Behavioural and Cognitive Psychotherapy, 2006, 34, 319–331
Printed in the United Kingdom doi:10.1017/S1352465806002827

Effects of State Dissociation on Objectively and Subjectively assessed Memory Disturbances

Nicole Buck

Maastricht University, The Netherlands

Merel Kindt

University of Amsterdam, The Netherlands

Marcel van den Hout

Utrecht University, The Netherlands

Abstract. Dissociation often occurs after a traumatic experience and has detrimental effects on memory. If these supposed detrimental effects are the result of disturbances in information processing, not only subjectively assessed but also objectively assessed memory disturbances should be observed. Most studies assessing dissociation and memory in the context of trauma have studied trauma victims. However, this study takes a new approach in that the impact of experimentally induced state dissociation on memory is investigated in people with spider phobia. Note that the aim of the present study was not to test the effect of trauma on memory disturbances. We found indeed significant relations between state dissociation and subjectively assessed memory disturbances: intrusions and self-rated memory fragmentation. Moreover, although no relation was found between state dissociation and experimenter-rated memory fragmentation, we observed a relation between state dissociation and experimenter-rated perceptual memory representations. These results show that state dissociation indeed has detrimental effects on the processing of aversive events.

Keywords: Dissociation, memory disturbances, intrusions and memory fragmentation, subjective and objective assessment.

Introduction

Dissociation has detrimental effects on memory (Halligan, Michael, Clark and Ehlers, 2003), which is clinically relevant to dissociative disorders, acute stress disorder and posttraumatic stress disorder. In this study, dissociation refers to depersonalization, derealization, altered time

Reprint requests to Nicole Buck, Maastricht University, Faculties of Medicine and Health Sciences, Department of Medical, Clinical and Experimental Psychology, PO Box 616, 6200 MD Maastricht, The Netherlands. E-mail: n.buck@dep.unimaas.nl

perception and numbing (see Marmar et al., 1994). The hallmark of dissociative disorders is an inability to recall important personal information, usually of a traumatic or stressful nature (APA, 1994, p. 478). In acute stress disorder and posttraumatic stress disorder (PTSD), trauma victims often have difficulty intentionally retrieving all aspects of the traumatic event (Ehlers and Clark, 2000). It is assumed that the detrimental effects of dissociation on memory are due to disturbances in information processing of the traumatic event, resulting in memory disturbances. Typically, two memory disturbances have been identified in traumatized individuals: intrusive memories and impoverished memory functioning or memory fragmentation (APA, 1994). For example, trauma victims who develop chronic PTSD are supposed to suffer from intrusive memories on the one hand and from fragmented memories of the traumatic event on the other (Foa and Riggs, 1993; van der Kolk and Fisler, 1995; Ehlers and Clark, 2000). It should be noted that observations of fragmentary traumatic memories are mainly based on subjectively assessed memory disturbances, that is clinical reports without experimental control of the memorized material (see also Shobe and Kihlstrom, 1997 for a critical review). If the supposed memory disturbances are the result of disturbances in information processing, not only subjectively assessed memory disturbances but also objectively assessed memory disturbances should be observed.

Recently, laboratory studies showed that state dissociation was indeed related to intrusive memories and memory fragmentation (Kindt and van den Hout, 2003; Kindt, van den Hout and Buck, 2005). However, the effect on memory fragmentation was restricted to subjective evaluation of the memory performance ("meta-memory"). Although this observation is in line with clinical reports given by trauma victims, no fragmentation was observed in actual memory performance. A disadvantage of these studies is that state dissociation was induced by a highly aversive film. The lack of personal involvement while watching a distressing film does not allow generalization of the results to real-life situations that may induce dissociation such as traumas or other unexpected experiences. In the present study, the relation between state dissociation and memory disturbances is further studied, taking the two above-mentioned disadvantages into account. Firstly, memory disturbances will not only be assessed by subjective measurements, but also by objective measurements. Secondly, in contrast to the previous experimental studies on state dissociation (Kindt and van den Hout, 2003; Kindt et al., 2005), in the present study personal involvement is assured by an exposure in vivo treatment.

Although there is no single definition of dissociation, there is a consensus that dissociation disturbs information processing (Spiegel and Cardena, 1991; Marmar, Weiss, Metzler and Delucchi, 1996; Foa and Hearst-Ikeda, 1996; Ehlers and Clark, 2000). We suppose that dissociation refers to the subjective experience of data-driven processing as opposed to conceptually-driven processing (see also Ehlers and Clark, 2000). Data-driven processing means that mainly the physical features of the event are processed, resulting in exact memory representations or perceptual memory representations of stimuli that have previously been perceived (Roediger, 1990). The opposite of data-driven processing is conceptually-driven processing. Conceptually-driven processing refers to processing the meaning of the situation and placing it into a context (Ehlers and Clark, 2000; Roediger, 1990). Initially, novel stimuli are processed mainly data-driven. After they have become more familiar, they will be processed more conceptually-driven and thus less data-driven (Johnston and Hawley, 1994). So a shift takes place from data-driven to conceptually-driven processing as stimuli become more familiar. Ehlers and Clark (2000) suggest that people who process the trauma in a mainly data-driven way *during* the traumatic event will be more likely to develop chronic PTSD. We

suggest that not only data-driven processing *during*, but also data-driven processing *after* a traumatic event may have detrimental effects.

It is suggested that state dissociation is enhanced during schema-incongruent situations (Siegel, 1996; Johnston and Hawley, 1994). In this study, a schema-incongruent situation refers to a situation for which people have no schema due to the unexpectedness, newness or the aversiveness of the situation. In this experiment, a one-session exposure in vivo for spider phobic patients was used as a schema-incongruent setting. Participants did something they never would have thought possible: instead of avoidance or escape, they stayed in close proximity to a live spider and allowed different-sized spiders to walk over their hands during a period of 2½ hours! The suggestion that a one-session treatment for people afraid of spiders may elicit state dissociation has already been pursued by Öst (1989), who stated that "some of the patients may afterwards experience the treatment as something unreal, a dream etc." (p. 4). We would like to emphasize that we fully acknowledge that a one-session exposure in vivo is not traumatic for spider phobic patients. But the purpose of this study is not to study the effects of trauma on memory disturbances but the effect of state dissociation on memory disturbances in a schema incongruent setting. A one-session exposure in vivo is schema-incongruent for spider phobic patients and may for that reason induce state dissociation during the treatment. Note, however, that state dissociation is often experienced in the context of traumatic experiences. Therefore, the results of this study may be relevant to the field of trauma research.

In sum, the aim of the present study was to investigate in individuals with spider phobia whether there is a relation between state dissociation and memory disturbances. Moreover, it was investigated whether this relation is observed not only for subjectively assessed memory performance, but also for objectively assessed memory performance. Subjectively assessed memory disturbances include intrusions and memory fragmentation, the two typical memory disturbances identified in traumatized individuals (APA, 1994). The objectively assessed memory disturbances include experimenter-rated perceptual memory representations and experimenter-rated memory fragmentation. Furthermore, detrimental effects of state dissociation on other symptoms were studied, i.e. self-reported fear and dysfunctional beliefs related to spiders (e.g. "a spider is uncontrollable") and assessment of behavioural fear. For successful exposure treatment, dysfunctional beliefs like "This spider spies on me" must be changed into functional beliefs like "This spider doesn't harm me". We hypothesize that this change in beliefs may be hindered when people dissociate during the exposure. For beliefs to change, it is very important that the person is convinced that he or she actually handled the spiders him/herself. People who dissociate during the exposure in vivo may experience the exposure session as unrealistic. As a result, dissociation during exposure may hinder dysfunctional beliefs being replaced by functional beliefs such that fear of spiders won't diminish.

The following hypotheses are formulated: state dissociation is related to 1) intrusive memories, 2) memory fragmentation, 3) experimenter-rated perceptual memory representations, 4) experimenter-rated memory fragmentation and 5) less reduction of both spider fear and strength of spider-related beliefs. Prior research has shown a relation between state dissociation and neuroticism (Holeva and Tarrier, 2001) and between trait dissociation and neuroticism (e.g. Kindt and van den Hout, 2003; Goldberg, 1999; De Silva and Ward, 1993). Further, dissociation may be the result of high emotional arousal (Spiegel, 1991). In addition, IQ scores have appeared to be inversely related to PTSD symptoms (McNally and Shin, 1995).

Therefore, in the present experiment we will control for neuroticism, arousal, education level and a sub-score of the IQ-test. Instead of a complete IQ test, only the subtest "Picture Arrangement Test" of the WAIS (Stinissen, Willems, Coetsier and Hulsman, 1970) will be included; this reflects the capacity to find coherence in a story.

Method

Participants

Thirty-four people participated in the study (32 women, 2 men). They were either recruited from a waiting list for treatment ($n = 19$), had responded to an advertisement or a flyer ($n = 9$), or were referred by friends and colleagues ($n = 6$). They were asked to participate in a study in return for free treatment. They were told that the aim of the study was to assess how people experience distressing situations. Four women did not complete the whole study and were excluded from further analyses. Reasons for drop-out were lack of time ($n = 3$) and disagreement with method of treatment ($n = 1$). Mean age of the participants was 36.4 years ($SD = 14.5$, range 17 – 68). They received a "free" 2½ hour treatment in return for participating in this study. The participants met DSM-IV (APA, 1994) criteria for specific phobia, which in this case refers to spider phobia. The mean score on the Spider Phobia Questionnaire (SPQ; Klorman, Weerts, Hastings, Melamed and Lang, 1974) was 24.0 ($SD = 3.0$), which is comparable to mean SPQ scores reported in other studies (Mayer, Merckelbach, De Jong and Leeuw, 1999; Lavy, van den Hout and Arntz, 1993). Participants were classified according to the level of education completed under the Dutch educational system. Four percent completed only some form of primary education. Forty-four percent completed some form of secondary education. Thirty-two percent completed some form of intermediate vocational education. Twenty percent completed some form of higher education such as university or business training.

Materials

State dissociation. State dissociation was measured by the Peri-traumatic Dissociative Experience Scale (PDEQ; Marmar, Weiss and Metzler, 1997), a questionnaire that is suitable to assess state dissociation after traumatic or other unexpected experiences. The PDEQ was adapted to refer to the exposure in vivo. The questionnaire consists of 10 questions about dissociative experiences that the participant might have experienced during the treatment. The participant is asked to rate these experiences, which include altered time perception, derealization and depersonalization, on a 5-point severity scale (1 = not at all, 5 = extremely). Mean item scores range from 1 to 5. A higher score indicates more state dissociation. In a study with combat veterans, the PDEQ (rater version) has demonstrated to be internally consistent (Cronbach's alpha = .81), associated with measures of traumatic stress response (mean correlation = .48; range = .39 to .60), associated with measures of general dissociative tendencies ($r = .41$; $p < .001$), associated with levels of stress exposure ($r = .48$, $p < .001$) and unassociated with measures of general psychopathology (mean correlation = −.06; range −.17 to .12) (Marmar et al., 1994). Marmar et al. (1996) suggested a cut-off score of 1.50. That is, people are thought to have experienced no clinically meaningful dissociation when

https://doi.org/10.1017/S1352465806002827 Published online by Cambridge University Press

they have a mean item score of 1.50 or lower, whereas those with mean item scores above 1.50 are considered to have clinically salient levels of state dissociation.

Subjectively assessed memory disturbances. The subjectively assessed memory disturbances include intrusive memories and self-rated memory fragmentation. Several aspects of *intrusions*, as a result of the exposure in vivo, were measured with Visual Analogue Scales (0–100 mm VAS). That is, Frequency of intrusions, Fearfulness of intrusions, Suppression of intrusions and the degree to which the intrusions were experienced as if participants Relived the exposure in vivo. The instruction to the questions was as follows: the items in this questionnaire refer to thoughts and images regarding spiders and the treatment for spider phobia, which you may have had during the week following the treatment. The items were as follows: 1) Did you have frightening thoughts or images about spiders during the day or night? 2) How frightening were these thoughts/images? 3) Have you tried to suppress these thoughts/images? 4) Did the thoughts/images feel as if you experienced everything again? After the exposure, participants were given a diary in which they had to rate these four questions daily during seven days. For each of the four questions, the mean score of seven days was used in further analyses.

Self-rated memory fragmentation was measured by a 100-mm VAS. Subjects rated the fragmentary quality of their recollections by indicating to what degree their recollections had a snap-shot character from 0 (not at all) to 100 (very much).

Objectively assessed memory disturbances. The objectively assessed memory disturbances include experimenter-rated perceptual memory representations and experimenter-rated memory fragmentation. Note, however, that the narratives are scored by the subjective evaluations of two experimenters. This scoring system is still considered as objective compared to the subjective evaluations of the participant's own judgments of their memory quality. Moreover, a detailed manual was developed to score the narratives to minimize the subjectivity of the raters. If the inter-rater reliability is sufficient, the objectivity of this scoring system is warranted.

Experimenter-rated perceptual memory representations were measured by scoring the reaction to the following task: "Tell what you can remember about the treatment. Tell everything that comes to your mind. Don't think too long before answering". The answer was audiotaped, transcribed verbatim, and scored on a 9-point scale from 1 (exclusively conceptual memory representations and/or contextualizations) to 9 (exclusively perceptual memory representations) by two raters. Thus, a higher score refers to more perceptual memory representations. The raters were the first author (NB) and a student (JR). All raters were ignorant to the status of the judged participant. Raters practised scoring with narratives of participants who dropped out. The narratives were chunked into separate utterance units. Each utterance that represented a physical feature (perceptual memory representations) was marked and each utterance that represented a conceptualization was marked differently. All references to time of day, date or location, were scored as contextual information. Indications of specific spiders were also scored as contextual information, in that it showed that participants were able to indicate what action occurred in the context of a specific spider. The scoring manual is available upon request. The intraclass correlation coefficient between the two raters was .90. For each individual a single mean score was calculated.

Experimenter-rated fragmentation was scored by NB and MK. They were blind to scores on all other variables. The intra-class correlation coefficient between the two raters was .93. The scripts, which were also used to measure the degree of perceptual versus conceptual

memory representations, were similar to Halligan et al. (2003), rated on a 10-point-scale from 1 (not fragmented at all) to 10 (extremely fragmented/disorganized). Fragmentation or disorganization was reflected in rambling from one subject to another, unfinished sentences, single words instead of sentences, and an incomplete or inaccurate order of events. Raters practised with scripts from participants who dropped out.

Fear of spiders

Fear of spiders was measured with the Spider Phobia Questionnaire (SPQ, Klorman et al., 1974), a 31-item self-report questionnaire. Scores ranged from 0–31 and a higher score indicated more fear of spiders. In addition, spider fear was also assessed using a Behavioural Approach Test (BAT) in order to assess avoidance behaviour for spiders. During the BAT, participants are asked to perform several steps (e.g. approaching a medium-sized spider, touching it with a stick, touching it with a finger, having the spider walk over one's hands), which they can refuse at any time. BAT performance was coded using an 8-point scale, ranging from 1 (approaching a medium-sized spider which is enclosed in a jar) to 8 (the medium-sized spider walks on the hand). A higher score indicated less avoidance of spiders. The BAT lasts about 3–7 minutes.

Spider-related beliefs

Spider-related beliefs were measured with the Spider Belief Questionnaire (SBQ; Arntz, Lavy, van den Berg and van Rijsoort, 1993). This questionnaire assesses (catastrophic) beliefs related to spiders and (catastrophic) beliefs related to the subjects' reactions when confronted with a spider. Subjects indicated the strength of each belief by filling in a percentage (0–100%). Scores ranged from 0 to 78. A higher score indicated a stronger subjective belief in the statements.

Neuroticism

Neuroticism was assessed by the shortened Eysenck Personality Questionnaire (EPQ; Eysenck and Eysenck, 1975). This is a 22-item questionnaire with yes or no answers. Scores ranged from 0 to 22 and a higher score indicated that the person was more neurotic.

Arousal

Arousal was assessed by asking participants to rate their fear every 10 minutes during the exposure in vivo treatment from 1 (not at all afraid) to 10 (very afraid). Participants rated their fear verbally when requested. The therapist wrote the score down. Mean scores were calculated.

Picture Arrangement Test

In the present study, only a subscale of the IQ-test was administered, appealing to the ability to find coherence among perceptual stimuli. This was measured by the Picture Arrangement Test from the Wechsler Adult Intelligence Scale (WAIS; Stinissen et al., 1970). This test consisted

of 10 sets of drawn pictures, which the participants had to place in a logical order within a given time. The sets consisted of 3 to 6 pictures. Scores ranged from 0 to 20. A higher score indicated a higher ability to find coherence.

Procedure

The study was approved by the Medical Ethical Commission of Maastricht University and the Academic Hospital of Maastricht. Participants were tested individually and attended two sessions, one week apart. For two participants, the two sessions were two weeks apart, and for one participant, the two sessions were three weeks apart.

Session 1 started with the BAT, which was followed by some questionnaires (biographical information, EPQ and Picture Arrangement Test from the WAIS). Then the exposure started, which lasted 2½ hours maximum. During the exposure, arousal was assessed. The exposure was immediately followed by the PDEQ. Finally, they were given a diary in which they answered the questions relating to intrusions during the following seven days after the exposure in vivo.

Session 2 started by assessing experimenter-rated perceptual memory representations and experimenter-rated memory fragmentation. Then, self-rated fragmentation, the BAT and the fear questionnaires (SPQ and SBQ) were assessed. At this time the participants also returned the diary.

Exposure in vivo

A one session exposure in vivo has been shown to produce just as good results in the treatment of spider phobia as treatments with multiple sessions and should be the treatment of choice (Öst, Ferebee and Furmark, 1997; Hellström and Öst, 1995; Öst, 1996; Arntz and Lavy, 1993). The exposure in vivo involves that people move gradually from looking at a spider to touching a spider with a stick, having a spider walk over one to several fingers, and finally handling a spider solo. The patient makes a commitment to remain in the exposure situation until the anxiety fades away, and never escape from the situation during treatment. When anxiety has decreased, the patient moves on to the next step. The therapist will never do anything in treatment without first describing it to the patient, modelling it, and get the patient's permission to perform that part of the treatment (Öst, 1989).

Design

Data were recruited from one group of spider phobic patients. The independent variable (dissociation) was assessed immediately after the exposure in vivo. The dependent variables (experimenter-rated perceptual memory representations, experimenter-rated memory fragmentation, self-rated memory fragmentation, spider fear and spider beliefs) were assessed at one-week follow-up. Intrusions were rated daily by the participants in the week following the exposure in vivo. Control variables (neuroticism, sub-score of the IQ-test, and education level) were assessed before the exposure. Arousal (a control variable) was assessed during the exposure. Pre-treatment scores of spider fear (SPQ, SBQ and BAT) were assessed before the exposure in vivo, enabling the hypothesis to be tested whether dissociation was related to less reduction of fear and less reduction in strength of beliefs. The questionnaires (SPQ and SBQ) were sent by mail several weeks before the exposure in vivo session took place. SPQ at

pre-treatment will further be referred to as SPQ^0. SPQ at one-week follow-up will be referred to as SPQ^1. The same notation also applies to BAT and SBQ scores.

Data reduction and data analyses

SPSS (10.0.7) estimated the few missing values by regression with residual estimation adjustment. One outlier was excluded from further analyses, because her PDEQ score was more than three standard deviations away from the group's mean: she scored 34 whereas the maximum score among the other participants was 24 ($M = 17.1$, $SD = 4.0$). First, it was verified whether the control variables were related to the experimental variables as predicted based on the literature. If this was not the case, they were not controlled for. Dissociation was predicted to be positively related to neuroticism and arousal. The sub-score of the IQ test and education level were both predicted to be inversely related to perceptual memory representations and memory fragmentation. Further, education level was also predicted to be inversely related to intrusions. Finally, it was verified whether it was necessary to control for the number of spiders that walked over the participant's hand. This variable will further be referred to as "number of spiders". It was predicted that "number of spiders" would be positively related to decline of fear and change in spider-related beliefs. The variable "number of spiders" differed between participants (range 0–5 spiders, $M = 3.5$, $SD = 1.4$). "Number of spiders" was converted into five dummy variables because it is not a linear variable. The step from handling 0 to 1 spider is very different from the step between handling 2 or 3 spiders or 3 and 4 spiders. After the first spider has walked over the hands of the participant, it takes far less time before the participant allows the second spider to walk over her hands. Dummy 1 referred to having handled one spider, dummy 2 referred to having handled two spiders etc. These 5 dummy variables were entered in a regression analysis to calculate R^2_{change}. R^2_{change} represents the strength of the relation between the variable "number of spiders" and *change* in fear of spiders or *change* in strength of spider-related beliefs.

Paired comparison *t*-tests were performed to test whether spider fear and strength of spider-related beliefs, declined significantly. Pearson correlations were calculated to test whether relations between control and experimental variables and between dissociation and dependent variables were significant. Partial correlations were calculated when a control variable was included. Pre-treatment level of spider fear and beliefs were controlled for when correlations were calculated between dissociation and spider fear or spider-related beliefs. All paired comparison *t*-tests and correlations were tested one-tailed.

Due to a technical failure, in four participants, data of the objective memory assessments were missing. These participants were excluded from further analysis.

Results

Manipulation check

The schema incongruent setting accomplished by a one-session Exposure in Vivo was successful in inducing different levels of mean scores of state dissociation (mean = 1.7; $SD = .4$; range 1.1–2.4). Based on a mean item cut-off score of 1.5 (Marmar et al., 1996), fourteen subjects (56%) had clinically salient levels of state dissociation.

Treatment was effective as indicated by a highly significant decrease in SPQ and SBQ scores and a significant increase in BAT score from pre-treatment to post-treatment. See

https://doi.org/10.1017/S1352465806002827 Published online by Cambridge University Press

Table 1. Means and standard deviations at pre-treatment and 1-week follow-up

	Pre-treatment M^0 (SD^0)	One-week follow-up M^1 (SD^1)
SPQ	24.1 (2.9)	17.2 (7.6)
SBQ	41.1 (10.2)	19.7 (12.6)
BAT	4.6 (1.6)	6.9 (1.0)

Note: SPQ = Spider Phobia Questionnaire, SBQ = Spider Belief Questionnaire and BAT = Behavioural Approach Test

Table 1 for the means and standard deviations of SPQ, SBQ and BAT at pre-treatment and 1 week follow-up. Paired comparison *t*-tests revealed that decrease of spider fear assessed by SPQ was significant ($t\,(24) = 5.4$, $p < .001$). Similarly, decrease of strength of spider beliefs as assessed by SBQ was significant ($t\,(24) = 8.6$, $p < .001$). Finally, decrease of spider fear as assessed by increase of performance on the BAT was also significant ($t\,(24) = -9.3$, $p < .001$).

Control variables. Except for arousal, none of the control variables was related to any of the experimental variables in the predicted direction. The relation between dissociation and arousal was in the predicted direction although marginally significant ($r = .30$, $p = .07$). Nevertheless, arousal will be included as control variables since there are indications in the literature that it is related to dissociation (Spiegel, 1991). Neuroticism was not related to dissociation ($r = -.25$, $p = n.s.$). The sub-score of the IQ test was neither related to perceptual memory representations ($r = -.18$, $p = n.s.$), nor to self-rated memory fragmentation ($r = -.03$, $p = n.s.$) or experimenter-rated memory fragmentation ($r = -.28$, $p = n.s.$). Education level was not related to several aspects of intrusions ($-.16 < r < -22$, $p = n.s.$), nor to self-rated memory fragmentation ($r = -.08$, $p = n.s.$) or experimenter-rated memory fragmentation ($r = -.19$, $p = n.s.$). Education level was related to perceptual memory representations, but not in the hypothesized direction ($r = .40$, $p < .05$) and thus will not be included as a control variable. 'Number of spiders' was not related to decline of spider fear assessed with the SPQ ($R^2_{\text{change}} = .21$, $p = n.s.$) or the BAT ($R^2_{change} = .16$, $p = n.s.$). Nor was it related to decline of strength of spider-related beliefs ($R^2_{change} = .30$, $p = n.s.$).

Relation between state dissociation and subjectively assessed memory disturbances. As hypothesized, state dissociation was positively related to frequency of intrusions ($r_{partial,\,arousal}\,(22) = .47$, $p = .01$), fearfulness of intrusions ($r_{partial,\,arousal}\,(22) = .44$, $p = .02$), suppression of intrusions ($r_{partial,\,arousal}\,(22) = .40$, $p = .03$) and the degree to which the intrusions were experienced as if participants relived the exposure in vivo ($r_{partial,\,arousal}\,(22) = .36$, $p = .04$). State dissociation was also related to self-rated memory fragmentation as hypothesized ($r_{partial,\,arousal}\,(22) = .34$, $p = .05$).

Relation between state dissociation and objectively assessed memory disturbances. Dissociation is related to experimenter-rated perceptual memory representations as was hypothesized ($r_{partial,\,arousal}\,(22) = .59$, $p = .001$). No relation was found between state dissociation and experimenter-rated memory fragmentation ($r_{partial,\,arousal}\,(25) = -.10$, $p = n.s.$).

https://doi.org/10.1017/S1352465806002827 Published online by Cambridge University Press

Relation between state dissociation and other symptoms. No significant relations were found between state dissociation on the one hand and change in SPQ, BAT or SBQ scores on the other. That is, change in SPQ scores at one-week follow-up ($SPQ^0 - SPQ^1$; $r_{partial,\ arousal} = .10$, $p = n.s.$), change in BAT performance at one-week follow-up ($BAT^0 - BAT^1$; $r_{partial,\ arousal} = -.06$, $p = n.s.$) and change in spider-related beliefs at one-week follow-up ($SBQ^0 - SBQ^1$; $r_{partial,\ arousal} = -.08$, $p = n.s.$).

Discussion

First, we would like to emphasize again that it was not our intent to study the effects of *trauma* on memory disturbances. We fully acknowledge that a one-session exposure in vivo is not traumatic for spider phobic patients. Instead, the aim of the present study was to investigate in individuals with spider phobia, whether state dissociation is not just related to subjectively assessed memory disturbances, but also to objectively assessed memory disturbances. The main results can be summarized as follows. First, in line with previous studies (Murray, Ehlers and Mayou, 2002; Halligan et al., 2003; Kindt and van den Hout, 2003; Kindt et al., 2005), a relation was found between state dissociation and subjectively assessed memory disturbances. That is intrusions and self-rated memory fragmentation. Second, although Halligan et al. (2003) reported a relation between dissociation and objectively assessed memory fragmentation, several other studies (Murray et al., 2002; Kindt and van den Hout, 2003; Kindt et al., 2005) were not able to find a relation. In line with the latter studies, no relation was found between state dissociation and experimenter-rated memory fragmentation in the present study. However, a relation was found between state dissociation and another objective measure of memory disturbances: experimenter-rated perceptual memory representations. Since perceptual memory representations are thought to be the result of sustained data-driven processing, the present results suggest that dissociation has detrimental effects on information processing. However, these detrimental effects of dissociation on information processing had no effect on therapy outcome. That is, the relations between state dissociation and reduction of spider fear or strength of spider beliefs after the exposure in vivo were not significant.

Some remarks are in order with regard to the assessment of state dissociation. It may be possible that the induction of state dissociation occurred early in the treatment process, and then dissipated by the end of the 2½ hour treatment. Since the exposure in vivo was successful in that fear of spiders declined, the positive effects of the treatment could have reduced the dissociative experiences enough, so it resulted in null correlations with experimenter-rated memory fragmentation and decline of fear symptoms. On the other hand, it is also possible that we should not only have assessed *state* dissociation during and directly after the exposure in vivo, but also '*persistent*' dissociation at one week follow-up. According to Spiegel (1991), dissociation may exert a dual function. First, dissociation may help participants to separate themselves from the full impact of the trauma. Second, dissociation may delay the necessary emotional processing and therefore hinder the contextualization of the traumatic experience. This may imply that in the short term, the first function of dissociation will help participants to endure the exposure treatment, resulting in a decline of fear. However, dissociation in the long run may be dysfunctional, in that 'emotional processing' will not occur. In line with this suggestion are observations by Murray et al. (2002). They observed that persistent dissociation assessed at 4 weeks after the traumatic event is a better predictor of PTSD symptoms at

https://doi.org/10.1017/S1352465806002827 Published online by Cambridge University Press

6 months than dissociation during and immediately after the traumatic event. Panasetis and Bryant (2003) found similar results in acute stress disorder patients.

Although a previous study reported a positive relation between state dissociation and neuroticism (Holeva and Tarrier, 2001), we did not observe a similar relation. The same holds for the other control variables, i.e. educational level and the sub-score of the IQ test. That is, McNally and Shin (1995) have shown that IQ scores are inversely related to PTSD symptoms. However, in the present study, educational level and the sub-score on the IQ test were not related to PTSD-like symptoms (intrusions and memory fragmentation). One explanation for these divergences is that the present study differed in several respects from these previous studies. Although the current study was designed to test the effects of dissociation on several PTSD-like symptoms, we did not test our hypotheses in a trauma sample and thus did not assess PTSD symptoms, rather PTSD-like symptoms.

Although Halligan et al. (2003) report a positive relation between dissociation and experimenter-rated memory disorganization in assault victims, other studies have failed to find this relation in road traffic accident victims (Murray et al., 2002) and in three laboratory studies (Kindt and van den Hout, 2003; Kindt et al., 2005). A disadvantage of the laboratory studies was the lack of personal involvement. However, even though participants were personally involved in the present study, and memory fragmentation was scored on a 10-point scale following Halligan et al. (2003), no relation was found between dissociation and experimenter-rated memory fragmentation. In these previous studies, however, as well as in the present study, a narrative was scored as very fragmented when the narrative itself was very disorganized. But this may not be the best operationalization of memory fragmentation. Mandler (1979) distinguishes two dimensions of organization to interpret a variety of different, often disparate appearing phenomena. First, the *integration dimension* refers to the degree to which the to-be-remembered items form functional units of thought and/or action; a highly integrated item is one in which the constituent elements of the response form a highly coherent unit. Second, the *elaborative dimension* refers to the degree of inter-relatedness of the to-be-remembered item with other units in memory. Thus, integration measures the within-unit organization, whereas elaboration measures the between-unit organization. In the above-mentioned studies, memory fragmentation has been investigated by focusing on the *integrative dimension* as opposed to the *elaborative dimension*. However, the elaborative dimension may be the most relevant dimension in understanding dysfunctional trauma processing, since it involves the formation and strengthening of associations between the trauma representation and other associated representations in memory. Additionally, the deficient embedding or contextualization of the traumatic event in autobiographical memory is thought to be one of the main problems in PTSD (see also Brewin and Holmes, 2003; Ehlers and Clark, 2000). Future research on trauma memory should focus on the contextualization of the trauma as opposed to the coherence of the trauma narrative per se.

In sum, it was assumed that if the detrimental effects of state dissociation are the result of disturbances in information processing, the observed memory disturbances should not be confined to subjectively assessed memory disturbances. Our findings tend to partly confirm this hypothesis. Firstly, in line with previous findings and clinical reports, state dissociation was again related to subjectively assessed memory disturbances. That is intrusions and self-rated memory fragmentation. However, no relation was found between dissociation and experimenter-rated memory fragmentation. More importantly, however, objective assessments show detrimental effects of state dissociation on perceptual memory representations. Future

studies should examine whether data-driven processing mediates the relation between state dissociation and memory disturbances by manipulating the processing style directly.

Acknowledgement

The authors wish to thank Jose Richters for scoring the narratives. There are no financial or other relationships that will lead to a conflict of interest.

References

American Psychiatric Association APA (1994). *Diagnostic and Statistical Manual of Mental Disorders: DSM-IV*. Washington DC: APA.

Arntz, A. and Lavy, E. (1993). Does stimulus elaboration potentiate exposure in vivo treatment? Two forms of one-session treatment of spider phobia. *Behavioural Psychotherapy*, *21*, 1–12.

Arntz, A., Lavy, E., van den Berg, G. and van Rijsoort, S. (1993). Negative beliefs of spider phobics: a psychometric evaluation of the spider phobia beliefs questionnaire. *Advances in Behaviour Research and Therapy*, *15*, 257–277.

Brewin, C. and Holmes, E. (2003). Psychological theories of posttraumatic stress disorder. *Clinical Psychology Review*, *23*, 339–376.

De Silva, P. and Ward, A. (1993). Personality correlates of dissociative experiences. *Personality and Individual Differences*, *14*, 857–859.

Ehlers, A. and Clark, D. M. (2000). A cognitive model of posttraumatic stress disorder. *Behaviour Research and Therapy*, *38*, 319–345.

Eysenck, H. J. and Eysenck, S. B. G. (1975). *Manual of the Eysenck Personality Questionnaire*. San Diego, CA: Educational and Industrial Testing Service.

Foa, E. B. and Hearst-Ikeda, D. (1996). Emotional dissociation in response to trauma: an information-processing approach. In L. K. Michelson and W. J. Ray (Eds.), *Handbook of Dissociation: theoretical, empirical and clinical perspectives*. New York: Plenum Press.

Foa, E. B. and Riggs, D. S. (1993). Posttraumatic stress disorder and rape. In J. Oldman, M. B. and A. Tasman. *Annual Review of Psychiatry, Vol. 12* (pp. 273–303). Washington, DC: American Psychiatric Association.

Goldberg, L. R. (1999). The curious experiences survey, a revised version of the Dissociative Experiences Scale: factor structure, reliability, and relations to demographic and personality variables. *Psychological Assessment*, *11*, 134–145.

Halligan, S. L., Michael, T., Clark, D. and Ehlers, A. (2003). Posttraumatic stress disorder following assault: the role of cognitive processing, trauma memory and appraisals. *Journal of Consulting and Clinical Psychology*, *71*, 419–431.

Hellström, K. and Öst, L. G. (1995). One-session therapist directed exposure vs. two forms of manual directed self-exposure in the treatment of spider phobia. *Behaviour Research and Therapy*, *33*, 959–965.

Holeva, V. and Tarrier, N. (2001). Personality and peritraumatic dissociation in the prediction of PTSD in victims of road traffic accidents. *Journal of Psychosomatic Research*, *51*, 687–692.

Johnston, W. A. and Hawley, K. J. (1994). Perceptual inhibition of expected inputs: the key that opens close minds. *Psychonomic Bulletin and Review*, *1*, 56–72.

Kindt, M. and van den Hout, M. (2003). Dissociation and memory fragmentation: experimental effects on meta-memory but not on actual memory performance. *Behaviour Research and Therapy*, *41*, 167–178.

Kindt, M., van den Hout, M. and Buck, N. (2005). Dissociation related to subjective memory fragmentation and intrusions but not to objective memory disturbances. *Journal of Behavior Therapy and Experimental Psychiatry*, *36*, 43–59.

Klorman, R., Weerts, T., Hastings, J. E., Melamed, B. G. and Lang, P. J. (1974). Psychometric description of some specific-fear questionnaires. *Behavior Therapy*, *5*, 401–409.

Lavy, E. H., van den Hout, M. A. and Arntz, A. (1993). Attentional bias and spider phobia: conceptual and clinical issues. *Behaviour Research and Therapy*, *31*, 17–24.

Mandler, G. (1979). Organization and repetition: organizational principles with special reference to rote learning. In L.G. Nilsson (Ed.), *Perspectives on Memory Research* (pp. 293–327). Hillsdale, NJ: Lawrence Erlbaum Associates.

Marmar, C. R., Weiss, D. S. and Metzler, M. A. (1997). The peritraumatic dissociative experiences questionnaire. In: J. P. Wilson and T. M. Keane (Eds.), *Assessing Psychological Trauma and PTSD: a practitioners' handbook*. New York: Guilford Press.

Marmar, C. R., Weiss, D. S., Metzler, T. J. and Delucchi, K. (1996). Characteristics of emergency services personnel related to peritraumatic dissociation during critical incident exposure. *American Journal of Psychiatry*, *153*, 94–102.

Marmar, C. R., Weiss, D. S., Schlenger, W. E., Fairbank, J. A., Jordan, B. K., Kulka, R. A. and Hough, R. L. (1994). Peritraumatic dissociation and posttraumatic stress in male Vietnam theater veterans. *American Journal of Psychiatry*, *151*, 902–907.

Mayer, B., Merckelbach, H., De Jong, P. and Leeuw, I. (1999). Skin conductance responses of spider phobics to backwardly masked phobic cues. *Journal of Psychophysiology*, *13*, 152–159.

McNally, R. J. and Shin, L. M. (1995). Association of intelligence with severity of post traumatic stress disorder in Vietnam combat veterans. *The American Journal of Psychiatry*, *152*, 936–938.

Murray, J., Ehlers, A. and Mayou, R. A. (2002). Dissociation and post-traumatic stress disorder: two prospective studies of road traffic accident survivors. *British Journal of Psychiatry*, *180*, 363–368.

Öst, L. G. (1989). One-session treatment for specific phobias. *Behaviour Research and Therapy*, *27*, 1–7.

Öst, L. G. (1996). One session group treatment of spider phobia. *Behaviour Research and Therapy*, *34*, 707–715.

Öst, L. G., Ferebee, I. and Furmark, T. (1997). One-session group therapy of spider phobia: direct versus indirect treatments. *Behaviour Research and Therapy*, *35*, 721–732.

Panasetis, P. and Bryant, R. A. (2003). Peritraumatic versus persistent dissociation in acute stress disorder. *Journal of Traumatic Stress*, *16*, 563–566.

Roediger, H. L. III. (1990) .Implicit memory: retention without remembering. *American Psychologist*, *45*, 1043–1056.

Shobe, K. K. and Kihlstrom, R. F. (1997). Is traumatic memory special? *Current Directions in Psychological Science*, *6*, 70–74.

Siegel, D. J. (1996). Cognition, memory, and dissociation. *Child and Adolescent Psychiatric Clinics of North America*, *5*, 509–536.

Spiegel, D. (1991). Dissociation and trauma. In A. Tasman and S. Goldfinger (Eds.), *American Psychiatric Press Review of Psychiatry, Vol. 10*. Washington DC: American Psychiatric Association.

Spiegel, D. and Cardena, E. (1991). Disintegrated experience: the dissociative disorders revisited. *Journal of Abnormal Psychology*, *100*, 366–378.

Stinissen, J., Willems, P. J., Coetsier, P. and Hulsman, W. L. L. (1970). *Handleiding bij de Nederlandstalige bewerking van de Wechsler Adult Intelligence Scale (WAIS)*. Lisse: Swets and Zeitlinger.

Van der Kolk, B. A. and Fisler, R. (1995). Dissociation and the fragmentary nature of traumatic memories: overview and exploratory study. *Journal of Traumatic Stress*, *8*, 505–525.