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RECALL OF SCHEMATIC AND NON-SCHEMATIC MATERIAL RELATED TO THREAT IN SOCIALLY ANXIOUS AND NONANXIOUS INDIVIDUALS

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Abstract. The present study examined the recall of material representative and non representative of schemata for social and evaluative situations. Socially anxious (n = 24) and nonanxious (n = 25) individuals were presented with three positively valenced and three negatively valenced prose passages describing common social and evaluative scenarios. Eight of the sentences in each passage described events representative of the schema content of most individuals, whereas three of the sentences in each passage described events that are not representative of typical schema content. Participants completed a free recall task in both immediate (i.e. 2 minutes) and delayed (i.e. one week) recall conditions. Although there were no group differences as a function of type of content (i.e. schematic, non-schematic), socially anxious individuals were less likely than nonanxious individuals to accurately recall the gist of passages containing negative information in the immediate recall condition. In all, this study provided little evidence for the influence of maladaptive schema content on memory for threatening material in anxious individuals, but it added to an increasingly large literature suggesting that some types of anxiety are associated with an avoidance of processing emotional material.

Keywords: Social anxiety, memory, prose recall, schema, script.

Introduction

For nearly 20 years, clinical scientists have investigated the cognitive factors that serve to maintain and exacerbate anxiety symptoms (see Williams, Watts, MacLeod, & Mathews, 1997 for a comprehensive discussion). Although evidence for attentional biases toward threat and the interpretation of ambiguous stimuli as dangerous in anxious individuals is well established (e.g. Butler & Mathews, 1983; MacLeod, Mathews, & Tata, 1986), evidence for memory biases toward threat in this population is equivocal at best (cf. Mathews & MacLeod, 1994). Some studies have found robust evidence for memory biases toward threat in individuals with panic disorder (e.g. McNally, Foa, & Donnell, 1989) and in individuals with posttraumatic stress disorder (e.g. Paunovic, Lundh, & Ost, 2002). In contrast, many studies have failed to demonstrate memory biases toward threat in generally anxious individuals (e.g. Mogg, Mathews, & Weinman, 1987) and social phobic individuals (Rapee,

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McCallum, Melville, Ravenscroft, & Rodney, 1994). Although several explanations have been posited for this discrepancy (cf. Lundh, Czyzykow, & Ost, 1997), at present the status of memory biases toward threat in anxiety disorders remains unclear.

Nevertheless, cognitive theories of anxiety clearly imply that anxious individuals should be characterized by a memory bias toward threat. One assumption of these theories is that information processing biases are driven by the presence of maladaptive schemas, or cognitive orientations that color the manner in which individuals view the world (e.g. Beck & Clark, 1997; Rapee & Heimberg, 1997). According to these theories, maladaptive schemas are formed and maintained by memories of threatening experiences that exaggerate the amount of danger associated with perceived threat and underestimate one's ability to cope with it. It is not directly stated in these theories that memory biases are a consequence of maladaptive schemas in the same manner as are attentional and interpretation biases. However, the presence of distorted memories for threat is necessary for the development of these schemas, which serve as the cornerstone of these cognitive theories (e.g. Eysenck, 1997; Rapee & Heimberg, 1997). Although little work has been done to validate the presence and maladaptive nature of threat-related schemata (cf. Eysenck, 1997; Wenzel & Holt, 2000, 2003), if these cognitive structures exist, then they should facilitate memory biases toward threatening material in anxious individuals.

Thus, one possible reason for the lack of convincing findings demonstrating memory biases toward threat in anxiety disorders is that the memory tasks used in most studies do not adequately access or activate threat-related schemata in anxious individuals. Specifically, most studies investigating memory biases in anxiety disorders adopt single word stimuli (e.g. Mogg et al., 1987), although it should be noted that more recent studies report memory for other anxiety-related stimuli such as critical faces (e.g. Lundh & Ost, 1996) and threat-related prose passages (Wenzel & Holt, 2002). It is unclear the extent to which single words, faces, and prose passages are related to or activate the negative schemata that are thought to drive cognitive biases toward threat. According to Beck and Clark's (1997) cognitive theory of anxiety, tasks that require elaborate processing will elicit cognitive biases toward threat that are influenced by threat-related schemata. If the tasks used in most studies examining memory for threat-related material do not tap into threat-related schemata, then cognitive biases toward threatening material are not likely to be found.

A small line of research in cognitive psychology provides a methodology to demonstrate the influence of schema content on short- and long-term memory. In this series of studies, schema content was identified through the use of *scripts*, which are ordered sequences of events for common situations (Schank & Abelson, 1977). For example, Bower, Black and Turner (1979) presented undergraduate research participants with common scenarios, such as going to the doctor and shopping at a grocery store, and asked them to generate 20 events that typically occur in those situations. Composite scripts were formed of events listed by 25% or more of participants in their study, which were regarded as representative of participants' schema content. In a subsequent experiment, Bower et al. (1979) presented participants with eight-line prose passages composed of a subset of the schematic events that formed these composite scripts as well as events that were not representative of schema content. After a 20-minute delay, participants recalled the non-schematic events at a higher rate than scripted events, presumably because the non-schematic events were more salient than scripted events and were assigned a higher value during encoding. Graesser, Woll, Kowalski and Smith (1980) replicated this finding with an immediate recall task and also reported

that as retention intervals increased, participants recalled scripted actions at a higher rate than non-schematic actions. That is, non-schematic events were recalled well in the short-term but generally were forgotten with the passage of time.

In all, studies from the cognitive psychology literature suggest (a) that event-based schemata for common situations indeed exist, and (b) that schema content has a differential influence upon short- and long-term memory. Specifically, non-schematic events are more salient in the short-term, such that they are recalled at a higher rate than schematic events. However, in the long-term, non-schematic events are forgotten at a higher rate than schematic information, as individuals rely on their schemas to guide their recollections. Thus, this literature suggests that schema content plays an important role in memory processes, and it outlines a straightforward methodological approach to provide empirical support for this notion. Wenzel and Holt (2003) applied Bower et al.'s (1979) procedure to compare composite scripts related to common social or evaluative situations in socially anxious and nonanxious individuals and confirmed that event-based schemata for situations that are threatening for socially anxious individuals exist. The present study was designed to take the next step in understanding the influence of threat-related schemata upon information processing and did so by using the event-based schemas reported by Wenzel and Holt (2003) to examine short- and long-term memory for threat in an identical manner as has been done in the cognitive psychology literature.

Thus, socially anxious and nonanxious participants in the present study were presented with six prose passages describing social or evaluative situations and completed both immediate and delayed free recall tasks. Passages were constructed in a similar manner as stimuli in Bower et al.'s (1979) study, such that they were composed of schematic events that were reported by at least 25% of participants in Wenzel and Holt's (2003) sample as well as non-schematic events that were generated by less than 25% of this sample. The inclusion of the eight schematic sentences ensured that relevant knowledge stores would be activated similarly in all participants, much in the same manner as was done in Bower et al. (1979). In addition, passages included one neutral but non-schematic event as well as two additional non-schematic events that were either positively or negatively valenced. It was predicted that groups could be differentiated, based on their recall of the non-schematic events that overtly reflected a specific affective tone.

Specific hypotheses for the present study were as follows. Consistent with results reported in previous cognitive psychology studies (e.g. Bower et al., 1979; Graesser et al., 1980), it was hypothesized that nonanxious individuals would recall a higher percentage of non-schematic information than schematic information in the immediate recall condition but would recall a higher percentage of schematic information than non-schematic information in the delayed recall condition. In contrast, it was expected that socially anxious individuals would recall a higher percentage of negative non-schematic information than schematic information in both the immediate and delayed recall conditions. Moreover, it was predicted that socially anxious individuals would recall a smaller percentage of positive non-schematic information than schematic information in both the immediate and delayed recall conditions. That is, we expected to obtain a memory bias *toward* the recall of negative non-schematic information compared to schematic and neutral non-schematic information as well as a memory bias *against* the recall of positive non-schematic information in the sample of socially anxious individuals.

It is acknowledged that we hypothesized that memory biases would occur for the non-

schematic affective information rather than the schematic information, which is the material suggested by cognitive theories of anxiety that should be linked with disrupted cognitive processing. We made these predictions for two reasons. First, Wenzel and Holt (2003) surprisingly found virtually no differences between socially anxious and nonanxious individuals in their schema content for common social and evaluative situations regardless of whether they were generating scripts that pertained generally to most people or that pertained specifically to themselves. Thus, there is no evidence to suggest that anxious individuals are characterized by maladaptive threat-related schemata, which cognitive theories of anxiety would suggest are necessary for biases toward threat to occur. In contrast, the non-schematic affective information is consistent with examples of ''worst case scenarios'' that are salient fears of socially anxious individuals as well as with ''best case scenarios'' that socially anxious individuals typically dismiss. We speculated that cognitive biases toward or against non-schematic affective information would occur in the context of the activation of the more mundane scripted events that form the skeleton of our social and evaluative passages. Second, studies from cognitive psychology suggest that recall of schematic material is not as important as the discrimination between schematic and non-schematic information (cf. Graesser, Gordon, & Sawyer, 1979). Thus, consideration of the recall of non-schematic information provides an index of the extent to which schemas for common threatening situations influence memory in the same way as do schemas for the common, everyday situations described in studies such as Bower et al. (1979).

Method

Participants

Two samples were used in the present study: 24 individuals with self-reported social and evaluative fears and 25 individuals with no self-reported social and evaluative fears. Participants were undergraduate psychology students who received either course credit or extra credit for their participation. Participants had a mean age of 20.4, 67.4% were female, and 98.0% were Caucasian. Demographic variables did not differ between groups. Participants were identified through an elaborate screening process. In two group testing sessions, participants ($n = 886$) were administered the Fear of Negative Evaluation Scale (FNE; Watson & Friend, 1969) and the Social Avoidance and Distress Scale (SAD; Watson & Friend, 1969). Individuals who scored one standard deviation above the mean on both the FNE and the SAD were eligible for the socially anxious group (FNE $\geq$ 20; SAD $\geq$ 12). Individuals who scored one standard deviation below the mean on both the FNE and the SAD were eligible for the nonanxious group (FNE $\leq$ 4; SAD = 0). Two screening measures were used to ensure that groups would remain valid despite regression to the mean. Seventy-seven individuals (8.7% of the total sample; mean FNE = 24.3; mean SAD = 17.4) met criteria to be contacted for the socially anxious group. Fifty-eight individuals (6.5% of the total sample; mean FNE = 1.8; mean SAD = 0) met criteria to be contacted for the nonanxious group.

Eligible participants were contacted by telephone about participating in the study. Thirty-seven individuals identified as socially anxious (mean FNE = 23.5; mean SAD = 15.8), and 37 individuals identified as nonanxious (mean FNE = 1.8; mean SAD = 0) agreed to participate and attended the initial experimental session. Reasons for other eligible research participants declining participation included having already completed their course requirement,

scheduling difficulties, having dropped the psychology class, and failing to report for the initial experimental session. At the time of the experimental session, all participants again completed the FNE and the SAD to assess the degree to which scores on these scales regressed to the mean. Data from anxious individuals were excluded from analyses if their score on either the FNE or the SAD dropped below the mean obtained on the screening sample (mean FNE = 12.1; mean SAD = 6.0), and data from nonanxious individuals were excluded if their scores on either the FNE or the SAD were above the mean obtained on the screening sample. In all, data from three socially anxious individuals and one nonanxious individual were excluded from analyses because their scores on at least one inventory measuring social anxiety had regressed past the mean. Furthermore, 10 socially anxious individuals (five of whom had also regressed to the mean on the social anxiety inventories) and nine nonanxious individuals participated in the immediate condition but in the delayed recall condition, and data sets from two nonanxious individuals were lost due to experimentor error. Thus, the data from these participants also were not included in analyses. There were no differences in demographic characteristics between individuals whose data were included in the analyses and individuals whose data were excluded from analyses.

Measures

Self-report inventories. Participants completed the FNE and SAD (Watson & Friend, 1969), the State-Trait Anxiety Inventory-Trait Version (STAI-T; Spielberger, Gorsuch & Lushene, 1970), and the Beck Depression Inventory (BDI; Beck, Ward, Mendelsohn, Mock, & Erbaugh, 1961) in order to characterize levels of anxious and depressive symptomatology.

Reading rate. The Nelson-Denny Reading Test (NDRT; Nelson & Denny, 1973) is a nine-paragraph passage used to measure reading rate. After reading the passage for one minute, partitipants placed a check mark on the line of the NDRT where they were reading when they were instructed to stop. Each line corresponds to a value that reflects the number of words read up to that point. The resulting score is the number corresponding to the line of the passage that the individual was reading after one minute had passed.

Stimuli

Passages consisted of bits of the schematic and non-schematic information obtained by Wenzel and Holt (2003) for the following scenarios: (a) going on a date; (b) eating at a restaurant with acquaintances; (c) going to a party; (d) presenting a speech; (e) presenting a new idea to a supervisor; and (f) complaining to a store manager about a product. Events comprising the prose passages in the present study were selected using guidelines put forth by Bower et al. (1979), Experiment 3. Eight concrete schematic events were chosen from each scenario. The beginning and ending events of each script in Wenzel and Holt (2003) were included as the beginning and ending events of the prose passages used in the present study. Every third schematic concrete event after the beginning event of scripts described by Wenzel and Holt (2003) was included in the present study's prose passage. This heuristic was modified slightly on some occasions to avoid inserting an event describing an emotion. In these cases, the next available concrete event was selected.

Positive, negative, and neutral non-schematic events listed by less than 25% of the participants in Wenzel and Holt (2003) were inserted into passages. Similar to the recommendations put forth by Graesser et al. (1980), the non-schematic sentences described events that would not necessarily be regarded as typical for the situations, but also not bizarre or irrelevant. For each of the six scenarios, there was a positive and negative version. The positive version included two positive non-schematic events, and the negative version included two negative non-schematic events. In addition, one neutral non-schematic event was chosen for inclusion into each scenario, and it was placed in the middle of the passage as the sixth sentence or after the fourth concrete, schematic event. The same neutral event was inserted into both the positive and negative versions of each of the six scenarios. The first non-schematic affective event was inserted after the second schematic concrete event as the third sentence in the passage. The second non-schematic affective event was inserted after the sixth schematic concrete event as the ninth sentence. In both the positive and negative versions of the six passages, one non-schematic affective event reflecting an emotion (e.g. ''feel embarrassed'') and one non-schematic affective event reflecting a concrete action (e.g. ''everyone stared'') were included. In four of the passages, the emotional event was the first non-schematic affective event inserted into the passage, and the concrete event was the second non-schematic affective event inserted into the passage. In the remaining passages, the concrete event was the first non-schematic affective event inserted into the passage, and the emotional event was the second non-schematic affective event inserted into the passage. Parallel male and female versions were created for use with male and female participants, and passages were presented in the third person to approximate the Bower et al. (1979) methodology as closely as possible. Table 1 displays examples of the prose passages created for the present study.

The selection of positive, negative, and neutral non-schematic events was conducted by examining the entire pool of events generated by fewer than 25% of participants in Wenzel and Holt's (2003) study. A group of psychology students rated these non-schematic events on a 7-point dimension of pleasantness (1 = extremely unpleasant; 7 = extremely pleasant). Events rated 5.5 and above were regarded as positive (e.g. ''smile'', ''feel proud''); events rated 2.5 and below were regarded as negative (e.g. ''fidget'', ''feel cheated''); and events rated from 2.6 to 5.4 were regarded neutral (e.g. ''listened to the manager'', ''looked around''). Events were selected for inclusion into passages based on these ratings and their logical fit with the passage content. A one-way ANOVA was conducted to confirm the

Table 1. Example of experimental stimuli

Positively valenced passage, male version	Negatively valenced passage, female version
John went to the library. He took notes. **John felt confident about his speech**. He made note cards. John practiced his speech. *He adjusted the microphone. John started his speech. He looked at the audience.* **The audience applauded**. John ended his speech. He exited the podium.	Mary went to the library. She took notes. **Mary felt intimidated**. She made note cards. Mary practiced her speech. *She adjusted the microphone. Mary started her speech. She looked at the audience.* **Mary made mistakes during her speech**. She ended her speech. Mary exited the podium.

Note: Sentences in normal type represent schematic events. Sentences in bold type represent non-schematic affective events. Italicized sentences represent non-schematic neutral events.

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expected valence of the positive, negative, and neutral non-schematic sentences inserted into scenarios. As anticipated, the ANOVA was highly significant (F [2, 24] = 174.37; $p <$ .001). Follow-up analyses revealed that positive non-schematic sentences were rated as more pleasant than the neutral and the negative non-schematic sentences (ps < .001), and negative non-schematic sentences were rated as less pleasant than neutral non-schematic sentences ($p <$ .001).

We also conducted an analysis to ensure that our schematic and non-schematic events were correctly classified as such. To address this issue, we calculated the percentage of participants from Wenzel and Holt (2003) that included each particular event into their personal sequence of events that they judged to be typical of the six scenarios. An average of 59% of participants from that study included the schematic sentences into their free generation of typical events, whereas only 6% of these participants included the non-schematic-affective events, and 8% of these participants included non-schematic-neutral events. The one-way ANOVA comparing the percentage of participants who listed each of the sentences included into passages was highly significant (F[2, 24] = 174.37; $p <$ .001). Follow-up analyses revealed that a greater percentage of participants listed schematic sentences than non-schematic-affective and non-schematic-neutral sentences (ps < .001). There was no difference in the percentage of participants who listed non-schematic affective events and the percentage of participants who listed non-schematic neutral events. From this analysis, we can conclude that schematic events were regarded by the majority of individuals as being typical of the scenarios and that less than 10% of individuals regarded the non-schematic events as being typical. To consider this issue in a different manner, undergraduate psychology students rated each event for the degree to which it commonly occurs in the scenarios (1 = not common, 7 = prototypical). A comparison of the schematic, non-schematic affective, and non-schematic neutral sentences revealed that schematic sentences indeed were regarded as much more commonly occurring than both categories of non-schematic sentences (F [2, 28] = 30.79; $p <$ .001). Thus, both methods of evaluating the nature of the sentences included in the passages confirmed that the typicality of the sentences selected to be schematic was much higher than the typicality of the sentences chosen to be non-schematic.

Procedure

Participants were tested individually during the experimental session. After giving their informed consent, participants completed the NDRT. Next, participants completed six trials according to the following procedure. One-and-one-half minutes were allotted for participants to read each passage, which was determined by the time it required for the slowest reader to complete a single passage during pilot testing (cf. Gunther, Ferraro, & Kirchner, 1996). After the presentation of the passage, participants engaged in a 2-minute distracter task of crossing out consonants from textbook pages. Next, participants were given 3 minutes to write down as much of the previously presented passage as possible. Participants were asked to be accurate and to record the information as verbatim as possible, although they were instructed to provide the gist of the passage if they were unable to provide a word-for-word recollection (cf. Bower et al., 1979). Participants then moved onto the next trial until all six prose passages had been presented and recalled. Finally, participants completed the self-report inventories to characterize the samples.

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After one week, participants returned for the delayed recall condition, conducted in groups of one to three participants. Each participant provided his or her own written recall of the passages without assistance from the other participants. Participants were asked to write the recall of each passage that was presented to them in the previous session, using passage titles as cues (cf. Graesser et al., 1980). Participants were encouraged to write the verbatim recall of passages using the same instructions as they were given in the immediate recall condition.

The counterbalancing scheme for the presentation of passages was as follows. Each participant was presented with six passages corresponding to each of the six scenarios. That is, participants received one passage from each topic area (e.g. going on a date, giving a speech). Of those six passages, three included positive non-schematic events, and three included negative non-schematic events. Thus, participants received only the positive or negative version of each scenario. Moreover, female participants read the female version of each scenario, whereas males read the male version of each scenario. The order of passages given to each participant was determined using a Latin Square counterbalancing scheme, resulting in 12 orders of passage presentation.

Data coding

A gist coding scheme was developed to assess the extent to which participants recalled the main idea of each sentence in the passages, which is regarded as the preferred approach to coding data obtained in this manner (Graesser et al., 1980). The coding scheme used in the present study was modeled after the guidelines described in Yussen, Huang, Mathews and Evans (1988). Responses corresponding to each sentence in the original prose passages were categorized using the following ratings: accurate, accurate with minor error, and inadequate. A rating of ''accurate'' was given to a response in which all events, actions, and the emotional tone of the original sentence was reproduced. Specific wording of the recall could deviate from the original sentence. For example, if a participant recalled the restaurant scenario sentence, ''They received their bill'' as ''They got their bill'', the response would be categorized as accurate because all necessary items from the original sentence were reproduced in the response. A rating of ''accurate with minor error'' was given to a response in which events, actions, and the emotional tone of the original sentence was generally reproduced with the exception that some detail had been confused or omitted but did not change the tone or meaning of the original sentence. For example, if the sentence in the original passage read, ''John purchased a produce and found a fault with it'', and the participant recalled, ''John purchased a product with which he was unhappy'', then that sentence would have been categorized with this rating because he or she retained the overall tone but omitted the detail about finding fault with the product. A rating of ''inaccurate'' was given to a recalled passage in which there was significant omission of action(s), lack of the emotional tone of the original passage, or demonstration of the misinterpretation of a major element of action, events, and/or subjects.

Each individual sentence in a recalled passage was compared to the corresponding sentence in the original passage and assigned a gist rating. The number of each possible category was tallied separately as a function of type of sentence (i.e. schematic, non-schematic-affective, non-schematic-neutral), passage valence (i.e. positive, negative), and recall condition (i.e. immediate, delayed). The individual tallies obtained for each of the categor-

ies – accurate, accurate with minor error, and inaccurate – were divided by the total number of sentences in each condition for all four conditions (e.g. immediate recall-positive passage). Three coders, blind to group membership, were trained on 15 pilot data cases and obtained a kappa of .83 with a 92% agreement. Subsequently, the three coders rated every tenth data set in each recall condition in order to maintain consensus and to prevent rater bias and drift.

Results

Participant characteristics

Table 2 presents group responses on the self-report inventories and the Nelson-Denny Reading Test (NDRT). A series of independent groups *t*-tests revealed significant differences between groups on the BDI ($t[47] = 4.34$; $p < .001$); FNE ($t[45] = 18.87$; $p < .001$), SAD ($t[47] = p < .001$), and STAI-T ($t[46] = 7.75$; $p < .001$). Overall, these results confirm that participants in the socially anxious group were experiencing high levels of social anxiety. They also reported more trait anxiety and depressive symptomatology than the nonanxious individuals. The socially anxious individuals group's mean BDI score of 12.1 reached the clinical range, defined as a score of 10 or above (Beck et al., 1961). Eleven of the 24 individuals in the socially anxious group had BDI scores of 10 or above (range = 1–31), whereas only two of the nonanxious individuals had BDI scores of 10 or above (range = 0–11). Thus, ANOVAs for memory performance using BDI scores as covariates were conducted to ensure that any significant results obtained were due to social anxiety rather than to concurrent depressive symptoms. Furthermore, there were no differences between groups on the NDRT, ruling out the possibility that systematic group differences in rating rate could account for any significant results.

Accuracy of recall

Table 3 summarizes the percentage of accurate gist ratings as a function of group, time, passage valence, and sentence type. A 2 (group: socially anxious, nonanxious) × 2 (time: immediate, delayed recall) × 2 (valence: positive, negative passage) × 3 (type: schematic,

Table 2. Group differences on measures of participant characteristics

	Socially anxious group ($n = 24$)	Nonanxious group ($n = 25$)
BDI*	12.08 (10.85)	2.84 (3.31)
FNE*	24.48 (5.50)	1.96 (1.94)
SAD*	16.54 (6.32)	0.60 (0.87)
STAI-T*	48.69 (9.02)	32.33 (5.04)
NDRT	243.74 (67.19)	241.58 (77.11)

Note: BDI = Beck Depression Inventory; FNE = Fear of Negative Evaluation Scale; SAD = Social Avoidance and Distress Scale; STAI-T = State-Trait Anxiety Inventory-Trait Version; NDRT = Nelson-Denny Reading Test. Values in parentheses are standard deviations.
* Significant differences between groups at $p < .001$.

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Table 3. Percentage of material accurately recalled

	Socially anxious group (n = 24)	Nonanxious group (n = 25)
Immediate recall:	68.24 (14.85)	73.15 (12.55)
Positive passages		
Schematic		
Non-schematic affective	72.90 (16.88)	66.00 (20.68)
Non-schematic neutral	69.42 (23.95)	73.33 (31.91)
Negative passages	65.44 (11.94)	68.50 (14.08)
Schematic		
Non-schematic affective	72.94 (20.14)	80.00 (18.00)
Non-schematic neutral	56.94 (30.28)	70.67 (24.19)
Delayed recall:	43.95 (14.61)	40.67 (15.64)
Positive passages		
Schematic		
Non-schematic affective	25.68 (21.36)	28.67 (20.71)
Non-schematic neutral	22.22 (23.42)	36.00 (28.74)
Negative passages	38.53 (14.44)	36.83 (17.50)
Schematic		
Non-schematic affective	27.75 (20.65)	28.01 (20.25)
Non-schematic neutral	22.22 (23.42)	26.67 (25.46)

Note: Values are expressed in terms of percentage of responses that were categorized as ''accurate'' using the gist coding scheme. Values in parentheses are standard deviations.

non-schematic affective, non schematic-neutral) mixed ANCOVA was conducted with repeated measures on time, valence, and type variables and including BDI scores as a covariate to assess participants' accuracy of recall. This analysis yielded main effects for time (F[1, 47] = 199.81; $p < .001$) and sentence type (F [2, 94] = 5.92; $p = .004$) but no main effects for valence or group. The time and type main effects were qualified by a significant time by type interaction (F[2, 94] = 9.60; $p < .001$). Although there was no difference in the accuracy of recall between schematic and non-schematic material in the immediate recall condition, participants recalled schematic material more accurately than non-schematic material in the delayed recall condition. Moreover, there was a significant three-way group by time by valence interaction (F [1, 47] = 9.16; $p = .004$). The four-way interaction between group, time, valence, and type was not significant.

To follow-up the significant three-way interaction involving group, composite variables created for percentage of accurate responses as a function of time and valence were collapsed across sentence type because sentence type was not a significant factor in this interaction. Two separate 2 (group: socially anxious, nonanxious) × 2 (valence: positive, negative recall) mixed ANOVAs were conducted for percentage of material accurately recalled in both recall conditions. In the immediate recall condition, there was a significant group by valence interaction (F [1, 47] = 3.94; $p = .044$), but there were no significant main effects or interactions for the delayed recall condition. Follow-up tests of simple effects indicated that socially anxious participants recalled material included in negative passages less accur-

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ately than nonanxious participants, but there were no differences between groups in the accuracy of material recalled in the positive passages. Further, within-group analyses indicated that socially anxious participants accurately recalled more material from positive passages than negative passages, whereas nonanxious participants recalled material from both types of passages with a similar level of accuracy. There were no significant main effects or interactions as a function of group or passage valence in the delayed recall condition.

This analysis was re-run combining percentages of gist scores of ''accurate'' and percentages of gist scores of ''accurate with minor error''. Most main effects and interactions were non-significant in this analysis, suggesting that consideration of the highest level of accuracy best differentiated between groups.

Discussion

The present study was conducted to examine the effects of threat-related schema content on short- and long-term memory for threatening material. Participants were presented with six prose passages relating to social and evaluative situations containing material that was both consistent and inconsistent with the schema content obtained for these situations in a previous study (Wenzel & Holt, 2003). In cognitive psychology studies examining memory for mundane, everyday scenarios, most individuals recalled non-schematic information for a greater degree than schematic information in the short term but demonstrated the reverse pattern in the long-term (e.g. Bower et al., 1979; Graesser et al., 1980). We expected that socially anxious individuals would recall *more* non-schematic negative than schematic information in both immediate and delayed recall conditions as well as recall *less* non-schematic positive than schematic information in both of these conditions. That is, we hypothesized that socially anxious participants would demonstrate both a memory bias toward non-schematic negative information as well as a memory bias against non-schematic positive information in the context of a schema activated for threatening situations.

Before considering group differences in the accuracy of recall, it must be acknowledged that our results only partially replicated those reported in the cognitive psychology literature. As expected, all participants more accurately recalled material in the immediate recall condition than in the delayed recall condition. Participants did not recall non-schematic information to a greater degree than schematic information in the immediate recall condition, although they indeed recalled more schematic than non-schematic information in the delayed recall condition. Thus, the expected effects of schema content upon free recall were obtained in the delayed recall condition but not in the immediate recall condition.

Contrary to expectation, there was little evidence for memory biases toward or against non-schematic affective material in the sample of socially anxious individuals. Analysis of the gist coding scheme revealed that, regardless of sentence type, socially anxious individuals recalled material from the negative passages less accurately than nonanxious individuals in the immediate recall condition. This finding was not consistent with predictions, as it had been expected that non-schematic negative information would be recalled more accurately than schematic information in both the immediate and delayed recall conditions. On the other hand, this finding concurs with a small but growing number of studies suggesting that socially anxious individuals are characterized by a memory bias *against* threat (Wenzel & Holt, 2002; Wenzel, Werner, Cochran, & Holt, 2002). Mogg and her colleagues (Mogg et al., 1987) proposed the vigilance-avoidance hypothesis to account for results from

their laboratory suggesting a memory bias against threat in anxious individuals. Specifically, this theory posits that although anxious individuals selectively attend to threat in their environment, they subsequently avoid elaborate processing of that information. This avoidance in turn interferes with the processing required for the successful explicit recall of threatening material. It is possible that socially anxious individuals in the present study avoided elaborate processing of the material in the negative passages, which impaired recall in the immediate recall condition. Perhaps cognitive avoidance was not observed in the delayed recall condition because all participants forgot approximately 30% of the material, which could have served to mask more subtle differences between groups.

In all, this study provided no evidence for the differential influence of threat-related schemata on the recall of threatening material in socially anxious and nonanxious individuals. These findings emerged despite the implementation of an experimental design that activated threat-related schema content as well as one that included valenced threat-related information than should have been salient to socially anxious individuals. We are making the assumption that schemata for these situations were activated by presenting participants with eight sentences reflecting the schema content generated by participants in Wenzel and Holt (2003). Because the schema is a hypothetical construct, there is no conclusive way to demonstrate empirically that relevant schemata were activated. On the other hand, we presented schema-relevant material in an identical manner as did Bower et al. (1979) and Graesser et al. (1980), whose line of research also rests on the notion that the presentation of at least eight events regarded as schema-relevant indeed activate the entire event-based schema.

Several limitations of this study must be acknowledged, as they may have contributed to the lack of significance found in our results. First, although we are confident that schema content as measured by prototypical events included in event-based scripts was activated, it is possible that more central aspects of the schemata of socially anxious individuals were not accessed. Typically, schemata in clinical populations are regarded as dysfunctional beliefs and negative self-statements (e.g. Beck & Emery, 1985) rather than events that comprise common but threatening situations. Examples of the sort of schema content associated with social anxiety include statements such as, ''I will make a fool out of myself'' or ''Others won't like me''. Perhaps priming participants with such statements to activate related dysfunctional beliefs would have enhanced results in the predicted direction. Moreover, recent research suggests that memory biases emerge in socially anxious individuals only after they have been primed with actual threat (e.g. Mansell & Clark, 1999). It is possible that results more in line with our hypotheses would have been obtained had such a manipulation been incorporated into the study design. Similarly, each of the passages was presented in the third person, and there is evidence that the most dramatic cognitive biases emerge when stimuli are self-relevant (e.g. Butler & Mathews, 1983). We chose to present passages in the third person in order to replicate the methodological approach of Bower et al. (1979) and Graesser et al. (1980) as directly as possible; however, it will be important for future researchers to investigate memory for schematic and non-schematic information using stimuli that are personally relevant to participants, such as by constructing passages in the first person.

Second, the study utilized a convenience sample of socially anxious college students rather than a clinical sample of individuals diagnosed with social phobia. We took a number of steps to ensure that our sample of socially anxious participants adequately represented

this dimension of anxiety, such as screening participants with two measures of social anxiety as well as excluding participants from analyses if their scores on either inventory regressed past the mean at the time of the experimental session. Nevertheless, it is possible that more compelling results would have been obtained with a sample of individuals who clearly experience life interference and distress as a result of their social anxiety.

Despite these limitations, we feel that the results obtained in this study are important because they challenge tenets put forth by cognitive theories of anxiety using a methodological approach that is well-validated in the cognitive psychology literature. Because it is theorized that schemata exert substantial influence on tasks that require elaborate processing (Beck & Clark, 1997), it would be expected that memory biases toward threatening stimuli would be robust when relevant schemata are activated. Thus, it is incumbent upon clinical scientists to determine the precise mechanism by which cognitive biases come about if they are *not* primed by threat-related schema. It is likely that future research will uncover results suggesting that the schema construct has little explanatory power to account for specific cognitive biases toward threatening material in anxious individuals.

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