British Journal of Psychology (2005), 96, 283–293

The British Psychological Society

www.bpsjournals.co.uk

Mood, dissociation and false memories using the Deese-Roediger-McDermott procedure

Daniel B. Wright[1]*, Helen M. Startup[2] and Sorcha A. Mathews[1]

[1]University of Sussex, UK

[2]Institute of Psychiatry, UK

Who is likely to have a false memory? Does being in a certain transient state, such as a negative mood, mean that a person is more like to have a false memory? These important questions are examined using the Deese-Roediger-McDermott (DRM) procedure. The amount of false memories was compared with people's score on a dissociation measure and by mood. Unlike past research, which has used different procedures to explore false memories, we found that dissociation was not associated with false memories. We argue that this is because the DRM procedure requires two processes for a false memory (the generation of the critical lure and mistaking its source), while most false memory procedures only require one process (source monitoring error) because the errant information is suggested to the participant. This pattern of results suggests that only errors with the source monitoring process are associated with dissociation. We found that mood was related to false memories, but it was dependent on the specific task demands. If participants were told to recall as many words as they could, then people in a negative mood had more false memories. However, if they were told to recall as many words as they felt like recalling, then there were more false memories for people in a positive mood. This can be explained by the mood-as-input hypothesis. Results are discussed in relation to both theories and applications of memory.

Since Roediger and McDermott (1995; see also Read, 1996) showed that people will falsely report hearing a word if they are presented with semantically related words, the Deese–Roediger–McDermott (DRM) procedure has frequently been used for examining false memories. The procedure involves presenting a set of associated words (e.g. 'bed', 'rest', 'awake', 'tired', and 'dream') and then asking participants to recall these words. Often, participants falsely recall a word that is highly associated with the words presented. Here, the highly associated word, called the *critical lure*, is 'sleep'.

This procedure was originally used by Deese (1959), but his paper did not have a large impact at the time (Bruce & Winograd, 1998). When Roediger and McDermott (1995) and Read (1996) first reported their research, there was much debate about the

* *Correspondence should be addressed to Daniel Wright, Department of Psychology, University of Sussex, Brighton BN1 9QH, UK (e-mail: danw@sussex.ac.uk).*

DOI:10.1348/000712605X49916

accuracy of recovered memories of traumatic events (Loftus, 1997). This simple laboratory task showed that false memories could be created for single words. They did not argue that this showed that false memories of complex events, particularly those of a traumatic nature, could be created. However, *if* memories for traumatic events could be created, then the DRM procedure is an ethical and robust method for studying the possible mechanisms involved in false memory creation. The evidence for the creation of false memories of entire events also came in the mid-1990s from the studies by Hyman, Husband, and Billings (1995), Loftus and Pickrell (1995), and others. Further, in several claims against therapists, courts and insurance companies in the United States found sufficient evidence to conclude that it was possible to create memories for traumatic, though non-existent, events like satanic ritual abuse and alien space abduction (Loftus, 1997; see also Ross, 2001).

The argument about the accuracy of recovered memories has largely centred around whether the traumatic nature of an event produces memories that are qualitatively different from memories for non-traumatic events. Some hypotheses that were discussed during the height of the recovered memory debate were very bold, claiming that the norm was for memories of traumatic events to be repressed from conscious awareness or for the person to dissociate from the situation and develop what was then called *multiple personality disorder* (now called *dissociative identity disorder*). Often, it was argued that once encoded, these memories were not susceptible to distortion and could not be falsely created. While these beliefs were accepted by many people (Garry, Loftus, Brown, & DuBreuil, 1997), they lacked scientific support. They were falsified by several cases studies (Loftus, 1997) and Nourkova, Bernstein, and Loftus (2004) have shown that it is even possible to alter a memory for a traumatic memory within a laboratory context. Other hypotheses are less bold, but are supported by scientific evidence. For example, as the level of emotion increases, different regions of the brain become relatively more active, there is narrowing of attention, and other physiological reactions. These may create differences in memory performance with the DRM procedure.

The current paper explores two questions about false memory. The first question concerns the relationship between mood and memory performance. We use different musical pieces to affect mood, and hypothesize that this will affect memory performance dependent on the task instructions. The second question is whether there is a relationship between dissociation and the creation of false memories using the DRM procedure. Dissociation is characterized by difficulty integrating mental images, emotions, thoughts, and memories into consciousness, and is associated with cognitive failures (Wright & Osborne, 2005). Several papers have examined whether dissociation is associated with false memories, but only one other has used the DRM procedure.

The relationship between mood and all cognitive tasks is important. Generally, positive mood tends to improve performance (Ashby, Isen, & Turken, 1999), but there are exceptions (Oaksford, Morris, Grainger, & Williams, 1996). The effects of mood can be complex and interact with task demands. Martin, Ward, Achee, and Wyer (1993; see also Schwarz, 1990; Startup & Davey, 2001, 2003) have conducted several studies where participants are allocated to a positive or negative mood condition and are asked to work on different tasks. Importantly, participants are either told to provide as many responses as they can or to provide as many as they feel like. We will refer to these conditions as 'as can' and 'as feel like'. People in the positive mood condition perform less well in the 'as can' condition, but better in the 'as feel like' condition.

Martin and colleagues (1993) explain these data with the mood-as-input hypothesis. People in a positive mood condition misinterpret the reason for their positive mood

state to mean that they have performed to the best of their ability. If they are in the 'as can' condition, they will stop earlier than people in a negative mood condition who misattributed their negative mood to not performing as well as they can. The opposite effect would occur for people in the 'as feel like' condition. They attribute their positive or negative mood to the task, and therefore people in the positive condition continue for longer because they feel like continuing.

Working longer on a task does not imply better performance. For example, Hallam, Price, and Katsarou (2002) randomly allocated 10- to 12-year-old children to either a positive mood music condition (they used Disney and other calming children's music) or a control condition without music. Children were told to complete mathematics problems and are likely to have done this as long as they felt like doing it. Children listening to the music did attempt more questions. Overall, they correctly answered about 20% more questions, a small and non-significant increase. However, they produced 90% more erroneous answers. With respect to the DRM paradigm, we are particularly interested in how the combination of mood and task demands predict whether people falsely recall the critical lure. The mood-as-input hypothesis predicts that mood and task demands will interact. Those in a positive mood will recall more critical lures in the 'as feel like' condition, but fewer in the 'as can' condition.

The second question addressed in this study is how dissociation relates to false memory recall using the DRM procedure. Several studies have found that people who report that they dissociate are more likely to report false memories using a variety of paradigms (see papers in Read & Winograd, 1998). For example, Heaps and Nash (1998) showed that self-reported dissociation was positively correlated with imagination inflation, and Wright and Livingston-Raper (2002) showed dissociation is correlated with false memories using the post-event information suggestibility procedure. Both these studies used the DES-C (Wright & Loftus, 1999), a questionnaire adapted from Bernstein and Putnam's original Dissociative experiences scale (DES; Bernstein & Putnam, 1986; Carlson & Putnam, 1993). Carlson and Putnam, among others, note that the original DES was designed for clinical populations and can produce highly skewed data with non-clinical populations. The original questionnaire was adapted so that it yields approximately normally distributed data with a student population. Therefore, we use this version here.

There is only one study in the literature that compares dissociation with the DRM procedure. Winograd, Peluso, and Glover (1998) conducted a DRM study and measured several individual differences including dissociation as measured by the original DES. They found that the DES was not significantly correlated with recall of the critical lures. This might have been because the power of their study was low. The sample they report was relatively small ($N = 42$), which yields a power of only 50% for a medium-sized correlation (Cohen, 1988, Table 3.3.5). There are also problems using the DES with non-clinical samples because it is usually positively skewed (Ross, 1997) and differences in the low end of the scale, where most of the data lie, can be difficult to interpret (Carlson & Putnam, 1993; see Wright & Loftus, 1999, for further discussion). These floor effects can further affect the power of the comparisons (Baguley, 2004). Therefore, it is important to try to replicate this result.

There are several ways to induce participants to be in a specific mood (Brenner, 2000; Martin, 1990; Westermann, Spies, Stahl, & Hesse, 1996). Some of these can be time consuming and may affect subsequent memory tasks (e.g. asking people to recall autobiographical memories). We chose letting participants listen to music. This task is a common mood induction procedure and one which we have used in several studies

(Startup & Davey, 2001, 2003). Unlike Hallam *et al.*'s (2002) study with children, we used classical music pieces as is normally done with adults (e.g. Moore & Oaksford, 2002). Music is also a good choice because it is used in many situations involving cognitive skills, for example, many students listen to music while revising (Kotsopoulou, 1997, as cited in Hallam *et al.*, 2002). Of more direct relevance to the current study is that music is sometimes used in a therapeutic context (e.g. the American Music Therapy Association (AMTA) website retrieved on 20-2-2005, from http://www.musictherapy.org/).

Martin and Metha (1997) randomly allocated undergraduates to different conditions in which they either listened to music or were in a control group without music. Participants were then asked to recall childhood memories. People who listen to the different pieces of classical music recalled more memories than people in a control group. While Hallam *et al.* (2002) were able to tell if their children's mathematics problems were done correctly or incorrectly, Martin and Metha were not able to judge whether their participants' memories were accurate. This seems important if music is to be used to help remember events that previously were not accessible, and this is what Martin and Metha suggest could be done. They argue that playing music may be helpful 'to explore the contents of the preconscious . . . exploration of the preconscious provides the individual insight into repressed events or memories and their relationship to maladaptive behaviour' (p. 453). Therefore, using music as an induction technique has particular relevance given its possible use in situations involving recovered memories.

Method

Sample and design

A power analysis was conducted to determine the sample size. Cohen (1988) lists a correlation of .30 as a medium-sized effect, which is the minimum that we felt worth detecting. However, because our measure of false memory is a discrete scale with only seven points (i.e. the recall of between 0 and 6 critical lures), this will lower the power (Baguley, 2004). Therefore, we set the minimum effect size to .25. To achieve 80% power with $\alpha = .05$, 156 students from the University of Sussex (89 female and 67 male, mean age of 23 years old, and a median of 21 years old) were recruited from posters and leaflets around the university. Participants were told that they could withdraw from the study at any point. American Psychological Association and British Psychological Society ethics guidelines were followed throughout. The study received clearance from the School of Cognitive and Computing Sciences Ethics Committee. Participants were paid £5 (approximately $8) for their participation.

Participants were randomly allocated to one of the six groups of a 3×2 between-subjects design. The first factor was whether participants heard music that earlier research (Startup & Davey, 2001, 2003) had shown to produce positive, negative, or neutral mood. The second factor was whether participants were they were told to recall as many words as they could (the 'as can' condition) or as many as words as they wanted to (the 'as feel like' condition). The main dependent measure was how many critical lures they recalled. Six different lists were used so this measure can range from 0 to 6.

Materials and procedure

Participants were tested individually in a laboratory cubicle. They were presented with an experimental booklet that contained most of the information that they would need

for the study. Other materials included headphones for listening to the music and to the word stimuli, and a microphone to record their free recall.

The first page of the booklet explained the voluntary nature of the study and asked for some basic demographic details. Next, participants filled out a version of the Dissociative experiences scale (Bernstein & Putnam, 1986) designed for non-clinical samples (Wright & Loftus, 1999). After they completed this questionnaire, which takes between 5 and 10 minutes, participants were asked to rate their current levels of anxiety, happiness, sadness, and arousal by placing a mark on a 10 cm line. These moods were chosen based on past findings (Startup & Davey, 2001, 2003). The response line had the anchors *not at all X* and *extremely X*, where X is the appropriate adjective. This is the first mood measurement.

Next, participants put on headphones and were presented with the first two DRM word lists. We chose six lists from the 55 reported in Roediger *et al.* (2001). To be chosen, the critical lure had to be free recalled more than 40% of the time in Roediger *et al.*'s summary statistics. We excluded some lists because the words have different meanings in British English than American English (e.g. trash). The final lists we chose were those associated with the following critical lures: anger, chair, cold, slow, soft, and sweet. The sets were played on a tape-recorder at a rate of approximately 4 seconds per word. They were read by a female with south-east England accent. The order of lists was counterbalanced.

When the word lists finished, participants listened to a short piece of music. The musical pieces for negative, neutral, and positive moods were Gyorgy Ligeti's *Lux Aeterna*, Chopin's *Waltz*, and Vivaldi's *The Four Seasons*, respectively. Two minutes of the music were played at each of the three mood induction points so participants heard, in total, 6 minutes of the music. During the mood inductions participants were told to relax and to close their eyes. After listening to the music, participants again filled out the mood rating scales. They then had a brief unrelated distractor task. The distractor tasks used in this study involved drawing maps of different parts of the University of Sussex for 30 seconds. These tasks were designed to use the visuospatial sketchpad and require central executive function.

Participants were then asked to free recall the words that they previously heard. Half were told to report 'as many words as you can' and half were told to continue writing down the words for as long as they 'feel like continuing'. The free recalls were recorded and transcribed.

This sequence – mood ratings, listening to two DRM lists, mood induction, mood ratings, distractor task, and free recall – was repeated twice more. After this, participants were presented with an old/new recognition test. The test included all six of the original critical lures and their three highest associates from Roediger *et al.* (2001). Six additional categories from Roediger *et al.*'s list (doctor, mountain, needle, river, sleep, and window) were used as critical fillers. The critical fillers' three highest associates were also used. We will refer to these just as fillers. In total there were 48 recognition items: 6 critical lures, 18 old items, 6 critical fillers, and 18 fillers. They were presented in one of four random orders. The response alternatives were 'sure that the word is new', 'probably new', 'probably old', and 'sure that the item is old'. Participants were then asked, on a 5-point scale, whether they liked the music. We did this because during pilot research some participants said they enjoyed the negative music. As Hallam (2001) has argued, musical taste has large individual variation. Finally, participants were debriefed and paid.

Results

Some preliminary analyses are necessary before examining the relationships among dissociation, mood, and memory performance. We need to establish that people do report false memories with both free recall and recognition, and that the mood manipulation worked appropriately. Next, we look at the relationship between mood and the memory measures, first for free recall and then for recognition. Finally, we examine the relationship between dissociation and false memories.

Preliminary analyses

The mean number of words correctly free recalled from the lists was 34.3 with a 95% confidence interval from 32.8 to 35.8. The mean number of critical lures recalled was 3.0 with a 95% confidence interval from 2.8 to 3.2. The maximum possible was six and the observed data ranged from 0 to 6. Thus, 50% of the lures were recalled and this is approximately the values reported for these sets in Roediger *et al.* Both of these variables were fairly symmetrical; their skewness values were less than their standard errors.

The recognition data can be analysed in several ways. People responded on a 1- to 4-point scale. Here, we treat these responses as interval data. One participant's data were excluded because they reported using the scale incorrectly. The means and 95% confidence intervals were: for old items 3.65 ± 0.05, for critical lures 3.68 ± 0.05, for critical fillers 1.66 ± 0.07, and for fillers 1.65 ± 0.06. Two observations are clear. First, both old items and critical lures are recognized at much higher rates than fillers. Second, there appears little if any difference in the ratings for critical lures compared with the items previously seen.

The mood manipulation had the strongest effects on happiness ratings, so we report these here. Mood measures were taken before and after each of the three mood inductions. Before any of the mood inductions, the mean happiness ratings were 4.47, 5.36, and 5.39 for the negative, neutral, and positive conditions, respectively. After the tapes, they were 4.33, 5.45, and 5.57, respectively. The shifts are in the predicted directions, but not as large as found in previous research (Startup & Davey, 2001, 2003). People were asked if they liked the music (Table 1). While there is a relationship between condition and how much people liked the music (Goodman and Kruskal's $\gamma = 0.47$, $SE = 0.08$), the relationship is not perfect. Therefore, how much people like the music should also be considered.

Table 1. The cross-tabulation of experimental condition and whether people liked the music

	What did you think of the music that you listened to?					
	Did not like at all				Liked a lot	Total
Negative						
Gyorgy Ligeti's *Lux Aeterna*	8	15	14	12	3	52
Neutral						
Chopin's *Waltz*	2	1	10	22	17	52
Positive						
Vivaldi's *The four seasons*	0	4	10	23	15	52
Total	10	20	34	57	35	156

We used how much people reported liking the music to predict the shift in self-reported happiness between before and after the mood induction. This variable, which we refer to as 'like', is a better predictor of the shift in self-reported mood than simply the condition a person was in. For example, the correlation between the shift in self-rated happiness between the first and second ratings and liking the music was $r = .22$ (95% confidence interval from .07 to .38, $p = .005$), which is marginally larger than the correlation with whether the person was in the negative condition or one of the two non-negative conditions: $r = .15$ (95% confidence interval from .01 to .31, $p = .06$). The correlations for the shift from the second mood induction were similar: .25 (95% CI from .10 to .40, $p = .001$) versus 0.18 (95% CI from .03 to .33, $p = .02$).

Comparisons of mood and recall task with memory performance

Regressions were conducted on the number of words correctly recalled and the number of critical lures recalled with between-subject factors being the recall task that participants were given ('as can' or 'as feel like') and how much participants liked listening to the music. First, we report the analyses with only main effects. For correct recall, there was a main effect of recall task, $t(153) = 4.57, p < .001$, but the effect for liking the music was not statistically significant, $t(153) = -0.28, p = .78$. The effect size for recall task, the standardized slope coefficient (β) of 0.35, if squared is 0.12, which can be compared with other standardized effect size measures like 0^2 and R^2. It is best also to report effect sizes in their raw units (Wright, 2003). The slope coefficient for free recall is 6.31 items with the 'as can' group recalling more (once controlling for liking the music). This is about 7% of the maximum. The findings were similar for lures: a statistically significant main effect of recall task, $\beta = 0.18$, $t(153) = 2.28$, $p = .02$, and a non-significant effect for liking the music, $\beta = -0.04$, $t(153) = -0.53$, $p = .60$. The shift for recall is 3% shared variance. Once controlling for how much the music is liked, the 'as can' group were predicted to recall 0.53 more critical lures. This is a 9% shift of the maximum that could be recalled.

Next, the interaction between recall task and music liking was included in the models. For correct recall, this did not increase the fit of the model significantly (change in $R^2 = .002$, $p = .56$). However, the interaction for reporting the critical lures was statistically significant (change in $R^2 = .03$, $p = .03$). Figure 1 shows the interaction. There is a negative correlation ($r = -.25, p = .03$) in the 'as can' condition, but a positive correlation in the 'as feel like' condition ($r = .11, p = .34$). Thus, the more you like the music, the less you recall if you are told to recall all you can, but not if you are told to recall as many as you feel like. This is as predicted from the mood-as-input hypothesis.

Dissociation and false memories

Here, we examine relationship between DES-C and the memory measures. The DES-C had a mean of 42.17 with a 95% confidence interval from 40.15 to 44.19. Bivariate correlations were run between the DES-C and number of items correctly recalled and the number of lures recalled. These resulted in correlations of $-.048$ (95% confidence interval from $-.21$ to .11) for correct items and of $-.013$ (95% confidence interval from $-.17$ to .15) for critical lures. Figure 2 shows scatterplots of these with their linear regressions (and their 95% confidence limits). There were no obvious outliers or peculiar patterns in the scatterplots for these variables. These analyses were repeated for the recognition data. The mean DES score was not associated with either the recognition score for old items ($r = .11$, $p = .19$) or for the critical lures ($r = .03$, $p = .73$).

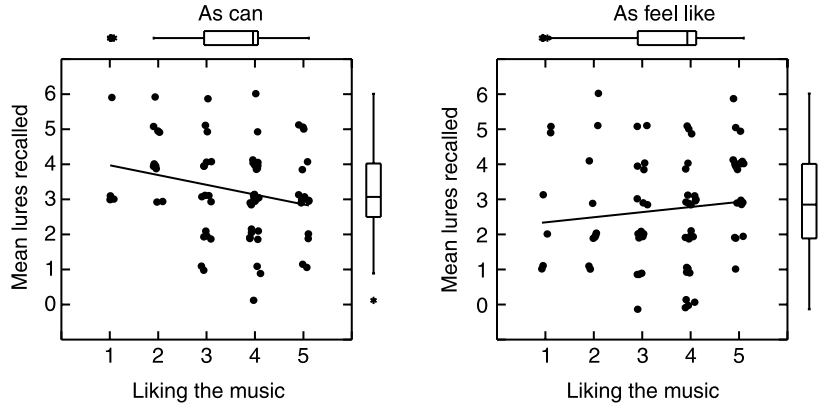

Figure 1. The relationship between liking the music and the number of critical lures recalled depends on the recall task. The more you like the music, the less you recall if you are told to recall all that you can, but there is no relationship if you are told to recall as many as you feel like. A random jitter has been added to the points so that all are visible.

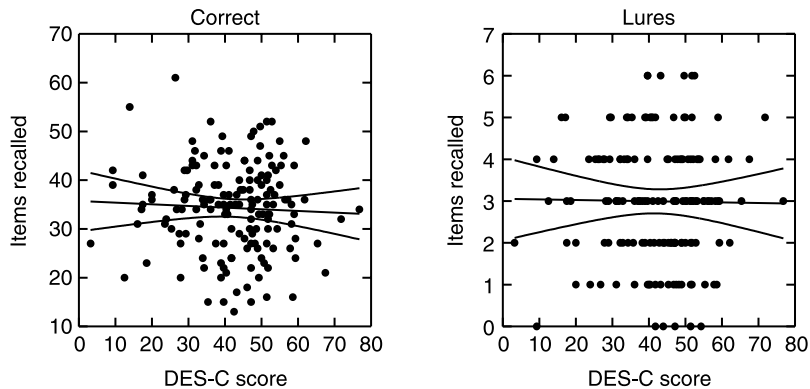

Figure 2. Scatterplots comparing the number of items correctly recalled from the DRM lists and the number of critical lures incorrectly recalled.

Discussion

The DRM procedure (Roediger & McDermott, 1995) is a robust method for creating false memories of individual words. Given that it is now accepted that false memories occur for entire events, the DRM procedure is a valuable method for investigating what is associated with false memory within the ethical and practical limitations of the psychology laboratory. In this study, we investigated the relationship between memory performance with mood, and with self-reported dissociation. Here, we review the results and discuss their implications.

Mood was manipulated by playing different musical tracks. Besides music affecting mood, it is an important applied variable because many people listen to music while performing cognitive tasks and people have advocated using it in a therapeutic context. The suggestion by Martin and Metha (1997) that music could be useful for accessing the preconscious and therefore eliciting recovered memories means that it is critical to understand how music may affect the recall of false memories. Hallam and colleagues'

(2002) results show that music can increase error rates for some tasks. There are many positive aspects about music therapy, as is evident from the US Senate's Music Therapy for Older Americans Act in 1991, but it is important to investigate if there may be unintended negative consequences.

The theoretical rationale for our study was the mood-as-input hypothesis (Martin *et al.*, 1993). This hypothesis predicts an interaction between mood and task demands. This interaction was observed for false recall of critical lures (Figure 2). If people are told to recall as many items as they can (the 'as can' condition), then they have to decide when to stop recalling. They have to judge how many they have recalled and if they are satisfied with this. If they are in a negative mood, then they interpret their mood as meaning they are not satisfied with their performance and continue trying to recall words. The opposite is true for those in a positive mood; they interpret their positive mood to mean that they are satisfied with their performance and finish. The effect is in the opposite direction for the 'as feel like' condition.

The implications for memories recovered in therapy are speculative, but could be important for how mental health professionals discuss a client's past. If recounting an unhappy childhood, the client will probably be in a negative mood state. Pressuring them to recall as much as they can could increase the likelihood of them errantly recalling events compared with people in a positive mood state. However, if the therapist asked them to continue only as long as they feel like continuing, then this should lessen the likelihood of false recall. Therefore, particularly when somebody is in a negative mood state, clients should not be forced to recall all that they can.

The second research question was whether there was a relationship between dissociation and false memories. Dissociation is one of the most discussed correlates of memory suggestibility (Wright & Livingston-Raper, 2002). A previous study by Winograd *et al.* (1998) found that they were uncorrelated, but they used a small sample and a measure of dissociation that was not designed for non-clinical samples. We used a relatively large sample and a version of the DES designed to yield roughly normally distributed data with student populations. We only used six DRM lists. It could be argued that this is not enough to produce large individual variation in reporting the critical lures. However, associations were found for other effects (i.e. interactions with mood and task demands). We did not find a statistically significant correlation between false memories with the DRM procedure and dissociation.

It is worth considering why dissociation is associated with false memory using other procedures (Read & Winograd, 1998; Wright & Livingston-Raper, 2002), but not the DRM procedure. The other procedures, for example, imagination inflation and post-event information, differ from the DRM procedure in an important way; they require only misattributing the source of an item presented to them. For example, with imagination inflation participants are presented with an event to imagine and errors result from people not accurately differentiating real from imagined events. The DRM procedure requires two processes. First, participants must generate some memory for the critical lures and then misattribute the source of this memory. They are not presented with the critical lures. We argue that dissociation is positively related to misattribution, but not the generation of the items. If dissociation is uncorrelated with the generation process, then it would be expected that there should be a correlation between dissociation and the DRM, although it would be smaller than the correlation between dissociation and false memory tasks that only require misattribution. It may also be that the generation process is negatively correlated with dissociation. If true, this

would mean that, depending on the size of the correlations and the relative importance of the two processes, the correlation might even be negative.

The false memory debate was at its height in the 1990s when some courts and many therapists were uncritically accepting the veracity of memories recovered after years of the memories apparently being inaccessible. Both courts and (most) therapists are now aware of that false memories do occur. While the volatility of the debate has lessened, there are still people recalling false memories and lives being affected. The cases no longer appear on the covers of the major weekly news magazines, but for the people involved, the effects are still daunting. In this paper, we used the most common laboratory technique for eliciting false memories and explored who was most susceptible and when they might be. Our most important finding was that if someone is in a negative mood, telling the person to recall 'as much as they can' will increase the chance of a false memory.

A final caveat is necessary. We have examined the conditions under which false memories occur. Much of the cognitive psychology research in this area has focused on one part of the recovered memory debate, the conditions in which false memories occur. This does not mean that true memories do not also occur.

Acknowledgements

The research was supported by a grant from the British Academy to Dan Wright and Helen Startup. We thank Siân Williams for help in preparing the stimuli.

References

Ashby, F. G., Isen, A. M., & Turken, A. U. (1999). A neuropsychological theory of positive affect and its influence on cognition. *Psychological Review, 106*, 529–550.

Baguley, T. (2004). Understanding statistical power in the context of applied research. *Applied Ergonomics, 35*, 73–80.

Bernstein, E. M., & Putnam, F. W. (1986). Development, reliability, and validity of a dissociation scale. *Journal of Nervous and Mental Disease, 174*, 727–735.

Brenner, E. (2000). Mood induction in children: Methodological issues and clinical implications. *Review of General Psychology, 4*, 264–283.

Bruce, D., & Winograd, E. (1998). Remembering Deese's 1959 articles: The Zeitgeist, the sociology of science, and false memories. *Psychonomic Bulletin & Review, 5*, 615–624.

Carlson, E. B., & Putnam, F. W. (1993). An update on the dissociative experiences scale. *Dissociation, 6*, 16–27.

Cohen, J. (1988). *Statistical power analysis for the behavioural sciences* (2nd ed.). Hillsdale, NJ: Erlbaum.

Deese, J. (1959). On the prediction of occurrence of particular verbal intrusions in immediate recall. *Journal of Experimental Psychology, 58*, 17–22.

Garry, M., Loftus, E. F., Brown, S. W., & DuBreuil, S. C. (1997). Womb with a view: Beliefs about memory, repression and memory-recovery. In D. G. Payne & F. G. Conrad (Eds.), *Intersections in basic and applied memory research* (pp. 233–255). Hillsdale, NJ: Erlbaum.

Hallam, S. (2001). *The power of music*. London: The Performing Arts Society.

Hallam, S., Price, J., & Katsarou, G. (2002). The effects of background music on primary school pupils' task performance. *Educational Studies, 28*, 111–122.

Heaps, C., & Nash, M. (1999). Individual differences in imagination inflation. *Psychonomic Bulletin & Review, 6*, 313–318.

Hyman, I. E., Jr, Husband, T. H., & Billings, F. J. (1995). False memories of childhood experiences. *Applied Cognitive Psychology, 9*, 181–195.

Loftus, E. F. (1997). Creating false memories. *Scientific American*, *277*, 70–75.

Loftus, E. F., & Pickrell, J. E. (1995). The formation of false memories. *Psychiatric Annals*, *25*, 720–725.

Martin, L. L., Ward, D. W., Achee, J. W., & Wyer, R. S. (1993). Mood as input: People have to interpret the motivational implications of their moods. *Journal of Personality and Social Psychology*, *64*, 317–326.

Martin, M. (1990). On the induction of mood. *Clinical Psychology Review*, *10*, 669–697.

Martin, M. A., & Metha, A. (1997). Recall of early childhood memories through musical mood induction. *Arts in Psychotherapy*, *24*, 447–454.

Moore, S. C., & Oaksford, M. (2002). Some long-term effects of emotion on cognition. *British Journal of Psychology*, *93*, 383–395.

Nourkova, V., Bernstein, D. M., & Loftus, E. F. (2004). Altering traumatic memory. *Cognition and Emotion*, *18*, 475–585.

Oaksford, M., Morris, F., Grainger, B., & Williams, J. M. G. (1996). Mood, reasoning, and central executive processes. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, *22*, 476–492.

Read, J. D. (1996). From a passing thought to a false memory in 2 minutes: Confusing real and illusory events. *Psychonomic Bulletin & Review*, *3*, 105–111.

Read, J. D. & Winograd, E. (Eds.), (1998). Individual differences and memory distortion. *Special issue of: Applied Cognitive Psychology* (Vol. 12, pp. S1–S137).

Roediger, H. L., III, & McDermott, K. B. (1995). Creating false memories: Remembering words not presented in list. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, *21*, 803–814.

Roediger, H. L., III, Watson, J. M., McDermott, K. B., & Gallo, D. A. (2001). Factors that determine false recall: A multiple regression analysis. *Psychonomic Bulletin & Review*, *8*, 385–405.

Ross, C. A. (1997). *Dissociative identity disorder: Diagnosis, clinical features and treatment of multiple personality* (2nd ed.). Wiley.

Ross, C. A (2001). *Bluebird: Deliberate creation of multiple personality by psychiatrists*. Manitou Communications.

Schwarz, N. (1990). Feelings as information: Informational and motivational functions of affective states. In E. T. Higgins & R. M. Sorrentino (Eds.), *Handbook of motivation and cognition*, (Vol. 2, pp. 527–561). New York: Guilford Press.

Startup, H. M., & Davey, G. C. L. (2001). Mood as input and catastrophic worrying. *Journal of Abnormal Psychology*, *110*, 83–96.

Startup, H. M., & Davey, G. C. L. (2003). Inflated responsibility and the use of stop rules for catastrophic worrying. *Behavior Research and Therapy*, *41*, 495–503.

Westermann, R., Spies, K., Stahl, G., & Hesse, F. W. (1996). Relative effectiveness and validity of mood induction procedures: A meta-analysis. *European Journal of Social Psychology*, *26*, 557–580.

Winograd, E., Peluso, J. P., & Glover, T. A. (1998). Individual differences in susceptibility to memory illusions. *Applied Cognitive Psychology*, *12*, S5–S27.

Wright, D. B. (2003). Making friends with your data: Improving how statistics are conducted and reported. *British Journal of Educational Psychology*, *74*, 123–136.

Wright, D. B., & Livingston-Raper, D. (2002). Memory distortion and dissociation: Exploring the relationship in a non-clinical sample. *Journal of Trauma and Dissociation*, *3*, 97–109.

Wright, D. B., & Loftus, E. F. (1999). Measuring dissociation: Comparison of alternative forms of the Dissociative Experiences Scale. *American Journal of Psychology*, *112*, 497–519.

Wright, D. B., & Osborne, J. E. (2005). Dissociation, cognitive failures, and working memory. *American Journal of Psychology*, *118*, 103–113.

Received 8 September 2004; revised version received 21 February 2005