

Psychophysiological and Psychological Correlates of Dissociation in a Case of Dissociative Identity Disorder

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ABSTRACT. The aim of this study was to examine the psychological and psychophysiological mechanisms that underlie dissociative experiences in dissociative disorders. A four-stage, personalized guided imagery methodology was used to recreate the psychological and psychophysiological responses associated with two dissociative episodes experienced by a 25 year old, single female diagnosed with Dissociative Identity Disorder. The responses to these two dissociative episodes were compared with a stressful experience and an emotionally neutral event. The results demonstrated a reduction in psychophysiological arousal associated with the experience of dissociation during times of intense distress accompanied by relevant alterations in psychological response. It was concluded that the experience of dissociation served to protect this individual from extreme distress and, therefore, functioned as a protective mechanism. *[Article copies available for a fee from The Haworth Document Delivery Service: 1-800-HAWORTH. E-mail address: <getinfo@haworthpressinc.com> Website: <<http://www.HaworthPress.com>> © 2003 by The Haworth Press, Inc. All rights reserved.]*

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The purpose of this study was to examine the psychophysiological and psychological reactions to dissociative experiences in a young woman with Dissociative Identity Disorder (DID). The aim was to establish the function of the dissociative experiences in terms of relief from distress.

Dissociation represents a psychological process that is characterized by the inability to recall the performance of complex behaviors, the experience of severe depersonalization, the alteration of personality state, and experiences of passive influence (Putnam, 1996). DID, formerly known as Multiple Personality Disorder, is a most perplexing and controversial mental disorder. The diagnostic criteria of DID include the following: (1) the presence of two or more distinct identities or personality states; (2) at least two of these identities or personality states recurrently take control of the person's behavior; and (3) there is an inability to recall important personal information that is too extensive to be explained by ordinary forgetfulness (APA, 1994).

The trauma-dissociation model of DID is quite comprehensive. Putnam and colleagues (1986) proposed that severe trauma in childhood initiates the disorder and in support of this proposition presented data indicating that 97% of 100 cases had experienced severely traumatic childhood events. The model proposed that the young cope with trauma through dissociative forms of coping. Such dissociative experiences form the beginning of one or more new identities, which appear as alters when the individual experiences severe stress in adulthood.

Therefore, if the dissociative experiences associated with DID are a form of coping, it should follow that the experience of dissociation as part of DID should produce a somatic and psychic anxiety reduction that forms the basis of the protection of the individual that dissociation episodes allow.

Although the psychophysiological examination of DID has a long history, and has examined a broad range of variables (Coons, 1988), the focus largely has been on the identification of differential response patterns of alternate personalities (see Coons, 1988; Miller & Triggiano, 1992; Putnam, 1984, 1991 for reviews) rather than an examination of the mechanisms that function at the time of dissociation. In general, there is some evidence for differential neurological and psychophysiological functioning between alternate personalities (e.g., Birnbaum &

Thomann, 1996; Brende, 1984; Putnam, Zahn & Post, 1990; Tsai, Condie, Wu, & Chang, 1999), although previously not all evidence was convincing in this regard (see Putnam, 1984). The approach of examining the mechanisms that underlie dissociation provides another avenue for the consideration of psychophysiology. However, very little research effort has been directed towards this area.

To examine the mechanisms associated with dissociation it is necessary to determine the influence on the individual at the time of dissociation. There are ethical and logistic difficulties in measuring the psychophysiological reactions to an episode of dissociation, particularly if the aim is to examine the typical dissociative reaction to stressful events. It is well established that people with DID experience a range of distressing symptomatology associated with a broad range of psychopathology (e.g., Ellason, Ross, & Fuchs, 1996). One method of examining psychological and psychophysiological states associated with a stressful experience is to recreate the memory of an event through the use of guided imagery. In instances where some recollection of a dissociative episode is apparent, a guided imagery methodology would overcome many of the problems inherent in examining processes associated with distressing situations.

Personalized guided imagery, where the individual is guided in a structured way through a memory of an actual event, has been demonstrated to result in accurate and interpretable responses that mimic the responses that occurred at the time of the event (Brain, Haines, & Williams, 1998; Haines, Josephs, Williams, & Wells, 1999; Haines, Williams, Brain, & Wilson, 1995; Pitman et al., 2001; Shin et al., 2000; Wells, Haines, Williams, & Brain, 1999). In addition, by dividing the event in question into stages and presenting the imagery scripts in this way (e.g., Brain et al., 1998; Haines et al., 1995, 1998; Wells et al., 1999), the development of a response such as dissociation can be considered and the processes associated with the response examined.

The aim of the study was to utilize a four stage, personalized guided imagery methodology in an attempt to chart the psychological and psychophysiological processes that may underlie uncharacteristic dissociative episodes. It was hypothesized that the most extreme experience of dissociation that would occur at the incident stage of imagery scripts would result in a reduction in psychophysiological arousal. Further, it was hypothesized that the psychological ratings would reflect the nature of the dissociative episode. In addition, it was hypothesized that no reduction in arousal would be evident in relation to a stressful life event to which dissociation did not occur. Neutral imagery was hy-

pothesized to result in low levels of arousal and ratings of positive psychological responses.

METHOD

Participant

The participant in this study was a 25 year old, single woman who was considered to be suffering from a chronic, severe psychiatric disorder. She first came to the attention of the authors some seven years prior to the study. During this time she had numerous, usually brief, admissions to psychiatric wards and had attracted a range of psychiatric diagnoses including Schizophrenia NOS, Psychosis NOS with dissociation, Depressive Disorder NOS, Schizoaffective Disorder, and Dissociative Disorder NOS. She is considered to be a diagnostic enigma.

This young woman was of slight build, pale complexion with long dark hair. Her posture was usually hunched, her head bowed and engaging in only limited eye contact. She was clearly very tense with clenching of fists, wringing of hands, and a worried facial expression. Generally, she was very softly spoken, extremely self-conscious, threat sensitive, and prone to devalue herself in relation to all areas of her life. She lived alone pursuing a quiet life and with a modest social network. She engaged in a number of artistic pursuits and was considered talented.

The participant suffered gross sexual and emotional abuse at the hands of one perpetrator for a period of four to five years from the age of 11 years. This person was an older, female, second-degree relative with whom the participant had regular, unwittingly sanctioned contact. Furthermore, she experienced a number of vicious, degrading sexual assaults by other individual perpetrators. For example, at the age of 12 years, the participant was sexually assaulted by a tradesman who came to the house. There was some suggestion that this tradesman was in collusion with the second-degree relative.

Consistent with her numerous hospitalizations and diagnoses, her clinical presentations were many and varied. She has presented with visual hallucinations, auditory hallucinations (usually persecutory), thought disorder, inappropriate affect, agitation, anxiety, self-mutilation, and catatonia. Significantly, it became apparent that the patient experienced frequent and extensive episodes of dissociation that caused disruption to her personal and social life. These episodes lasted from two hours to one day and while in the state she carried out complex behaviors that

were quite uncharacteristic of her, and of which she tended to be amnesic. Some of these dissociative episodes were as follows:

1. Becoming aware that she was in a hotel, smoking, drinking alcohol and in the company of a number of men. The venue and the behaviors were foreign to her. She became frightened and fled the scene.
2. Becoming aware of driving and noticing items of food and clothing that were not of her taste.
3. Becoming aware of lying in a city park in the middle of the night.
4. Becoming aware of sitting on a swing in a children's playground naked to the waist on a cold winter morning.

Some segments of dissociative episodes were observed by others. On one occasion she paid a rare visit to a female acquaintance, demanding some clothing. She was reported to have behaved in an outlandish and assertive manner and used a name that was not her own. She later became aware of being on a beach wearing strange clothing and sunglasses. It was raining. She felt upset and depressed and returned to the hospital where she was an inpatient.

In making a diagnosis of DID, the treating professionals had observed and recorded this individual manifesting complex behaviors consistent with an alternative personality state. In contrast to her normal, threat-sensitive presentation, this personality state was characterized as relaxed, assertive, provocative and witty. On these occasions the participant referred to herself with the name of her second-degree relative abuser. Additional anecdotal reports of others supported the occurrence of this alternate personality state.

In addition, on other occasions the participant referred to herself with a more exotic name. This happened infrequently and not enough is known about this alternate personality state to be able to accurately describe its characteristics other than to state that in this manifestation she was reported to be relaxed, assertive and demanding.

Procedure

The participant was interviewed in the laboratory at the University of Tasmania's School of Psychology. She was administered an interview schedule and was asked to complete a range of psychological scales. She was then interviewed about four events: a dissociative episode experienced when she ordered a home delivery pizza; a dissociative epi-

sode experienced when being sexually assaulted; a visit from a friend that caused her distress but did not produce dissociation; and an emotionally neutral event (making a cup of coffee). The participant was asked to describe in detail these events in terms of the environmental, cognitive, emotional, behavioral and psychophysiological components of each episode.

The information gathered from the participant was then translated into personalized guided imagery scripts. The information was divided into four stages: setting the scene (containing information about the immediate antecedents of the event); approach (containing information about the events as they developed); incident (containing information relating to the actual nature of the event); and the consequence (containing information about the events that occurred immediately afterwards). The content of the scripts was based solely on information obtained at interview, in the wording provided by the participant.

In a separate laboratory session approximately one week later, electrodes to monitor heart rate were applied to the participant. She was asked to sit quietly, with her eyes closed, while a 60 second baseline measure of psychophysiological response was taken. Keeping her eyes closed, the first stage of the first script was verbally administered to her while she concentrated on recalling the events as they were described. At the end of the stage, the participant was told to open her eyes. A 10 second between-stage pause followed. She was then asked to close her eyes and the next stage was administered. This procedure was used for the remaining stages. The duration of each stage of each script was approximately 60 seconds. At the end of administration of each script type, visual analogue scales were presented.

The study and its procedures were approved by the University of Tasmania Human Research Ethics Committee.

Measures and Apparatus

Psychological tests and interviews. The Dissociative Disorders Interview Schedule (DDIS; Ross et al., 1989) was used to determine the nature of her dissociative experiences. The Questionnaire of Experiences of Dissociation (QED; Riley, 1988) was used to determine the severity of dissociation and the extent to which the level of dissociation was similar to other dissociation samples.

The Symptom-Checklist-90-Revised (SCL-90-R; Derogatis, 1983) was used to measure the participant's psychological state in the seven

days prior to interview. The scale provides scores for nine psychiatric dimensions and three global indices of severity and distress.

Imagery scripts. Personalized guided imagery scripts were devised as follows:

1. *Dissociation 1.* This script related to an incident that occurred in her home. The sequence included the telephone ringing, and hearing a man who had previously attempted to sexually assault her stating that he would be there in ten minutes. She did not reply; she felt anxious and unreal. He knocked on the door, and she let him in without checking to see who he was despite the fact that this was something she would not normally do. She then was subjected to physical and sexual abuse. She experienced herself being on the ceiling looking down on what was happening. The man told her that if she was going to “slip into a coma,” then he was going to leave.
2. *Dissociation 2.* This script related to an incident that occurred when she was sharing a residence with a male friend. The sequence included ordering a home delivery pizza, then entering her friend’s bedroom naked to the waist, asking him if he wanted a cup of coffee, and the friend stating that she was acting in a “weird” manner. She heard the pizza delivery person knock on the front door, walked towards the door, but was gently restrained by the friend.
3. *Stressful event.* This script served as a stressful experience control event and related to an incident where an acquaintance came to her residence and she did not want to see him. She pretended not to be at home. This was a common experience.
4. *Neutral event.* This script served as an emotionally neutral control event and involved the sequence in making a cup of coffee in her kitchen.

Visual analogue scales. A number of visual analogue scales (VASs; McCormack, de Horne, & Sheather, 1988) were employed to assess the psychological response to the guided imagery scripts. These scales were used to obtain a score from 0 to 100 on the bipolar dimensions of unafraid-afraid, in control-out of control, relaxed-anxious, happy-sad and normal-unreal (representing feelings of dissociation or depersonalization). The participant was requested to place a mark on a single 100 mm line between the bipolar anchor points to indicate her psychological response to imagery. A higher score represented a more negative expe-

rience. Scores above 50 are considered to be in the negative range with scores up to 75 being moderately elevated, 75-85 being markedly elevated, and over 85 being extremely elevated.

Psychophysiological measures and equipment. A Macintosh Powermac 7300/180 computer was used, linked to a MacLab/8S data acquisition system using Chart 3.5.6 software. Recordings were made at 1mm/s, with a sampling speed of 200 samples/s. Heart rate data was taken from 7mm Ag/AgCl electrodes, one placed on each side of the torso along the lateral line with an earth on the mastoid process. A scoring period of 30 seconds was extracted from each stage of each script. This scoring method has been successfully used elsewhere (e.g., Brain et al., 1998; Haines et al., 1995, 1998; Wells et al., 1999). Mean heart rate from each scoring period was calculated.

Data Analysis

The data were handled in a number of ways. Descriptive data from psychological testing is presented here either with indication of clinical significance or comparison with normative data. Across stage responses to imagery are described relative to script content. For the VASs, between script differences at each stage were determined to be significant if more than two standard deviations from the mean of the stages of the neutral script.

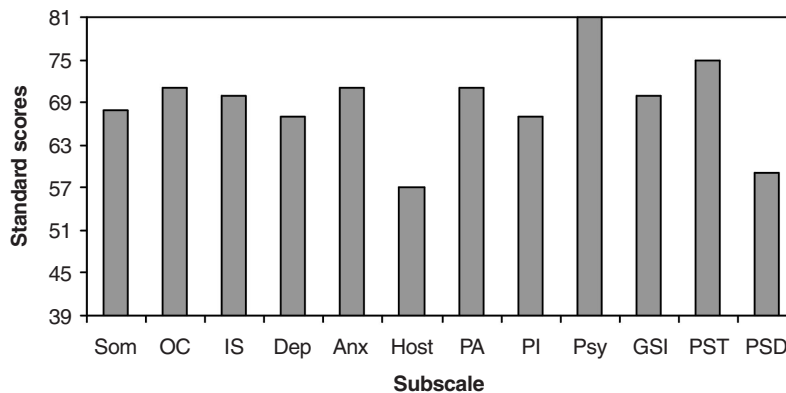
RESULTS

Psychopathology

The administration of the DDIS (Ross et al., 1989) confirmed the presence of the symptoms characteristic of DID. Further, with a score of 21 obtained on the QED (Riley, 1988), the dissociative experiences of this young woman were substantially greater than the general population ($M = 9.92$) and a group with Somatization Disorder ($M = 13.9$), and most similar to a group with DID ($M = 24.6$).

Figure 1 presents the scores obtained on the SCL-90-R. With a recommended cut-off score of 63 on two subscales or the Global Symptom Index representing clinical significance, it is clear that this woman experiences marked and broad ranging symptomatology.

FIGURE 1. The standard scores for the scales and global indices of the SCL-90-R.

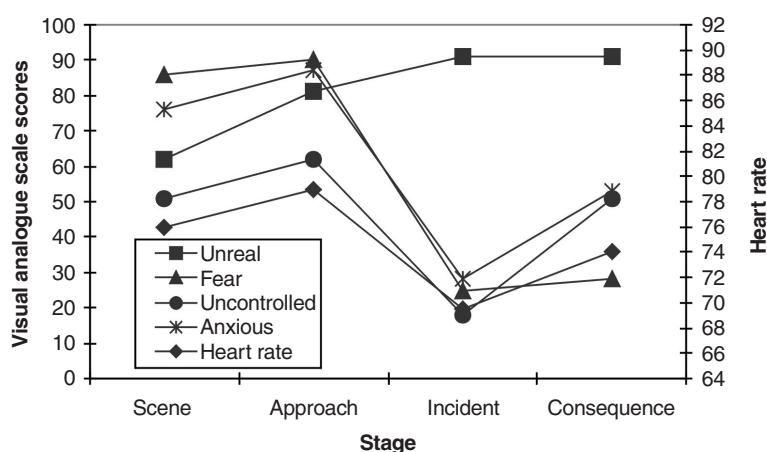


Response to Imagery

It should be noted that the Dissociation 1 script was administered on a separate day and the relatively lower level of psychophysiological arousal reflected only general arousal level on that day. The importance is not the comparison between scripts but the differences in patterns across the stages of the individual scripts. It also should be noted that the magnitude of the changes in psychophysiological arousal to imagery cannot be expected to be as great as would occur at the time of the event. Again, it is the change in the pattern of arousal that is relevant to this examination. However, in comparison, the ratings on VASs of psychological response may be compared between scripts and across sessions (McCormack et al., 1988). Further, whereas baseline heart rate data is presented, the psychological data derived from the VASs does not include a baseline as these data reflect ratings of the effect of imagery and no imagery is presented at baseline.

Figure 2 presents the VAS ratings and the mean heart rate for the Dissociation 1 script. It was evident that the ratings of feelings of unreality increased over the stages of the script. High levels of fear and anxiety in the setting the scene and approach stages gave way to low levels at the incident stage when the sexual assault took place. The ratings of a moderate level of lack of control in the scene and approach stages decreased to a low level at the incident stage when the dissociative experience was at its peak. The reduction in negative affect at the incident stage coin-

FIGURE 2. The visual analogue scale scores and the mean heart rate response to each stage of the Dissociation 1 script.



cided with a reduction in heart rate at this stage. At the consequence stage, there were increases in heart rate, anxiety and lack of control as the immediate aftermath of the sexual assault was imaged.

Figure 3 presents the ratings for the VAS ratings and the mean heart rate elicited in response to the Dissociation 2 event. In response to imagery of this event, there was little evidence of fear and anxiety ratings were not elevated. Unlike the Dissociation 1 event, intense depersonalization was reported from the first stage of imagery. At the incident stage, there was a reduction in the ratings of unreality that coincided with an uncontrolled excitement. Despite this, the pattern of heart rate response coincided with the Dissociation 1 event with a reduction in heart rate at the incident stage when the intensity of the uncharacteristic behaviour was at its peak.

Figure 4 presents the VAS ratings and the mean heart rate for each stage of the stressful event script. In contrast with the Dissociation events, there was an elevation in negative affect across the stages of the script as the event unfolded. Heart rate remained high throughout the stages of the imagery script. Interestingly, there was an elevation in ratings of unreality at the incident and consequence stages to a moderate level.

Figure 5 presents the VAS ratings and the mean heart rate elicited in response to the neutral imagery. VAS ratings were low and in the posi-

FIGURE 3. The visual analogue scale scores and the mean heart rate for each stage of the Dissociation 2 script.

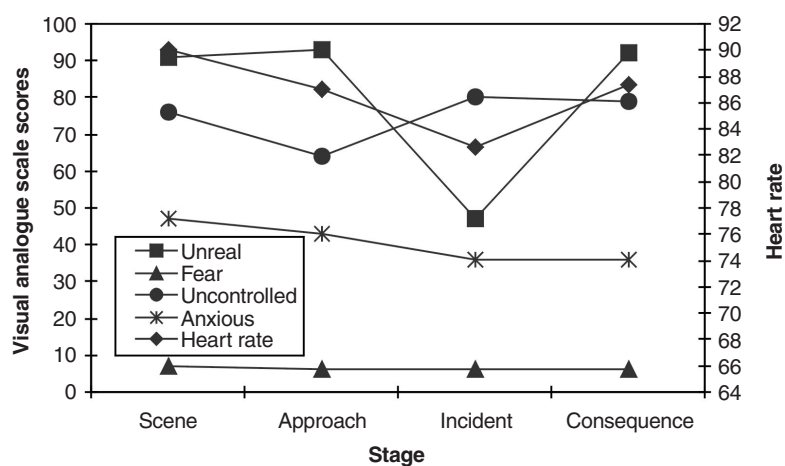


FIGURE 4. The visual analogue scale scores for mean heart rate for each stage of the stressful event script.

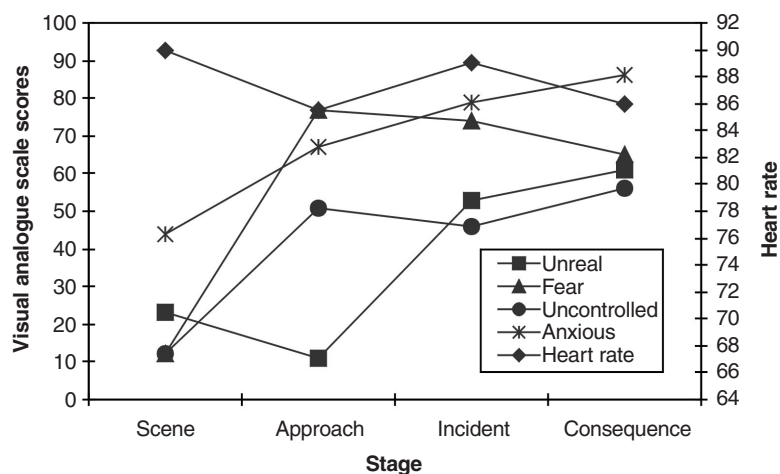
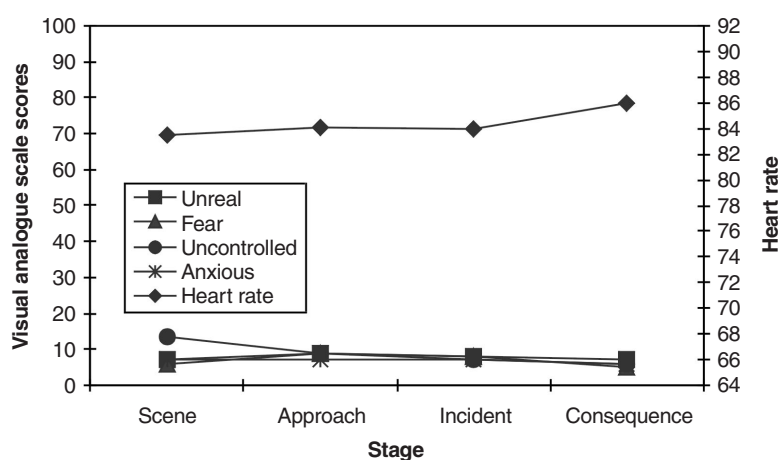


FIGURE 5. The visual analogue scale scores and mean heart rate for each stage of the neutral script.



tive range and there was little variation in heart rate across the stages of the script.

DISCUSSION

The results of this assessment indicated that dissociation was associated with a reduction of arousal. This was evident with the heart rate measure that consistently has been reported to be a robust measure of the autonomic responses (Arena & Hobbs, 1995; Blanchard, Hickling, & Taylor, 1991; Burns, Ferguson, Fernquist, & Katkin, 1992; Holland, Bouffard, & Wagner, 1992). It is most interesting to note that in response to the Dissociation 1 script when sexual and physical assault were being described, the patient experienced a marked reduction in heart rate that could not be accounted for by the content of the experience being described. The patient was able to describe a dissociative/ depersonalization experience that felt to her like she was removed from the immediate scene and being allowed to view the assault from a distance, feeling calm and detached.

It is also interesting to note that the heart rate response to the Dissociation 2 script at the incident stage also resulted in a reduction in arousal. In this incident stage, the patient was determined to open the door to the

pizza delivery person despite the fact that she was semi-naked and despite the fact that the threat-sensitive nature of her normal presentation would have made such an act impossible for her. Although it is not known what triggered that particular dissociative episode, it was clear that she was able to describe being in an altered state that was associated with an excited and carefree personality.

The division of imagery into stages has demonstrated that it is the actual experience of dissociation that is associated with reduced heart rate. It would appear that heart rate reduction is most evident when the dissociative experience is most intense. The detailed and carefully structured nature of the guided imagery presentation allows for the tracking of responses over the course of an event. This has clearly been demonstrated elsewhere. For example, by divided imagery of self-mutilation into stages, it has been determined that intense distress and elevated heart rate immediately prior to self-cutting changed to a tension reduction response with the act of self-cutting that was presented in the incident stage of the self-mutilation imagery script (Brain et al., 1998; Haines et al., 1995). The highly structured nature of the imagery presentation distinguishes it from the free form of some imagery techniques that would allow for a drift in the material imaged by the individual and an inability to distinguish the changes in the nature of the response to presented material.

The psychological ratings of response to imagery clearly demonstrated the different responses this patient had to the two very different dissociative episodes. In response to the Dissociation 1 script describing the assault, the patient reported initially high levels of psychological distress that gave way to very low ratings of distress when the dissociative experience was most complete. Clearly the most distressing of the two dissociative episodes, the assault, was related to a consistent pattern of reduction of distress at the incident stage. This fits with the psychophysiological response to the assault. In contrast, the Dissociative 2 episode, was associated with a range of psychological responses that were not necessarily negative for the individual. The patient did report feeling out of control throughout the pizza delivery episode but this lack of control was associated with self-reports of excitement and ratings of little anxiety or sadness. The ratings of lack of control during the Dissociation 2 script contrasted with the rating of much control during the incident stage of the Dissociation 1 script when the patient indicated that the feeling of detachment and the sense of floating on the ceiling provided for her a sense of being in charge of the situation.

A further interesting result occurred in relation to the level of dissociation/depersonalization (normal-unreal rating) that the patient reported in relation to the stressful event. It is evident that this person has a propensity to dissociate at times of stress. It may be that some critical point needs to be reached before dissociation occurs but that there is a lead up to this critical point where depersonalization is experienced. It also may be that the critical stress point beyond which dissociation will occur changes as a function of current functioning and levels of symptomatology.

The results of this study have supported the proposition that dissociation serves to protect the individual from the consequences of extreme distress. The results of this study more strongly support the notion that dissociation occurs as a function of stress or distress despite others speculating that dissociation is more related to the relevance of the experience to a particular identity than affective state (e.g., Beere, 1996). There is little doubt in this case that the patient experienced high levels of distress and reported an impressive array of symptoms related to a number of Axis I and Axis II disorders. The high levels of Axis I and II comorbidity in patients with DID has been noted elsewhere (Ellason, Ross, & Fuchs, 1996).

Another attempt was made to examine the function of dissociation as a means of reducing psychophysiological arousal (Griffin, Resick, & Mechanic, 1997). In that study, women who had recently experienced rape were categorized on the basis of high or low peritraumatic dissociation. The high dissociation group demonstrated reduced psychophysiological arousal when talking about the rape compared with the low dissociation group and despite continued report of psychological distress.

Similarly, the participant in this study demonstrated decreased psychophysiological arousal. However, in contrast with the study by Griffin and colleagues (1997), the participant in this study accurately rated her psychological response as congruent with her description of events and the level of psychophysiological arousal. That is, she reported feeling less fearful during the periods of dissociation. The congruence of the psychophysiological and psychological responses in this study probably reflects the fact that this young woman had considerable experience in using dissociation to control unpleasant distress. She had learned that she feels relief during the dissociative episodes.

A single case study such as this provides a good place to begin to examine the processes associated with a psychological phenomenon such as dissociation. In this case, the multiple script types used with a single

participant allows the differential responding under different psychological conditions to be examined. However, it is subsequently preferable to determine the robustness of the finding by comparing these results with those of others experiencing similar psychological reactions. Indeed, the experimental examination of DID has been identified as an area necessary to pursue given the overemphasis in the literature on clinical interpretation (Reisner, 1994).

A limitation of this study is that the need to use a non-invasive technique such as guided imagery results in the necessity that the individual is able to recall elements of a dissociative episode and have some awareness of the altered state. It has been determined that even in the absence of complete, explicit information transfer between alternate personalities, some information is passed on (Eich, Macaulay, Loewenstein, & Dihle, 1997; Peters, Uytterlinde, Consemulder, & van der Hart, 1998). The participant described in this report was able to recall these two episodes although, clearly, they were not the events associated with the most extreme experience of dissociation; those events were outside her awareness. However, the alternative is to continuously monitor the person's responses in an intrusive manner and it is questionable whether it is ethically sound to record responses in the hope that the individual becomes sufficiently distressed to dissociate. Certainly, given this participant's fragile adjustment, such a procedure would not be considered.

Of course, as an alternative research strategy, it may be interesting to administer guided imagery scripts of a dissociative episode of which the participant has no conscious awareness and which was witnessed by a significant other. It cannot be assumed that because the individual is unable to voluntarily recall the circumstances of a dissociative episode, that psychophysiological responses will accord with this lack of recall (i.e., minimal response). It may be that even in the absence of conscious awareness, appropriate psychophysiological responses to dissociation would be evident. The extent to which this research strategy could be applied would be dependent on the severity of dissociation and the extent to which memory encoding fails at the time of dissociation (Allen, Console, & Lewis, 1999), that is, whether dissociative memories are able to be retrieved or were not encoded sufficiently well at the time of experience to allow recall to occur.

CONCLUSIONS

This study was undertaken to determine the function of dissociative episodes experienced by a young woman whose symptoms meet the di-

agnostic criteria for DID. It was determined that the dissociative episodes served the purpose of reducing psychophysiological arousal. In light of this, serious consideration would need to be given before therapeutically intervening to control dissociative episodes given that it is apparent that they protect the individual from intense and overwhelming distress. The debate about the appropriateness of controlling dissociation in DID has been raised by others (e.g., Boon, 1997; van der Hart & Boon, 1997).

The results of this study also highlight the importance of examining the mechanisms of dissociation in DID rather than predominantly directing research efforts to establishing the existence of alternative personality states. The consideration of the process of dissociation may help clarify the etiology of DID and other dissociative disorders as well as direct therapeutic efforts.

REFERENCES

- Allen, J.G., Console, D.A., & Lewis, L. (1999). Dissociative detachment and memory impairment. Reversible amnesia or encoding failure? *Comprehensive Psychiatry*, 40, 160-171.
- American Psychiatric Association (1994). *Diagnostic and Statistical Manual of Mental Disorders (4th ed.)*. Washington, DC: Author.
- Arena, J.G., & Hobbs, S.H. (1995). Reliability of psychophysiological responding as a function of trait anxiety. *Biofeedback and Self-Regulation*, 20, 19-37.
- Beere, D.B. (1996). Switching: Part 1. An investigation using experimental phenomenology. *Dissociation: Progress in the Dissociative Disorders*, 9, 48-59.
- Birnbaum, M.H., & Thomann, K. (1996). Visual function in multiple personality disorder. *Journal of the American Optometric Association*, 67, 327-334.
- Blanchard, E.G., Hickling, E.J., & Taylor, A.E. (1991). The psychophysiology of motor vehicle accident related posttraumatic stress disorder. *Biofeedback and Self-Regulation*, 16, 449-458.
- Boon, S. (1997). The treatment of traumatic memories in DID: Indications and contra-indications. *Dissociation: Progress in the Dissociative Disorders*, 10, 65-79.
- Brain, K.L., Haines, J., & Williams, C.L. (1998). The psychophysiology of self-mutilative behavior: Evidence of tension reduction. *Archives of Suicide Research*, 4, 227-242.
- Brende, J.O. (1984). The psychophysiologic manifestations of dissociation: Electrodermal responses in a multiple personality disorder. *Psychiatric Clinics of North America*, 7, 41-50.
- Burns, J.W., Ferguson, M.L., Fernquist, S.K., & Katkin, E.S. (1992). Test-retest reliability of inotropic and chronotropic measures of cardiac reactivity. *International Journal of Psychophysiology*, 12, 165-168.
- Coons, P.M. (1988). Psychophysiologic aspects of multiple personality disorder: A review. *Dissociation: Progress in the Dissociative Disorders*, 1, 47-53.

- Derogatis, L.R. (1983). *SCL-90-R: Administration, scoring and procedures manual* (2nd ed.). Towson: Clinical Psychometric Research.
- Eich, E., Macaulay, D., Loewenstein, R.J., & Dihle, P.H. (1997). Memory, amnesia, and dissociative identity disorder. *Psychological Science*, 8, 417-422.
- Ellason, J.W., Ross, C.A., & Fuchs, D.L. (1996). Lifetime Axis I and II comorbidity and childhood trauma history in dissociative identity disorder. *Psychiatry: Interpersonal and Biological Processes*, 59, 255-266.
- Griffin, M.G., Resick, P.A., & Mechanic, M.B. (1997). Objective assessment of peritraumatic dissociation: Psychophysiological indicators. *American Journal of Psychiatry*, 154, 1081-1088.
- Haines, J., Josephs, S., Williams, C.L., & Wells, J.H. (1998). The psychophysiology of obsessive-compulsive disorder. *Behavior Change*, 15, 244-254.
- Haines, J., Williams, C.L., Brain, K.L., & Wilson, G.V. (1995). The psychophysiology of self-mutilation. *Journal of Abnormal Psychology*, 104, 471-489.
- Holland, L.J., Bouffard, M., & Wagner, D. (1992). Rating of perceived exertion, heart rate, and oxygen consumption in adults with multiple sclerosis. *Adapted Physical Activity Quarterly*, 9, 64-73.
- McCormack, H.M., de Horne, D.J., & Sheather, S. (1988). Clinical applications of visual analogue scales: A critical review. *Psychological Medicine*, 18, 1007-1019.
- Miller, S.D., & Triggiano, P.J. (1992). The psychophysiological investigation of multiple personality disorder: Review and update. *American Journal of Clinical Hypnosis*, 35, 47-61.
- Peters, M.L., Uytterlinde, S.A., Consemulder, J., & van der Hart, O. (1998). Apparent amnesia on experimental memory tests in dissociative identity disorder: An exploratory study. *Consciousness and Cognition: An International Journal*, 7, 27-41.
- Pitman, R.K., Lanes, D.M., Williston, S.K., Guillaume, J.L., Metzger, L.J., Gehr, G.M., & Orr, S.P. (2001). Psychophysiologic assessment of posttraumatic stress disorder in breast cancer patients. *Psychosomatics*, 42, 133-140.
- Putnam, F.W. (1984). The psychophysiologic investigation of multiple personality disorder: A review. *Psychiatric Clinics of North America*, 7, 31-39.
- Putnam, F.W. (1991). Recent research on multiple personality disorder. *Psychiatric Clinics of North America*, 14, 489-502.
- Putnam, F.W. (1996). Child development and dissociation. *Child and Adolescent Psychiatric Clinics of North America*, 5, 285-301.
- Putnam, F.W., Guroff, J.J., Siberman, E.K., Barban, L., & Post, R.M. (1986). The clinical phenomenology of multiple personality disorder: Review of 100 recent cases. *Journal of Clinical Psychiatry*, 47, 285-293.
- Putnam, F.W., Zahn, T.P., & Post, R.M. (1990). Differential autonomic nervous system activity in multiple personality disorder. *Psychiatry Research*, 31, 251-260.
- Reisner, A.D. (1994). Multiple personality disorder diagnosis: A house of cards? *American Journal of Psychiatry*, 151, 629.
- Riley, K.C. (1988). Measurement of dissociation. *The Journal of Nervous and Mental Disease*, 176, 449-450.
- Ross, C.A., Heber, S., Norton, G.R., Anderson, D., Anderson, G., & Barchet, P. (1989). The Dissociative Disorders Interview Schedule: A structured interview. *Dissociation*, 11, 169-189.

- Shin, L.M., Dougherty, D.D., Orr, S.P., Pitman, R.K., Lasko, M., Macklin, M.L., Alpert, N.M., Fischman, A.J., & Rauch, S.L. (2000). Activation of anterior paralimbic structures during guilt-related script-driven imagery. *Biological Psychiatry*, 48, 43-50.
- Tsai, G.E., Condie, D., Wu, M.T., & Chang, I.W. (1999). Functional magnetic resonance imaging of personality switches in a woman with dissociative identity disorder. *Harvard Review of Psychiatry*, 7, 119-122.
- van der Hart, O., & Boon, S. (1997). Treatment strategies for complex dissociative disorders: Two Dutch case examples. *Dissociation: Progress in the Dissociative Disorders*, 10, 157-165.
- Wells, J.H., Haines, J., Williams, C.L., & Brain, K.L. (1999). The self-mutilative nature of severe onychophagia: A comparison with self-cutting. *Canadian Journal of Psychiatry*, 44, 40-47.

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