. In many respects this is similar to the position of Janet, James, and Prince, but it differs in one important respect. Whereas Prince (1905/1978) would describe DID as a "*disintegrated* personality . . . [formed by] . . . a breaking up of the original personality at different moments along different lines of cleavage" (p. 3), the paradigm investigated here views DID as the product of a lack of appropriate experience and/or psychological trauma in childhood that serves to inhibit the normal integration of conscious streams.

REFERENCES

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

Barach, P. M. M. (1991). Multiple personality disorder as an attachment disorder. *Dissociation*, *4*(3), 117–123.

Blizard, R. A. (1997). The origins of dissociative identity disorder from an object relations and attachment theory perspective. *Dissociation*, *10*(4), 223–229.

Bogen, J. E. (1997). Physiological consequences of complete or partial commissural section. In M. J. M. Apuzzo (Ed.), *Surgery of the third ventricle* (2nd ed., pp. 167–186). Baltimore: Williams & Wilkins.

Bogen, J. E., & Vogel, P. J. (1975). *Neurological status in the long term following complete cerebral commissurotomy*. Retrieved June 3, 2008, fromhttp://www.its.caltech.edu/~bogen/text/lyon.html (Reprinted from *Les Syndromes de Disconnexion Calleuse chez l'Homme (Clinical Disconnected Syndromes)* (pp. 227–251), by F. Michel & B. Schott (Eds.), 1975, Hôpital Neurol).

Bowlby, J. (1969). *Attachment and loss: Vol. 1. Attachment*. New York: Basic Books.

Brodman, K. (1909). *Vergleichende lokalisationslehre der Grossbirnrinde* (*Comparative localisation studies of the cerebral contex*). Leipzig, Germany: J. A. Barth.

Cavanagh, P., Tyler, C. W., & Favreau, O. E. (1984). Perceived velocity of moving chromatic gratings. *Journal of the Optical Society of America*, *1*, 893–899.

Chase, T. (1987). *When rabbit howls*. New York: Jove Books.

Ellenberger, H. F. (1970). *The discovery of the unconscious: The history and evolution of dynamic psychiatry*. New York: Basic Books.

Fairbairn, W. R. D. (1954). *An object relations theory of the personality*. New York: Basic Books.

Finlay, D. C., Peto, T., Payling, J., Hunter, M., Fulham, W. R., & Wilkinson, I. (2000). A study of three cases of familial related agenesis of the corpus callosum. *Journal of Clinical and Experimental Neuropsychology*, *22*, 731–742.

Freud, A. (1936). *The ego and mechanisms of defense*. New York: International Universities Press.

Freud, S. (1896). Aetiology of hysteria. *Standard Edition*, *3*, 189–221.

Freud, S. (1919). Introduction to psychoanalysis and the war neuroses. *Standard Edition*, *17*, 189–221.

Freud, S. (1995). *The Freud reader* (P. Gay, Ed.). London: Vintage. (Original work published 1915)

Hopper, A., Ciorciari, J., Johnson, G., Spensley, J., Serejew, A., & Stough, C. (2002). EEG coherence and dissociative identity disorder: Comparing EEG coherence in DID hosts, alters, controls and acted alters. *Journal of Trauma & Dissociation*, *3*(1), 75–88.

Hubel, D. H., & Wiesel, T. N. (1959). Receptive fields of single neurons in the cat's striate cortex. *Journal of Physiology (London)*, *148*, 574–591.

James, W. (1890a). The hidden self. *Scribner's Magazine*, *7*(3), 361–374.

James, W. (1890b). *The principles of psychology*. New York: Holt.

Janet, P. (1973). *L'Automatisme psychologique* (*Psychological automatism*). Paris: Société Pierre Janet. (Original work published 1889)

Janet, P., & Prince, M. (1907). A symposium on the subconscious. *Journal of Abnormal Psychology*, *2*(2), 58–92.

Jones, E. (1956). *Sigmund Freud: Life and work (Vol. One) The Young Freud 1856–1900*. London: The Hogarth Press.

Julesz, B. (1971). *Foundations of cyclopean perception*. Chicago: University of Chicago Press.

Kohut, H. (1971). *The analysis of the self*. New York: International Universities Press.

LaMothe, R. (2001). Freud's unfortunates: Reflections on haunted beings who know the disaster of severe trauma. *American Journal of Psychotherapy*, *55*, 543–563.

Liotti, G. (1992). Disorganized/disoriented attachment in the etiology of the dissociative disorders. *Dissociation*, *5*(1), 196–204.
Liotti, G. (2006). A model of dissociation based on attachment theory and research. *Journal of Trauma & Dissociation*, *7*(4), 55–73.
Livingstone, M. S., & Hubel, D. H. (1988, May 6). Segregation of form, color, movement and depth: Anatomy, physiology and perception. *Science*, *240*, 740–749.
Mahoney, J. (1998). *Trauma and chaplaincy*. Retrieved May 15, 2007, from http://www.jmahoney.com/_prof1/00000019.htm
Manning, M. L., & Manning, R. L. (2007). Legion theory: A metapsychology. *Theory & Psychology*, *17*, 839–862.
Maunsell, J. H. R., & Newsome, W. T. (1987). Visual processing in monkey extrastriate cortex. *Annual Review of Neuroscience*, *10*, 363–401.
McHugh, P. R. (1995). Resolved: Multiple personality disorder is an individually and socially created artifact. *Journal of the American Academy of Child and Adolescent Psychiatry*, *34*, 957–959.
Merskey, H. (1992). The manufacture of personalities: The production of multiple personality disorder. *British Journal of Psychiatry*, *160*, 327–340.
Neill, R. A. (1984). *Physical measurement of human binocular parameters*. Unpublished doctoral dissertation, University of Newcastle, Australia.
Nishikawa, T., Okuda, J., Mizuta, I., Ohno, K., Jamshidi, J., Tokunaga, H., et al. (2001). Conflict of intentions due to callosal disconnection. *Journal of Neurology, Neurosurgery and Psychiatry*, *71*, 462–471.
Oppenheimer, L. (2002). Self or selves? Dissociative identity disorder and complexity of the self-system. *Theory & Psychology*, *12*, 97–128.
Pearlman, A. L. (1981). Anatomy and physiology of central visual pathways. In R. A. Moses (Ed.), *Adler's physiology of the eye* (pp. 427–465). St. Louis: Mosby.
Piper, A. (1997). *Hoax and reality: The bizarre world of multiple personality disorder*. Northvale, NJ: Jason Aronson.
Prince, M. (1906). Hysteria from the point of view of dissociated personality. *Journal of Abnormal Psychology*, *1*(4), 170–187.
Prince, M. (1908). Experiments to determine co-conscious (subconscious) ideation. *Journal of Abnormal Psychology*, *3*(1), 33–42.
Prince, M. (1978). *The dissociation of a personality*. New York: Oxford University Press. (Original work published 1905)
Prince, M., & Peterson, F. (1908). Experiments in psycho-galvanic reactions from co-conscious (subconscious) ideas in a case of multiple personality. *Journal of Abnormal Psychology*, *3*(2), 114–131.
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*(6), 285–293.
Reinders, A. A. T. S., Nijenhuis, E. R. S., Quak, J., Korf, J., Haaksma, J., Paans, A. M. J., et al. (2006). Psychobiological characteristics of dissociative identity disorder: A symptom provocation study. *Biological Psychiatry*, *60*, 730–740.
Rodiek, R. W. (1979). Visual pathways. *Annual Review of Neuroscience*, *2*, 193–225.
Ross, C. A. (1989). Effects of hypnosis on the features of multiple personality disorder. *American Journal of Clinical Hypnosis*, *32*, 99–106.

Ross, C. A. (1997). *Dissociative identity disorder: Diagnosis, clinical features, and treatment of multiple personality*. New York: Wiley.

Ross, C. A., Keyes, B. B., Yan, H., Wang, Z., Zou, Z., Xu, Y., et al. (2008). A cross-cultural test of the trauma model of dissociation. *Journal of Trauma & Dissociation*, *9*(1), 35–49.

Rycroft, C. (1978). Introduction. In M. Prince, *The dissociation of a personality* (pp. v–xxi). New York: Oxford University Press.

Shapley, R., & Perry, V. H. (1986). Cat and monkey retinal ganglion cells and their visual functional roles. *Trends in Neuroscience*, *9*, 229–235.

Sincich, L. C., & Horton, J. C. (2005). The circuitry of V1 and V2: Integration of color, form, and motion. *Annual Review of Neuroscience*, *28*, 303–326.

Sizemore, C. C. (1989). *A mind of my own*. New York: Morrow.

Spanos, N. P. (1996). *Multiple identities & false memories: A sociocognitive perspective*. Washington, DC: American Psychological Association.

Spanos, N. P., Weekes, J. R., & Bertrand, L. D. (1985). Multiple personality: A social psychological perspective. *Journal of Abnormal Psychology*, *94*, 362–376.

Springer, S. P., & Deutsch, G. (1989). *Left brain, right brain* (3rd ed.). New York: Freeman.

Van Essen, D. C., & Maunsell, J. H. R. (1983). Hierarchical organization and functional streams in the visual cortex. *Trends in Neuroscience*, *6*, 370–375.

Vermetten, E., Schmahl, C., Linder, S., Loewenstein, R. J., & Bremner, J. D. (2006). Hippocampal and amygdalar volumes in dissociative identity disorder. *American Journal of Psychiatry*, *163*, 630–636.

Wilson, M. E., & Cragg, B. G. (1967). Projections from the lateral geniculate nucleus in the cat and monkey. *Journal of Anatomy*, *101*, 677–692.

Xiao, Z., Yan, H., Wang, Z., Zou, Z., Xu, Y., Chen, J., et al. (2006). Trauma and dissociation in China. *American Journal of Psychiatry*, *163*, 1388–1391.

Zeki, S. M. (1975). Functional organization of projections from striate to prestriate visual cortex in rhesus monkey. *Cold Spring Harbour Symposia on Quantitative Biology*, *40*, 591–600.

Zeki, S. M. (1991). Cerebral akinetopsia (visual motion blindness): A review. *Brain*, *114*, 811–824.

Zeki, S. M., & Bartels, A. (1999). Toward a theory of visual consciousness. *Consciousness and Cognition*, *8*, 225–259.