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Effects of experimentally induced dissociation on attention and memory

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ABSTRACT

Dissociation is an important aspect of responses to traumatic events. According to a number of influential theories, it negatively impacts cognitive performance including encoding of the trauma memories, leading to an increased risk of later conditions such as posttraumatic stress disorder (PTSD). We tested this hypothesis experimentally in two studies by inducing dissociation in the laboratory and investigating the effects on several aspects of cognition, including time estimation, digit and spatial span, and story recall. Dissociation was related to decrements in time estimation, digit span, and story retention, but did not affect perceptual attention, spatial span, or immediate story recall. The results are discussed in the context of theoretical models of PTSD and their implications for official questioning of traumatized individuals such as sexual assault survivors.

1. Introduction

Dissociation is a common response to a wide variety of highly stressful and traumatic events (Cardena & Spiegel, 1993; Classen, Koopman, & Spiegel, 1993; Morgan et al., 2001). Although it has long been thought to assist coping by temporarily reducing negative emotional states and physiological arousal (Dorahy & van der Hart, 2007), and to be related to the freezing response observed in animals (Nijenhuis, Spinhoven, Vanderlinden, van Dyck, & van der Hart, 1998), it also demonstrates a robust association with adverse longer-term outcomes such as posttraumatic stress disorder (PTSD) (Brewin & Patel, 2010; Lensvelt-Mulders et al., 2008). It has frequently been suggested that dissociative states affect the encoding of these events into memory, making them more likely to subsequently intrude into consciousness (Bremner & Brett, 1997; van der Kolk, van der Hart, & Marmar, 1996). Despite the theoretical and practical importance attributable to dissociation, there have been few experimental studies of how it affects cognitive processes. We report two studies in which dissociative states were induced in the laboratory using a recently developed technique and their cognitive effects on attention, memory, and time estimation measured.

Dissociation is defined as "a disruption in the usually integrated functions of consciousness, memory, identity, or perception of the environment" in the DSM-IV-TR (American Psychiatric Association, 2000). It takes many different forms, including depersonalization (alterations in the sense of self such as out-of-body experiences), derealization (alterations in the perception of the world such as people appearing unreal or as actors in a play), and changes in time estimation (a speeding up or slowing down of subjective time) (Ursano, Fullerton, & Benedek, 2007). Peri-traumatic dissociation is the term given to these reactions when they occur during and immediately after a traumatic event. There have been numerous retrospective studies demonstrating an association between reports of such reactions and subsequent PTSD (Lensvelt-Mulders et al., 2008). Two of the most characteristic symptoms of PTSD are the involuntary intrusion of detailed images of the traumatic scene and the prolongation of strong emotional reactions to trauma reminders. Reports of peri-traumatic dissociation in PTSD patients are consistently associated with independent ratings of fragmentation in narrative accounts of the traumatic event (Brewin,

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2007). Moreover, in PTSD patients state dissociation contributed to the strength of perceptual priming for trauma-related stimuli (Lyttle, Dorahy, Hanna, & Huntjens, 2010).

Establishing a causal role for dissociation after actual traumatic events is problematic because of the retrospective measurement of these reactions. Nevertheless there is evidence that healthy individuals who report more dissociative states while watching a traumatic film in the laboratory subsequently experience more intrusive images of the film over the next week (Holmes, Brewin, & Hennessy, 2004). This combination of clinical and non-clinical research has supported earlier proposals that dissociative states may in some way impede the encoding of such events into memory, resulting in them being more likely to be subsequently retrieved involuntarily. More recently, the dual representation theory of PTSD proposed that the disorder arises because perception-near, viewpoint-dependent representations supporting action on the environment are encoded relatively strongly at the same time that contextualized, viewpoint-independent representations supporting language and higher cognitive functions are encoded relatively weakly (Brewin, Gregory, Lipton, & Burgess, 2010). Dissociative states may be important influences on these encoding processes.

The preponderance of research to date has investigated cognitive processing in individuals with high trait dissociation or with clinical disorders accompanied by high levels of dissociation. For example, although not consistent, findings have not generally supported the idea that high trait dissociators have working memory deficits (De Ruiter, Phaf, Elzinga, & Van Dyck, 2004; Giesbrecht, Geraerts, & Merckelbach, 2007). In contrast, there is evidence that under divided-attention demands, high dissociators have impaired memory for words associated with trauma (e.g., incest) but not for neutral words, as compared with low dissociators (DePrince & Freyd, 2001, 2004). Similarly, studies of working memory capacity have failed to find consistent deficits in dissociative disorder patients compared with controls (Elzinga et al., 2007; Guralnik, Schmeidler, & Simeon, 2000; Rossini, Schwartz, & Braun, 1996). In contrast, a sample of people with depersonalization disorder showed compromised visual and verbal short-term memories, especially under information overload conditions, and had difficulty with early stimulus encoding tasks under conditions of heightened distraction (Guralnik et al., 2000).

These inconsistent findings may reflect problems with the retrospective assessment of dissociation, or with the fact that the relation between dissociative tendencies and the presence of dissociative states at the particular point in time when cognitive processes are measured is weak. Individuals with dissociative disorders may have found ways of compensating for cognitive deficits that make these hard to detect. For these reasons the experimental manipulation of dissociation offers the opportunity to test clinical theories more rigorously. Mirror-gazing for approximately 10 min under dim illumination has been found to cause participants to perceive their reflected face in the mirror as distorted or as belonging to someone else (Caputo, 2010a, 2010b). These reactions, including alterations in perceived identity, are similar to the depersonalization described in PTSD, although Caputo did not support these observations with standardized measures of dissociation. His technique nevertheless promises the opportunity to test theories about the causal role of dissociation in altering cognitive processing.

2. Experiment One

2.1. Introduction

The first study investigated the impact of dissociation on time estimation, perceptual attention, and digit and spatial span. As individuals are known to vary considerably in their propensity to report dissociative experiences in everyday life (Bernstein & Putnam, 1986), we anticipated a wide range of reactions to the mirror-gazing task. As a result the comparison of mean scores in groups who have or have not practised mirror-gazing may not provide a sufficiently sensitive test of the hypothesis. We therefore recruited additional participants to the experimental (mirror-gazing) group in order that correlational analyses could be conducted on the strength of the association between the resulting state dissociation and measures of cognitive performance. The first aim was to replicate the effects of mirror-gazing reported by Caputo (2010a, 2010b) and confirm their nature with a validated measure of state dissociation. The second hypothesis was that induced dissociation would produce an altered sense of subjective time and would reduce performance on the other three cognitive tasks. In addition to the main group comparison, this was tested with partial correlations controlling for experimental condition. Given existing evidence that PTSD is associated with high levels of dissociation and with greater deficits in verbal than in non-verbal memory (Brewin, Kleiner, Vasterling, & Field, 2007), we further predicted that dissociation would have a stronger relationship with impaired performance on digit span than on spatial span.

2.2. Material and methods

2.2.1. Participants

Sixty undergraduate students from University College London took part in this experiment (19 males, 41 females), recruited through advertisement and word of mouth. Those studying psychology earned course credits for their participation. Participants were only included if they reported no history of psychiatric treatment and if they were unfamiliar with Caputo's mirror-gazing illusion. The age range was 18–25 and the mean age was 20.05 (SD = 1.61). In order to avoid interference during perception of their face in the mirror, all participants either had normal vision or wore contact lenses for the experiment.