



Experimentally-induced dissociation impairs visual memory



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ABSTRACT

Dissociation is a phenomenon common in a number of psychological disorders and has been frequently suggested to impair memory for traumatic events. In this study we explored the effects of dissociation on visual memory. A dissociative state was induced experimentally using a mirror-gazing task and its short-term effects on memory performance were investigated. Sixty healthy individuals took part in the experiment. Induced dissociation impaired visual memory performance relative to a control condition; however, the degree of dissociation was not associated with lower memory scores in the experimental group. The results have theoretical and practical implications for individuals who experience frequent dissociative states such as patients with posttraumatic stress disorder (PTSD).

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1. Introduction

Dissociation is established empirically as a common feature of posttraumatic stress disorder (PTSD) (Brewin & Patel, 2010; Carlson, Dalenberg, & McDade-Montez, 2012). Based on the evidence for dissociation-related symptom and response variations (e.g., Lanius et al., 2010), a dissociative subtype of PTSD has been introduced into the latest version of the American Psychiatric Association's Diagnostic and Statistical Manual (DSM-5: APA, 2013). Dissociation also commonly occurs during stressful or traumatic events, i.e. peri-traumatically, and these responses predict the development of PTSD (Lensvelt-Mulders et al., 2008). The increased risk is thought to derive from dissociation-induced disturbance in the encoding of the traumatic memory but little direct evidence exists for this conjecture. Previous research using experimentally-induced dissociation in healthy volunteers has found disturbances in digit span and delayed verbal recall but no evidence for deficits in perceptual attention or spatial span (Brewin, Ma, & Colson, 2013). Given that PTSD is associated with larger deficits in verbal than non-verbal memory (Brewin, Kleiner, Vasterling, & Field, 2007), the present experiment sought to replicate the finding of preserved perceptual attention and further investigate the presence of possible dissociation-induced deficits in non-verbal memory.

Dissociation is a complex construct and a recent definition is as follows: "An experienced loss of information or control over mental processes that, under normal circumstances, are available to conscious awareness, self-attribution, or control, in relation to the individual's age and cognitive development. Symptoms are characterized by (a) a loss of continuity in subjective experience with accompanying involuntary and unwanted intrusions into awareness and behavior (so-called positive dissociation); and/or (b) an inability to access information or control mental functions or behaviors, manifested as symptoms such as gaps in awareness, memory, or self-identification, that are normally amenable to such access/control (so-called negative dissociation); and/or (c) a sense of experiential disconnectedness that may include perceptual distortions about the self or the environment" (Cardena & Carlson, 2011, pp. 251–252). Peritraumatic dissociation (i.e. feelings that the experience is unreal coupled with the breakdown of identity, memory, and consciousness during or immediately following a traumatic

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event) has been linked to the disruption in information encoding and subsequent intrusive trauma-related memories (e.g., Allen, Console, & Lewis, 1999; Bremner & Brett, 1997). Consistent with this view, numerous studies have reported incoherent, fragmented autobiographical memories of the traumatic event in PTSD patients and found that the degree of fragmentation was associated with reports of greater dissociation during the traumatic event (see Brewin, 2013, for review).

Other research on memory and dissociation has utilized groups high on dissociative tendencies. Guralnik, Schmeidler, and Simeon (2000) found that a sample of patients with depersonalization disorder performed significantly worse, compared with healthy controls, on a number of visual memory measures. Guralnik et al. (2000) argued that given their impaired functioning on a computerized test of attention, short-term memory deficits might be the result of lowered perceptual sensitivity and depleted attentional resources disrupting information encoding. In contrast, Wright and Osborne (2005) failed to find impairments on short-term visual memory in healthy participants characterized by high trait dissociation.

Pre-existing memory-related deficits in clinical populations and predisposing factors in high dissociators (e.g. a distinct cognitive style; De Ruiter, Phaf, Elzinga, & Dyck, 2004) hinder the use of these samples to investigate the role of dissociation in memory anomalies. Furthermore, the correlation between the time of test administration and the experience of dissociation episodes is weak, and thus the immediate effects of these episodes on memory are not captured in the tests. Individuals with strong dissociative tendencies may also have adopted compensatory mechanisms that make it difficult to detect memory impairments related to dissociation. For all these reasons, experimental studies that induce dissociation directly and measure its immediate or delayed effects on cognitive functions offer significant advantages.

One common method of inducing dissociative experiences is to simulate stressful situations, analogous to real world stressor events, to which individuals may exhibit dissociative responses and measure these responses under controlled conditions. For instance, in a study with special operations soldiers (Morgan, Doran, Steffian, Hazlett, & Southwick, 2006), participants underwent different levels of stress induction procedure. Participants who completed the Rey-Osterrieth Complex Figure (ROCF) test of visual memory during the stress induction (i.e., the high stress group) reported more dissociative symptoms and performed significantly worse in both copy and recall parts of the ROCF test compared with those who finished the tests before or after the stress induction. Interestingly, in the copy phase there was evidence of the high stress group switching from a more configurational to a more piecemeal strategy, which the authors attributed to their increased arousal. Furthermore, dissociative symptoms were negatively correlated with ROCF recall in the stress group. Morgan et al. (2006) argued that symptoms of dissociation, as well as visual memory impairments, might be the consequences of the high state of arousal induced in their study. Therefore, in order to better explore the effects of dissociation *per se*, symptoms should be induced in the absence of intense stress and arousal.

Another recently developed method which induces dissociative symptoms involves gazing at one's own face in a mirror under low illumination for at least 10 min (Caputo, 2010a,b). Recent evidence shows that similar effects may be obtained by gazing at another person's face instead of one's own (Caputo, 2013). Using the mirror-gazing version Brewin et al. (2013) provided the first experimental evidence of the effects of dissociative states on short-term memory for emotionally neutral stimuli. The results showed that higher dissociation scores were associated with less accurate time estimation, smaller digit span, and worse delayed story recall, but not with deficits on perceptual attention or spatial span.

Given the inconsistent findings between, on the one hand, dissociative patient samples and samples under severe stress and, on the other hand, healthy volunteers exposed to induced dissociation, the current study sought to further investigate visual memory performance in the face-gazing paradigm. We employed the ROCF test used by Morgan et al. (2006) to enable more direct comparison between the studies. The ROCF test is particularly well-suited because participants must first copy a complex figure, thereby separately assessing their level of perceptual attention. As Guralnik et al. (2000) pointed out, the effects of such attentional deficits need to be ruled out when assessing the influence of complex mental states such as dissociation on memory. Based on previous findings, we hypothesized that induced dissociation would impair performance on the ROCF test of visual memory while leaving perceptual attention intact.

2. Method

2.1. Participants

Sixty students from University College London took part in this experiment (12 males, 48 females). Their age range was 18–29 and the mean age was 25.41 years ($SD = 1.96$). Participants had no history of psychiatric treatment and were unfamiliar with the mirror-gazing technique (Caputo, 2010a). Fifty-eight percent of them were familiar with the Rey-Osterrieth figure. Participants had normal vision or were shortsighted, in which case they had to remove their glasses to avoid interference with their face perception in the mirror.

2.2. Design

A between-group design was used with control and dissociation conditions, the dependent variables being the ROCF copy and recall scores. First, equal numbers of participants were recruited to the two conditions to enable fully randomized comparisons testing the effects of the manipulation. Afterwards, additional non-randomized participants were recruited to the experimental group in order to increase the power for exploring the association between dissociation and memory performance.

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