THE ROLE OF ABSORPTION, FANTASY PROVENESS AND HYPNOSIS IN RESPONSE TO TRAUMA

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Detachment and compartmentalization are frequently reported features of psychological reactions to trauma. We propose that these responses are the result of changes in two distinct but reciprocally active neuronal systems of self-regulatory control. The former is linked to affective and experiential self-regulation and the latter to cognitive and behavioural self-regulation. Detachment and compartmentalization are neither intrinsically negative nor positive. Each is a process which carries with it a discrete set of potentials for self-regulation which in turn closes off access to an alternative set of conscious cognitive self-regulatory strategies. Compartmentalization results from the disengagement of networks of volitional control. Detachment may be invoked by absorption in inner-generated experiences, a process equivalent to hypnosis, through which individuals may learn to regain control of the shifts between the two modes of self-regulation as contexts and circumstances require.

This paper explores the potential role of individual differences in the personality traits absorption, fantasy proneness and hypnotic susceptibility in the response to trauma and the potential importance of this process for both researchers and clinicians. Each is closely related to self-generated “inner” experience and thereby, it is argued, to important potential pathways for regulating awareness of stressful and painful situations.

We aim to use these individual differences to build a model of at least some trauma responses. While we will not be presenting results from new experimental research, we will be examining the literature in order to gain a clearer understanding of some of the major psychological components of traumatic stress. Our examination of the relevant literature will also guide us in our attempt to best determine how our model can be tested experimentally.
Ultimately, the aim of building a model of the differences in trauma responding is to tailor individual treatment programs to individual responses. However, this paper does not attempt to describe a treatment program or to cover all aspects of responses to trauma. What we hope to describe is a way of thinking about these issues that is both new and beneficial.

There is no simple definition of a traumatic incident. Traumatic incidents run the gamut of experiences from natural disasters through to deliberate human acts of immense cruelty. The experience of trauma is not an uncommon one, as van der Kolk and McFarlane (1996, p. 3) state: “Experiencing trauma is an essential part of being human.” However, defining what trauma is can be a complex undertaking. Trauma has been defined as something “outside the range of usual human experience” according to the *Diagnostic and Statistical Manual of Mental Disorders*, third edition (DSM-III-R; American Psychiatric Association, 1987, p. 250). However, this definition came under some scrutiny for the implication that experiencing trauma was in some way abnormal. As Herman (1997, p. 33) was to state many years later, “Traumatic events are extraordinary, not because they occur rarely, but rather because they overwhelm the ordinary human adaptations to life.”

Spiegel (1997, p. 494), for instance, describes trauma as a “sudden discontinuity in physical experience that elicits similar discontinuities in mental experience.” The most recent edition of the DSM, the DSM-IV-TR (American Psychiatric Association, 2000) provides a broad, but relatively all-encompassing definition which no longer makes reference to traumatic situations as uncommon. Rather, it describes a traumatic stressor as one:

> involving direct personal experience of an event that involves actual or threatened death or serious injury, or other threat to one’s physical integrity; or witnessing an event that involves death, injury, or a threat to the physical integrity of another person; or learning about unexpected or violent death, serious harm, or threat or injury experienced by a family member or other close associate. (p. 463)

The DSM-IV-TR (2000, pp. 463–464) also presents a long list of experiences that may be perceived as traumatic ranging from experiences that may be considered at the extreme end of the trauma spectrum (e.g., being taken hostage, incarceration in a concentration camp) to more everyday experiences that could happen to anyone anywhere (e.g., natural disasters, automobile accidents, being diagnosed with a life-threatening illness). This list is far from exhaustive, however, as there are potentially many other situations which may be perceived as traumatic.
A great deal of research has been conducted on reactions to various traumatic incidents. For example, research has examined earthquakes (e.g., Cardeña & Spiegel, 1993), a firestorm (Koopman, Classen, & Spiegel, 1994), rape (e.g., Griffin, Resick, & Mechanic, 1997) and motor vehicle accidents (e.g., Harvey & Bryant, 1999). The individuals who had experienced these traumas responded with numerous negative reactions including anxiety, depression, acute stress, or posttraumatic stress disorder (PTSD). Many studies have reported that those exposed to traumatic events often experience dissociation, both at the time of the incident (peritraumatic dissociation) and at a later time (Nijenhuis, van der Hart, & Steele, 2010). It appears that dissociation is either an effect or a coping mechanism by which many confronted with trauma respond to what Brown (2004, p. 797) refers to as “overwhelming negative affect.”

Research has also investigated the possibility that the capacity for dissociation may result in vulnerabilities to certain psychopathological reactions (Merckelbach & Muris, 2001). While it has been found that dissociation is not an abnormal response to a traumatic situation (e.g., Brown, 2004), this response may become maladaptive if it persists in new contexts. For instance, Nixon, Bryant, Moulds, Felmingham, and Mastrodomenico (2005) claim that for those exposed to trauma, dissociation may be a useful response that can assist in limiting distress. However, this is in the short-term. They claim that the continued use of a dissociative mechanism may interfere with trauma recovery. Littleton, Horsley, John, and Nelson (2007) found similar results when individuals rely on any kind of avoidance strategy for too long a period of time. Again, these strategies are helpful and adaptive in the short term but problematic in the long term. The long-term use of a dissociative mechanism or other avoidance strategy may be a central feature of the development of PTSD. PTSD is characterized by persistent avoidance of any reminder of the trauma, emotional numbing (i.e., dampened affect and detachment) and trouble concentrating (Foa & Riggs, 1995).

TRAUMA AND DISSOCIATION

The concept of dissociation, and its relationship to trauma, has a long history. In the nineteenth century, Jean-Martin Charcot, the French neurologist, was in residence at the famous Salpêtrière Hospital in Paris where he worked with patients experiencing hysteria. Charcot was the first to determine that a relationship existed between hysteria and dissociation, although he did not
coin the phrase and only approached the study of this phenomenon from a purely neurological viewpoint (Scaer, 2001). The concept of dissociation itself was first introduced by Pierre Janet (1907, as cited in Roelofs et al., 2002), a student of Charcot. Janet introduced the concept of autohypnosis which he considered to be “an adaptive reaction to overwhelming stress” and thus a dissociative response (Roelofs et al., 2002, p. 390). In subsequent studies on hysteria, Janet was convinced that hysteria itself was the result of traumatic experiences and, as such, could be studied and treated through the use of hypnosis (Butler, Duran, Jasiukaitis, Koopman, & Spiegel, 1996). This was a progression in thinking from that of Charcot who believed that hysteria was a hereditary and degenerative process (Scaer, 2001). According to Janet, dissociation only occurred in individuals exposed to traumatic situations and thus experiencing hysteria (van der Hart & Horst, 1989). Since then, others have taken the view that some forms of dissociation occur within the ordinary range of experience and are not necessarily confined to pathological circumstances (Giesbrecht, Lynn, Lilienfeld, & Merckelbach, 2008).

**THE CONCEPT OF DISSOCIATION**

As there is no agreed-upon definition of what constitutes dissociation (Cardeña, 1994), many different researchers have taken the concept and divined many different ways to describe it. The DSM-IV-TR (American Psychiatric Association, 2000, p. 519) defines dissociation as a “disruption in the usually integrated functions of consciousness, memory, identity, or perception.” On the other hand, Marmar, Weiss, Metzler, and Delucchi (1996, p. 94) define dissociation solely in terms of the compartmentalization “of experience in which elements of a traumatic experience are stored in memory as isolated fragments rather than as an integrated whole.”

In their 2005 review, Holmes et al. compared three theorists’ conceptualizations of dissociation in order to find points of convergence in their different viewpoints. First, Cardeña (1994) identified three categories of dissociation which Holmes et al. (2005, p. 4) described as: (a) the lack of integration between mental systems, (b) an “alteration in consciousness involving a disconnection from self or the world,” and (c) a defensive strategy. The first category encompasses disorders such as dissociative amnesia or dissociative identity disorder (DID). Category two intrinsically covers just two concepts: depersonalization (the feeling that one is removed or detached from one’s feelings, thoughts or emotions; Cardeña, 1994) and derealization...
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(experiencing the world as unreal or feeling that there is no substance to it; Cardeña, 1994). Such a feeling may arise in situations such as in the aftermath of natural disasters where such traumatic incidents “profoundly alter the individual’s sense of personal and environmental continuity and challenge the usual integrative processes of identity and conscious experience” (Cardeña & Spiegel, 1993, p.477). Cardeña and Spiegel (1993) present just such evidence in their study of the reactions to the San Francisco Bay Area earthquake of 1989.

Second, Putnam (1997, as cited in Holmes et al., 2005, p. 5) distinguished between two categories. The first is referred to as “dissociative-process symptoms” and encompasses the concepts depersonalization and derealization. The second category is one Putnam also referred to as compartmentalization and can describe the process that occurs in DID. That is, a lack of integration that echoes Cardeña’s (1994) category one dissociation.

Finally, Brown (2002) distinguished between two categories of dissociation: Type 1 (inclusive of conditions such as the conversion disorders, dissociative amnesia, dissociative fugue and DID) and Type 2 dissociation (which comprises depersonalization and derealization).

As may be observed from the preceding review, there are many similarities between the three different perspectives. Holmes et al. (2005) concluded that these points of similarity converge on two distinct categories of dissociation that they call detachment and compartmentalization.

Detachment may be defined in terms of an “altered state of consciousness characterized by a sense of separation (or ‘detachment’) from certain aspects of everyday experience, be it their body … sense of self (as in depersonalization), or the external world (as in derealization)” (Holmes et al., 2005, p. 5). It may be observed that this definition encompasses Cardeña’s (1994) category 2 dissociation, Putnam’s (1997) “dissociative-process symptoms” and Brown’s (2002) Type 2 dissociation. There has been a great deal of research conducted on the experience of detachment on individuals after traumatic experiences. For instance, Noyes and Kletti (1977) interviewed 101 survivors of life-threatening danger (e.g., motor vehicle accidents, falls, serious illnesses, etc.) and found that 34% felt detached from their bodies and 30% experienced derealization during the actual life-threatening event. These figures increase substantially when only looking at those individuals who believed that they were going to die as a result of the trauma (61% and 49%, respectively; \( n = 59 \)). Cardeña and Spiegel (1993) found that for the week following the San Francisco Bay Area earthquake, the individuals they interviewed reported more experiences of depersonalization (e.g., self-detaching from the body,
seeing events at a distance) and derealization (e.g., having a lack of interest in activities, feeling that one’s surroundings are unreal).

Compartmentalization, on the other hand, encompasses Cardeña’s (1994) category 1 dissociation, Putnam’s (1997) use of the term and Brown’s (2002) Type 1 dissociation. Compartmentalization may be defined in terms of an inability to “deliberately control processes or actions that would normally be amenable to such control” and which “incorporates conditions characterized by an inability to bring normally accessible information into conscious awareness” (Holmes et al., 2005, p. 6) and is exemplified in the disorders previously mentioned by Brown (2002). Thus, it is a lack of volition. Holmes et al. (2005) speak of the relationship between “traumatic amnesia” (i.e., an inability to retrieve a required memory) and compartmentalization. Their claim is that details and memories of the traumatic event never reach consciousness and are therefore “compartmentalized” or isolated away from conscious thought. In addition, Holmes et al. (2005) claim that compartmentalization may best be exemplified in the symptoms of conversion disorder.

Conversion disorder is a condition whereby individuals display neurological symptoms even when no neurological explanation can be found. When an individual is exposed to a traumatic or stressful situation, the physical symptoms that arise in response to this event allow the individual to effectively repress the memory of the actual event and instead focus on their symptomatology. So as Brown (2004) states, the individual is able to express distress without focusing on the actual cause of that distress. Roelofs et al. (2002, p. 390), taking their cue from the work of Kihlstrom (1992), describe conversion as a “dissociation of lower level implicit information processes from higher level explicit information processes.” Kihlstrom, Barnhardt, and Tataryn (1992) provide an example involving visual processing in a person with conversion blindness. Conversion blindness occurs when an individual reports a lack of visual awareness in the absence of an organic cause. A particular curiosity of this condition is that people are unlikely to run into furniture or other people or to trip over obstacles in front of them. Kihlstrom et al. (1992) explain the reason for this phenomenon is that while individuals claim honestly that they cannot see (i.e., they have a failure in explicit visual processing), the stimuli around them are still being processed, albeit at a lower, implicit level. This is the reason why they do not collide with the items or people around them: The stimuli still have an influence on their behaviour.

Also of interest, Roelofs et al. (2002) found evidence to support the claim that those with conversion disorder show higher levels of hypnotic susceptibility
compared with those diagnosed with another disorder (e.g., affective disorder). Thus, they believe that information is dissociated from consciousness after a traumatic event and the individual “self-hypnotizes” in order to separate themselves from the impact of the situation. This idea is in line with Janet’s original thoughts on autohypnosis in response to overwhelming stress. Thus conversion disorder may be regarded as a defence mechanism.

Research has also found that there is a close association between absorption and widely used measures of dissociation (e.g., Hutchinson-Phillips, Gow, & Jamieson, 2007), and between absorption and fantasy proneness (e.g., Braffman & Kirsch, 1999; Lynn & Rhue, 1988; Merckelbach, Muris, & Rassin, 1999). It was Hilgard (1970) who, in her study on imaginative involvement, determined that individuals were prone to become deeply involved in a wide variety of experiences or imaginative activities. This discovery gives credence to the close links that exist between absorption and fantasy proneness. Hilgard (1970) also found that those who experienced greater numbers of imaginary involvements were more hypnotically suggestible. Thus, it is this “imaginative involvement” that helps to facilitate absorption (Lynn & Rhue, 1988; Tellegen & Atkinson, 1974).

Lynn and Rhue (1986, 1988) are two researchers who have conducted numerous studies in this field and continually found evidence to support the contention that fantasy proneness and absorption are strongly related. In fact, Lynn and Rhue (1988) have concluded that the two constructs are in fact indistinguishable. Further evidence for this close association may be given in the form of the instruments used to measure the two constructs. For example, Merckelbach et al. (1999) found that the Tellegen Absorption Scale (TAS; Tellegen & Atkinson, 1974), the primary measure of absorption, and the Creative Experiences Questionnaire (CEQ; Merckelbach, Horselenberg, & Muris, 2001), a measure of fantasy proneness, correlated at $r = .76$. Lynn and Rhue (1988) have also found, on more than one occasion, high correlations (> .70) between the measures of absorption and fantasy proneness (see Lynn & Rhue, 1986, 1988). With such a close association existing between these two constructs, it has been suggested that a more apt name for this particular characteristic should be “fantasy-absorption” (Hough, 2006).

**ABSORPTION**

Absorption may be defined as the ability to become engrossed in an experience to the exclusion of other distracting concerns and is a relatively common
characteristic in the population. Much of the original research on this construct is attributable to Tellegen and Atkinson (1974, p. 268) who defined absorption as “a disposition for having episodes of ‘total’ attention that fully engages one’s representational (i.e., perceptual, enactive, imaginative and ideational) resources” and which results “in a heightened sense of the reality of the attentional object, imperviousness to distracting events, and an altered sense of reality in general, including an empathically altered sense of self.” While absorption often relates to quite ordinary experiences (e.g., watching an engrossing film in a cinema and being quite unaware of your surroundings or actions), some researchers have drawn parallels between the components of hypnosis (dissociation, absorption and suggestibility) and experiences related to trauma. For example, Spiegel (1997) examined these three components and their relation to PTSD. He claimed that absorption, in particular, may be considered as similar in experience to the intrusive re-experiencing that some individuals undergo after a traumatic event. An example of such a traumatic re-living is the experience of flashbacks.

Tellegen (1981) extended the definition of absorption by introducing the concept of two distinct modes of attentional deployment that he regarded as of central importance to the construct: the instrumental and the experiential mental sets. The instrumental mental set may be defined as a “state of readiness to engage in active, realistic, voluntary, and relatively effortful planning, decision making, and goal-directed behavior” (Tellegen, 1981, p. 222). The experiential mental set, on the other hand, is a “state of receptivity or openness to experiencing in the sense of readiness to undergo whatever experiential events, sensory or imaginal, that may occur, with a tendency to dwell on ... the experiences themselves and the objects they represent” and thus there is a sense of “effortlessness” and “involuntariness” (Tellegen, 1981, p. 222). Tellegen concluded that those high in absorption are more inclined, when circumstances permit, to set aside an instrumental set and to adopt an experiential set, whereas those low in the trait are predisposed to continue to hold an instrumental set. Thus, in the face of traumatic experiences, individuals high in the trait are more likely to be able to use this ability to “escape” their current aversive reality. The individual is able to use this as a coping mechanism to remove themselves from an experience that would otherwise be unbearable.

FANTASY PRONENESS

The related personality trait of fantasy proneness is a relatively recent “discovery” in the psychological literature. This discovery was explicated in light of
Josephine Hilgard’s work in the related field of imaginative involvement which was a huge leap forward in the area of hypnosis research. What Hilgard (1970) discovered after interviewing both high and low hypnotizable individuals was that some individuals were capable of becoming so involved in an activity (e.g., reading or music) that they were indifferent to distracting stimuli. They were able to block it out and become totally absorbed in whatever they were actively pursuing. Hilgard thus determined that imaginative involvement was a necessary component of hypnotic susceptibility.

Following Hilgard’s (1970) pioneering work on imaginative involvement in highly hypnotizable individuals, Wilson and Barber (1983) conducted an initial study which involved interviewing 27 women who they had rated as highly hypnotizable and comparing them with 25 low-to-medium hypnotizable women. The results of this research indicated to Wilson and Barber (1981, 1983) that a subset of the population (approximately 4% of North Americans) fantasize throughout large portions of their waking life and vividly experience their imaginings as though they are “as real as real” (Wilson & Barber, 1983, p. 340). While this research had its limitations (i.e., all the participants were female and the majority were university educated), the implications were still noteworthy.

Wilson and Barber (1983) also found that those individuals high in fantasy proneness could use their ability to become absorbed in fantasy as a coping device. These individuals can use their imaginings as a means to escape a difficult or stressful situation, or as Wilson and Barber (1983, p. 353) state: “...they never need to ... feel miserable, or feel stuck in an unbearable life situation because they can always escape into fantasy.” They also state that this reaction or ability is automatic; it occurs spontaneously in response to their thoughts and feelings at the time (Wilson & Barber, 1983). This escape from the reality of a painful or stressful event is echoed in studies on dissociation (e.g., Cardeña, 1994; Koopman, Classen, Cardeña, & Spiegel, 1995; Marmar et al., 1996; Nixon et al., 2005).

Lynn and Rhue and colleagues (e.g., Lynn & Rhue, 1986, 1988; Lynn, Rhue, & Green, 1988; Rhue & Lynn, 1987, 1989) have spent many years examining the relationship between fantasy proneness and the related constructs of hypnotizability, absorption, imaginative ability and waking suggestion. They have continually discovered that fantasizers are distinguishable from non-fantasizers on measures of fantasy, imagination, creativity and hypnotizability. Their research has also determined that there may in fact be developmental antecedents for the fantasy prone personality. Rhue and Lynn (1987) found
that fantasy prone individuals tended to come from two different backgrounds. The first group had a history of extensive involvement in fantasy dating back to childhood. They were encouraged in many activities such as the reinforcement of imaginary play. In addition, they were read to by significant adults (e.g., parents or grandparents) who reinforced their fantasies (Lynn & Rhue, 1988). The second group, though, experienced punishment and/or physical abuse or isolation in their childhood and used their fantasy ability to escape from their aversive environment. Thus fantasy served a defensive function that may be regarded as an adaptive response (Lynn & Rhue, 1988).

**ABSORPTION AND PSYCHOSOMATIC SELF-REGULATION**

While it has been suggested that hypnotic suggestibility is a risk factor for dissociative psychopathology (e.g., Nixon et al., 2005), absorption and hypnotic suggestibility can also be adaptive and both have been found to be related to psychosomatic self-regulation. For example, Ott, Sammer, and Vaitl (2002; Vaitl et al., 2005) conducted research on baroreflex sensitivity in response to rhythmic tilting. The baroreflex is a mechanism employed by the body to maintain blood pressure. It works by way of a negative feedback loop that reduces elevated blood pressure and increases blood pressure that has fallen too low. Ott et al. (2002) found that baroreflex sensitivity is significantly correlated with absorption. The higher the individual was in trait absorption, the greater was baroreflex sensitivity.

Further relevant evidence of the role of inner experience in psychosomatic self-regulation is found in Qualls and Sheehan (1981), who conducted research on the effect of inner and outer directed attention on electromyograph (EMG) biofeedback in high and low absorption participants. EMG biofeedback has been used to promote relaxation by drawing attention (by way of light or sound) to muscles that have become contracted through stress. Through continuous monitoring of their muscle activity, individuals become more aware of their tension and through biofeedback training learn to control their anxiety when they feel it building in their everyday lives. Interestingly, Qualls and Sheehan found that biofeedback interfered with high absorption participants’ ability to relax, but assisted those low in absorption. It was determined that high absorption participants already had the requisite skills necessary to become relaxed and so did not need external assistance. These skills included the ability to divert attention from the environment onto
inner-generated experiences and imaginings. As those low in absorption did not have these skills, biofeedback actually encouraged them to redirect their thoughts and to concentrate on relaxing. As Qualls and Sheehan (p. 205) state: “It is thus hypothesized that the biofeedback condition places an external attentional demand on low-absorption subjects that enhances their capacity to focus on the task at hand.” Thus, this supports the notion that those high in absorption are more capable of these forms of somatic self-regulation than those low in absorption as a result of their ability to “focus inwardly” in response to the problems plaguing them.

An example of the role high hypnotic suggestibility has in psychosomatic self-regulation comes from Santarcangelo and Sebastiani (2004), who found that this trait offered protection against cardiovascular threat. In this study, the researchers found that highs were able to better maintain an adaptive cardiovascular response (i.e., flow-mediated dilation [FMD] of peripheral arteries) when confronted with a moderately aversive stimulus compared with those low in hypnotic suggestibility (Sebastiani, Simoni, Gemignani, Ghelarducci, & Santarcangelo, 2003). FMD is reduced during mental stress and is an important risk factor for cardiovascular disease (Santarcangelo & Sebastiani, 2004). Their research found that hypnosis buffers the stress-induced reduction of FMD in highs and provides a kind of protective barrier against stress at the vascular level (Jambrik, Sebastiani, Picano, Ghelarducci, & Santarcangelo, 2005; Santarcangelo & Sebastiani, 2004).

HYPNOSIS AND ANALGESIA

One of the principal clinical uses of hypnosis has been for analgesia, the relief of pain. The sensation of pain may be regarded as multidimensional (Rainville, Carrier, Hofbauer, Bushnell, & Duncan, 1999). Pain may be described in terms of its quality (i.e., the characteristics that distinguishes it from other sensory experiences), intensity (i.e., the strength of the sensation) and spatio-temporal characteristics (i.e., where and when it occurs; Rainville et al., 1999). Pain has been defined as “an unpleasant sensory and emotional experience associated with actual or potential [italics added] tissue damage, or described in terms of such damage” (Mersky & Bogduk, 1994, as cited in Rainville, 2002, p. 195). Thus pain may or may not involve actual physical stimuli.

There has been extensive research conducted employing combined behavioural, self-report and neuroimaging paradigms to investigate the role of hypnosis in attenuating the sensation of pain (e.g., Faymonville et al., 2000;
Faymonville et al., 2003; Rainville, 2002; Rainville et al., 1999). These studies utilized actual physical stimuli to induce pain (e.g., immersion of a participant’s hand in hot water) and found that the anterior cingulate cortex (ACC) is one of the key brain regions activated in the experience of pain. The ACC has been found to be involved in the regulation of autonomic (sympathetic) activity (Luu & Posner, 2003). A study by Rainville, Duncan, Price, Carrier, and Bushnell (1997) found that pain affect (i.e., the painfulness and perceived unpleasantness of pain), as distinct from the sensory experience of pain, was encoded in the dorsal region of the ACC. When hypnotic suggestion was employed to reduce or alter the experience of pain, they found that participants rated the pain as less unpleasant even though it was still as intense. Of importance, they also discovered that activity in the same region of the ACC actually decreased (Rainville et al., 1997).

Marie Faymonville is an anaesthetist who has successfully employed hypnotic analgesia in her clinical practice since the early 1990s. She employs a surgical technique known as hypnosedation which uses a combination of hypnosis, local anaesthesia and a mild sedative instead of a general anaesthesia (Song, 2006). Since creating this technique, it has been used on more than 5,000 people. Faymonville does not induce analgesia directly by referring to a suggestion to reduce pain; rather, patients are instructed to think of pleasant experiences in which they then become immersed. She has continued this approach in her experimental work (e.g., Faymonville et al., 2000) to great effect. For instance, Faymonville et al. (2000) conducted a study to examine the brain areas that may be modulated by hypnosis in response to a painful stimulus (a heat probe applied to the right hand). They found that hypnosis (induced by instructing participants to think of something pleasant from their past experiences) decreased pain sensation and the perceived unpleasantness of the painful stimulus. Both perception of pain and the reduction of painful affect in the hypnotic state were found to correlate with activity in the ACC (as determined by positron emission tomography [PET]).

Interestingly, research has not limited itself to examining the experience of physical trauma. Rather, there has been some research which has examined the experience of social or emotional pain and found that the brain regions implicated are those active in the affective component of physical pain. Vastag (2003) found that social rejection generated activity in the ACC and so may be regarded as equivalent to actual physical pain. Eisenberger and Lieberman (2004) also discovered that the ACC was involved in the affective components of both physical and social pain and that increased levels of activity in the ACC
coincide with increased levels of reported pain unpleasantness.

Brown (2004) considers “overwhelming negative affect” as the fundamental psychological component of trauma. Negative affect is undoubtedly a painful emotion and, as has been demonstrated, is represented by activation in the same neural networks as physical pain. Thus psychological mechanisms which have been successful in the regulation of physical pain (e.g., hypnotic analgesia) are very likely to be implicated in the modulation of affective responses to trauma. Hypnotic suggestibility (and/or related traits such as absorption and fantasy proneness) in combination with the mechanism underlying hypnotic analgesia is therefore likely to be successful in the regulation of negative affect.

**EMOTIONAL NUMBING**

Hypnotic suggestion has also been used to produce emotional numbing which is closely related to the concept of analgesia (e.g., Foa, Zinbarg, & Rothbaum, 1992). Emotional numbing may be defined as “the lack of emotional responsivity to stimuli that would normally elicit emotional reactions” and is particularly characteristic of PTSD (Bryant & Kourch, 2001, p. 220).

One of the most influential researchers in the field of trauma, dissociative processes and PTSD is the Australian, Richard Bryant. Bryant and colleagues have conducted a number of studies investigating hypnotically induced emotional numbing. In an initial pilot study, Bryant and Kourch (2001) analysed hypnotic suggestion in the suppression of emotional responses in high and low hypnotizable participants. The researchers presented individuals with a series of slides of neutral and disfigured faces and found that individuals who received an emotional numbing suggestion (i.e., they would be “unable to feel any emotions” and feel “emotionally numb” and “cut off from any emotional responses”; Bryant & Kourch, 2001, p. 222) were less distressed and displayed less responsivity (as measured by self-report and their facial expressions) than those who did not receive such a suggestion, and this pattern was stronger for high than low hypnotizable individuals. Thus the emotional numbing suggestion was able to significantly suppress emotional responding in high hypnotizable participants.

In a second study, Bryant and Mallard (2002) examined the reactions of “real” hypnotized and “simulating” unhypnotized participants who were also given a hypnotic induction and presented with ten neutral and aversive images from the International Affective Picture System (IAPS; Lang, Bradley, & Cuthbert, 2005). Half the participants were also administered an emotional numbing suggestion.
The results of this study found that those who received the suggestion (both reals and simulators) experienced less distress and emotional responsivity to the aversive imagery (as measured by self-report and facial EMG corrugator muscle activity) compared with those who received no such suggestion.

Bryant (2005) conducted a similar study in which high and low hypnotizable participants were administered a hypnotic induction and half were also given an emotional numbing suggestion. He then presented participants with a series of neutral and aversive images. Participants rated, on a 100-point scale, how they felt while looking at these images. Following this, participants were shown a series of neutral words and asked to rate their valence on a 100-point scale. Prior to the presentation of each word, though, participants were shown a subliminal neutral or aversive image. The results confirmed and validated those of Bryant and colleagues’ previous studies (Bryant & Kourch, 2001; Bryant & Mallard, 2002). High hypnotizable participants who received the numbing suggestion rated the words preceding the aversive images more positively than other highs who did not receive the suggestion as well as low hypnotizable participants who did or did not receive the suggestion.

A final study into the effects of emotional numbing to be investigated is that by Bryant and Kapur (2006). In this study, Bryant and Kapur examined the role of hypnotizability and hypnosis in suggested emotional numbing. The researchers hypothesized that hypnosis is related to stronger responding to suggestion and thus high hypnotizable participants in a hypnosis condition would display less emotional responding than highs in a wake condition (i.e., no hypnotic induction). Again, participants were shown a series of neutral and aversive images and their facial EMG was recorded in addition to them rating how they felt while looking at the images. The results found that highs who received an emotional numbing suggestion were less responsive to the aversive stimuli in both the hypnosis and wake conditions. Bryant and Kapur thus claim that it is hypnotic susceptibility that is important in successfully responding to an emotional numbing suggestion.

Hypnotizability is significantly related to both absorption and fantasy proneness (Roche & McConkey, 1990; Wilson & Barber, 1981, 1983), thus high-hypnotizables are also reliably high in absorption levels. Bryant and colleagues demonstrate that those high in hypnotic susceptibility are also more responsive to emotional numbing suggestions—a response which functionally parallels the peritraumatic response of detachment. These findings lead us to suggest that high absorption and fantasy proneness may also play a generative role in at least some dissociative responses to trauma.
SELF-REGULATION AND DISSOCIATIVE RESPONSES

Individuals who are high in the ability to dissociate are able to detach from exposure to negative stimuli more effectively than those low in the ability (e.g., Nixon et al., 2005). Recent research has found that the parasympathetic (i.e., calming) component of heart rate variability (HRV) can be modulated in a state of disengagement from external reality. For instance, Diamond, Davis, and Howe (2008) investigated whether HRV could serve as an instrument of self-rated hypnotic depth (SRHD). Hypnotic depth is inferred from an individual’s subjective and behavioural responses to hypnosis (Pekala et al., 2009). So for example, the individual may be asked to rate in a questionnaire how hypnotized they felt they became. Diamond et al. (2008) found that SRHD was correlated with the high frequency (HF) component of HRV, the component associated with parasympathetic nervous system activity. Thus the more deeply participants were hypnotized (or perceived they were hypnotized) the more relaxed they felt and this was demonstrated physiologically.

Noyes and Kletti (1977, p. 375) claim that it is possible to identify depersonalization (one form of detachment) as a state of “heightened arousal on the one hand and attenuation of potentially disorganizing emotion on the other.” Sierra and Berrios (1998), in their study of depersonalization, concluded that the ACC is inhibited and thus painful affect is not felt. They refer to this as an “indifference to pain” (Sierra & Berrios, 1998, p. 898) which is closely linked to the previous discussion on hypnotic analgesia.

Holmes et al. (2005, p.12), in their discussion on the phenomenon of compartmentalization describe it as a “deficit in functioning alongside evidence demonstrating the preservation of the apparently disturbed function.” The disruption in the sense of volition (i.e., the lack of willpower or control) that characterizes the somatization disorders (Brown, 2002) is itself a form of compartmentalization. In hypnosis (which serves as a model for somatization disorder symptoms), the sense of non-volition emerges as a consequence of a breakdown in the integration of monitoring and control aspects of supervisory attentional system (SAS) monitoring (Egner, Jamieson, & Gruzelier, 2005). Conscious volition and self-awareness are closely tied to the functional integration of the SAS and hypnotic induction in high susceptibles can result in a weakening of its operation (Brown, 2004; Jamieson & Sheehan, 2004). Under normal circumstances, individuals are able to manage most instances of “negative affect via self-regulatory processing and goal-oriented action” (Brown, 2004, p. 806). But as the negative affect associated with traumatic
episodes may be regarded as “overwhelming,” self-regulation becomes a much more difficult proposition (Brown, 2004). Thus, as trait measures of dissociation have been found to correlate with fantasy proneness, hypnotizability and absorption, it is likely that those individuals high in these latter traits will find it easier to become detached from their experience of traumatic events or negative affect relative to those low in these traits. Therefore we propose that those individuals who are high in the traits of hypnotizability, absorption, or fantasy proneness are likely to engage these skills to become detached from their experience of traumatic events whereas those low in these traits will need to employ other response options.

There are a number of different reactions that individuals may experience in response to acute trauma. Detachment and compartmentalization are reactions which, if overgeneralized, ultimately become maladaptive (Butler et al., 1996). It is clear that detachment may play an adaptive as well as a maladaptive role. Hypnosis–like interventions may be better placed than cognitive–behavioural techniques (alone) to harness the adaptive and to ameliorate the maladaptive potential of these responses in those who are prone to exhibit them. A similar conclusion is reached by Butler et al. (1996, p. 53), who state: “As a therapeutic tool, hypnosis may be used to regulate the intensity and immediacy of painful affect while processing traumatic experiences.”

**HOW TO STUDY THE EFFECTS OF TRAUMA ON COGNITIVE AND AFFECTIVE SELF-REGULATION**

Detachment, hypnotic analgesia and emotional numbing all involve a muting of emotional responsivity to aversive stimuli. We propose that trance or absorption in inner–generated experiences is a discrete pathway of response to traumatic events. Recent brain imaging studies show that the emotional Stroop task provides an important new method by which we can investigate the neuroscience of affective self-regulation which underlies this effect.

The emotional Stroop is used to study the effects of emotional conflict on response selection. In an initial version of this task, participants are required to name the colour of a word when it is either emotionally neutral (e.g., apple) or emotionally salient (e.g., death) and what has been discovered is that response times (RTs) for the colour naming of emotionally salient words is slower than for emotionally neutral words (Etkin, Egner, Peraza, Kandel, & Hirsch, 2006). The emotional Stroop thus “assesses the ability of emotional stimuli … to withdraw attention from the main task” which is the naming of the colour (Etkin et al., 2006, p. 1). Etkin et al. (pp. 1–2), however, aimed to create an
emotional Stroop task that directly assessed emotional conflict which arose from “incompatibility between the task-relevant and task-irrelevant emotional dimensions of a stimulus” and which “represents an appropriate emotional analog to the color-word Stroop task.” They claim that the original emotional Stroop did not directly assess the interference of emotional processing and cognitive processing because there is no link between the word and the colour of the ink so there is inadequate relevance. This is unlike the traditional Stroop in which the colour of the ink interferes with the reading of the word (e.g., the word “green” in red ink).

Etkin et al. (2006) created a modified version of the emotional Stroop task in which facial expressions were presented with the words “happy” or “sad” written across them. This new paradigm more closely parallels the traditional Stroop: It creates a conflict between emotional and cognitive processing as the main task is to identify the facial expression while ignoring the word.

Successful performance on the emotional Stroop involves the ability to control the effects of emotional arousal. That is, the ability to focus on the task-relevant dimension of the presented stimulus. The mechanism for this control was investigated by Etkin et al. (2006) in a functional magnetic resonance imaging (fMRI) study. They discovered that emotional conflict evoked activity in the amygdala. Conflict resolution, however, evoked activity within the rostral ACC (rACC). When participants were presented with an incongruent image (e.g., a happy facial expression with the word “fear” printed on it), the conflict-induced activation of the amygdala was inhibited by the rACC. Thus Etkin et al. concluded that the role of the rACC was the mediation of emotional conflict through the suppression of amygdalae activity.

Sheehan, Donovan, and MacLeod (1988) tested whether those highly susceptible to hypnotic suggestion, compared with those low in susceptibility, would show less interference under hypnosis than in a waking condition. To their surprise, they found that the Stroop interference effect (SIE) was worse (i.e., RTs were slower) for highs under hypnosis compared to when they were awake. One hypothesis proposed for this unexpected result was that, under hypnosis, there was a weakening of the SAS which meant that participants were less able to control the tendency to read the word (see Jamieson & Sheehan, 2004). However, when an “attentional focusing instruction” was administered under hypnosis, highs were then able to reduce the SIE unlike in the hypnosis alone condition. Raz and his colleagues (Raz, Kirsch, Pollard, & Nitin-Kaner, 2006; Raz, Shapiro, Fan, & Posner, 2002) extended Sheehan et al.’s (1988) research. They too found that hypnosis and suggestion together
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could reduce the SIE in highs but not lows (Raz et al., 2002), but they also discovered that suggestion alone could reduce the effect in highs without a hypnotic induction (Raz et al., 2006).

In this context, the traditional Stroop task may be considered to measure the effect of Holmes et al. (2005) type compartmentalization. Compartmentalization is characterized by the failure to control processes and actions normally under volitional command. Support for this contention comes from studies which have found that even under hypnotic induction, highly suggestible individuals will perform poorly (i.e., display increased errors) on the Stroop task (Jamieson & Sheehan, 2004) as the hypnotic context seems to attenuate attentional control. The emotional Stroop, by contrast, may then be considered as a measure of affective control. We propose that the later version of the emotional Stroop is particularly well suited to test our account of the role of the state and trait processes involved with inner-generated experiences in determining the psychological responses elicited by traumatic events and their subsequent effects on affective self-regulation.

**CLINICAL IMPLICATIONS**

The model developed here proposes that when confronted by trauma, those high in hypnotizability and/or absorption and/or fantasy proneness will have difficulty in volitionally disengaging from what they are seeing. This follows from what Jamieson and Sheehan (2004) refer to as a breakdown in SAS control. Action that is under SAS control is perceived as voluntary, but other actions are experienced as automatic and lacking self-control. However, as has been demonstrated in previous research, the deliberate use of appropriate suggestion may be an important factor in self-regulation for those higher on the traits of hypnotizability, absorption or fantasy proneness.

Individuals who have prior experience of trauma are more susceptible to uncontrolled negative reactions than those who have no prior exposure. Those high in hypnotizability and/or absorption and/or fantasy proneness have the ability to detach themselves from the situation and focus on inner-generated experiences that may help them to modulate these painful experiences (Wilson & Barber, 1983) and thus cope with otherwise overwhelming negative affect (Brown, 2004). On the other hand, those low in these traits are far less likely to utilize such mechanisms as they lack the ability to focus inwardly (they may, however, be able to utilize other self-regulatory strategies successfully). If this thinking is indeed correct, then highs who have experienced trauma should be
able to utilize specific suggestions to regulate their affective responses leading to better performance on the emotional Stroop (as they will be less disrupted by the effects of emotional arousal evoked by negative images) and experience a greater sense of authorship and control over their subjective state.

Those with prior experience of a traumatic incident will be particularly vulnerable to strong negative reactions. It is expected then, that high hypnotizability and/or absorption and/or fantasy proneness will directly influence the availability of detachment and compartmentalization as coping responses. It is likely that the ability to modulate further processing of relevant aspects of a scene (or in the case of a traumatic incident, painful aspects) is central to how those high in hypnotizability and/or absorption and/or fantasy proneness are able to suppress (detach or compartmentalize) their emotional (and cognitive–behavioural) reactions. Those low in these traits are less able to disengage from the irrelevant or painful aspects of a scene by this route and will be better served by conventional cognitive–behavioural therapeutic interventions.

REFERENCES


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Experimental Hypnosis, 55, 84–113.


Nijenhuis, E., van der Hart, O., & Steele, K. (2010). Trauma-related structural dissociation


