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The specificity of autobiographical memory and imageability of the future

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Three studies examined whether the specificity with which people retrieve episodes from their past determines the specificity with which they imagine the future. In the first study, suicidal patients and nondepressed controls generated autobiographical events and possible future events in response to cues. Suicidal subjects' memory and future responses were more generic, and specificity level for the past and the future was significantly correlated for both groups. In the second and third studies, the effect of experimental manipulation of retrieval style was examined by instructing subjects to retrieve specific events or summaries of events from their past (Experiment 2) or by giving high- or low-imageable words to cue memories (Experiment 3). Results showed that induction of a generic retrieval style reduced the specificity of images of the future. It is suggested that the association between memory retrieval and future imaging arises because the intermediate descriptions used in searching autobiographical memory are also used to generate images of possible events in the future.

"Will you be coming to the party? How long will it take you to get there? Will there be time for you to buy some bread on the way?" Answering these commonplace questions involves being able to rapidly construct a number of possible future scenarios and explore their implications, including the relative probability that certain actions will lead to certain outcomes (Schank, 1982). We are interested in one aspect of this process: the specificity with which subjects imagine future events. There are both theoretical and practical reasons for our interest. Theoretically, we wish to explore the extent to which constructing future scenarios depends on retrieval of relevant autobiographical memory for past events. Our applied interest derives from the finding that certain clinical groups (in particular, suicidal and depressed subjects) have difficulty imagining the future, which may contribute to the maintenance of the disorder and continuing suicidal risk. This study uses two strategies. First, we assess future event imagery in a group known to show deficits in retrieving events from the past (Experiment 1). Second, we evaluate the effect of experimentally manipulating autobiographical retrieval strategy on future event imaging (Experiments 2 and 3).

The association between memory processes and judgment about the future has in the past been investigated using "heuristics and biases" paradigms. Tversky and Kahneman (1973) reviewed evidence suggesting that the ease of retrieval from memory is used in making judgments about future events. This availability heuristic research focuses largely on judgments of frequency of past occurrences and probability of future occurrence. It assumes that a subject has already specified the past events that are relevant to the future judgment. But event information is only one of a number of possible outputs following autobiographical retrieval.

Norman and Bobrow (1979), in outlining a "descriptions theory," pointed out how specific event retrieval is not necessary or desirable in many contexts. Often, a summary of a class of events will suffice. Memory retrieval is conceived as a staged process in which an individual first derives an intermediate description of the to-be-recalled information, then uses the description to derive indices to search for candidate episodes that fit the description. The descriptions framework has influenced a number of models of event retrieval (Conway, 1990; Reiser, Black, & Abelson, 1985; Williams & Hollan, 1981; see also Watkins & Kerkar, 1985, for discussion of a related phenomenon in a verbal learning context using a superadditivity paradigm). Implicit within descriptions frameworks is the notion that there can be variation in the specificity of the output, and that the individual has some strategic control over how much of the memory hierarchy needs to be searched in order to meet the requirements of the task. The implications of such variable output for constructing future event scenarios have not been explored. The possibility that this aspect of recollection could affect imageability of future events might have important clinical implications.

The clinical context in which perspective on the future is the most central element is suicidal depression. Hopelessness about the future plays a central role in suicidal be-

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havior. Several studies have found that hopelessness mediates the relationship between depression and suicidal intent within suicidal populations (see Salter & Platt, 1990, Wetzel, Margulies, Davis, & Karam, 1980). Furthermore, hopelessness has been found to predict repetition of parasuicide 6 months later (Petrie, Chamberlain, & Clarke, 1988) and completed suicides up to 10 years later (Beck, Brown, & Steer, 1989; Fawcett et al., 1990).

Why might people, when suicidal, have such pessimism about the future? The most obvious answer is that poorer circumstances and reduced life opportunities mean that these people actually have less to look forward to. There is certainly evidence to support this position. The relations between suicidal behavior, life events, and chronic difficulties are well established (see Williams & Pollock, 1993, for review). However, it is becoming clear that such individuals also have a cognitive deficit that compounds their problem by making it more difficult for them to imagine their future sufficiently concretely to generate specific plans and goals. Early work (reviewed by Baumeister, 1990, and MacLeod, Williams, & Linehan, 1992) suggested that suicidal people have difficulties in providing elaborate descriptions of the future, think less far into the future, and use fewer future tense verbs when asked to finish incomplete sentences. We suggest that the way individuals retrieve autobiographical events may play an important role in determining the ease with which they can construct possible future events.

In previous work on memory in suicidal patients, we have found that they have particular deficits in recalling specific events, even neutral or trivial events (the "mnemonic interlock" phenomenon; Williams, 1996). They respond with generic memories that summarize a category of events rather than selecting one (e.g., "going to parties"; "arguments with my boyfriend"; Williams & Broadbent, 1986). Subsequent studies found that this difficulty in responding with specific memories was a reliable phenomenon that occurred in patients who were able to perform normally on other cognitive tasks, suggesting that it is not simply due to poor task motivation (Williams & Dritschel, 1988). Early research showed that patients had particular deficits in giving specific memories for positive events, but later research has revealed that suicidal patients have a more general problem in remembering specific events from their past, whether positive or negative (Evans, Williams, O'Loughlin, & Howells, 1992). Furthermore, such a memory deficit has been found to be related to an inability to solve current problems (Evans et al., 1992).

Three experiments are reported with the aim of examining the possibility that predictions of the future are affected by a deficit in being able to be specific about the past. In the first experiment, we give positive, negative, and neutral cues to suicidal patients and nondepressed controls, requiring them to retrieve memories for past events, and, with a matched list of cues, to respond with an event they expect to happen in the future. We are particularly interested in how the specificity of past events relates to the specificity of images of future events. The second and third experiments manipulate retrieval strategy in normals to see if generic retrieval style, if experimentally induced, is associated with a greater vagueness in imagining future events.

EXPERIMENT 1

Method

Subjects

Twenty-four patients admitted to medical wards at Addenbrooke's Hospital, Cambridge, England, following self-poisoning were interviewed. There were 16 women and 8 men. The age range was 18 to 66, with an average age of 34 years (SD = 12.0). Patients were interviewed in the hospital following recovery from the overdose (range = 20–96 h; median = 39 h). Half of the group had no previous history of parasuicide, 8 had one previous incident, and the remaining 4 had two or more previous incidents. Of the overdose subjects, 16 met criteria for Major Depressive Disorder, 4 for Minor Depressive Disorder, and the remaining 4 did not meet Research Diagnostic Criteria for depression (Spitzer, Endicott, & Robins, 1978). An additional 2 subjects declined to take part in the study.

There were two control groups. Twenty-four hospital patients (15 women and 9 men) were recruited from the same ward as the overdose patients in order to control for any general effects of hospitalization. These were all patients who had been admitted with minor problems, usually for routine physical investigations, and who, like the overdose group, would be expected to be discharged within a few days. An additional group of subjects (16 women and 8 men) were recruited from a subject panel of volunteers. Both control groups were matched with the overdose group for age and educational level.

Materials

Questionnaires. The Beck Depression Inventory (BDI; Beck, Ward, Mendelson, Mock, & Erbaugh, 1961), a 21-item scale, was used to assess level of depression. The Hopelessness Scale (HS; Beck, Weissman, Lester, & Trexler, 1974), a 20-item scale, was used to assess levels of hopelessness about the future.

Control task. A standard verbal fluency task, the FAS (Lezak, 1976) was used to assess possible differences between the groups on general cognitive processing. Subjects were given a letter of the alphabet and allowed 30 sec to generate as many words as possible beginning with that letter. This was carried out for the three letters *F*, *A*, and *S*, consecutively. The number of words generated was recorded.

Autobiographical memory and future cuing tasks. There were two main tasks. In the autobiographical memory task, subjects were required in response to cues to recall events that had happened to them. The time period from which events could be recalled was not specified, and subjects were told that the event could be important or trivial. It was emphasized that the events from the past should be specific (i.e., events that lasted less than a day). In the future-oriented task, they were required to picture future events associated with a number of cues.

Thirty words were used as cues with which to prompt subjects for responses, 10 neutral, 10 positive, and 10 negative, matched for word frequency. The positive and negative words were chosen to be high on emotionality, and the neutral words were chosen to be low on emotionality (John, 1988). The words were divided into two matched sets of 15 words (A and B). Half of the subjects were given Set A for the memory task and Set B for the future task; the order in which subjects completed the two tasks were counterbalanced. The words are listed in Table 1.

In contrast to previous autobiographical research, in which single words were presented to subjects, the words in these tasks were embedded in a plausible sentence. For the memory task, for example: "Try to remember an occasion in the past when you felt *proud*." For the future task: "Try to picture a situation in the future where you will feel *proud*." (A full list of sentences used is available from the first author.) Sentences were used because piloting revealed that the

Table 1
Lists of Cue Words Used in Experiment 1

List A	List B
Positive	
successful (A/B)	laughing (C/D)
smile (A)	friendly (C/D)
gift (A)	proud (C)
relaxed (A/B)	helpful (C)
compliment (B)	enthusiastic (D)
(excited) (B)	(pleased) (D)
Negative	
danger (A)	argument (C/D)
mistake (A/B)	failure (C)
angry (A/B)	nervous (C/D)
tears (A)	blame (C)
guilty (B)	lonely (D)
(disappointed) (B)	(embarrassed) (D)
Neutral	
garden (A)	shop (C/D)
conversation (A/B)	library (C/D)
late (A)	make/made (C)
package (A/B)	walking (C)
advice (B)	traveling (D)
(look) (B)	(listening) (D)

Note—Additional words and list allocation for Experiment 2 are in parentheses.

future cuing task was too difficult for subjects when they were given only a single word with which to generate a response.

Procedure

After an initial introduction that included an explanation of the study, subjects signed a consent form and provided the examiner with basic demographic data and information relevant to the Research Diagnostic Criteria. Subjects then completed the verbal fluency task, the BDI, and the HS, in that order. Finally, subjects were given the cuing tasks, both memory and future (in counterbalanced order). After data collection, time was taken, particularly with the overdose group, to talk about the study and any reaction subjects may have had to it. The testing session lasted approximately 1 h.

Results

Questionnaires

The means for each experimental group on the BDI, HS, and verbal fluency task (FAS) are shown in Table 2. One-way between-group analyses of variance (ANOVAs) on each of these variables showed the expected group differences on both the HS [$F(2,69) = 34.5$, $MS_e = 14.55$, $p < .001$] and the BDI [$F(2,69) = 55.5$, $MS_e = 56.51$, $p < .001$].

Individual comparisons revealed that these differences were due to overdose subjects scoring significantly more highly than both control groups on the HS and the BDI (Newman-Keuls, all $ps < .005$). The control groups did not differ significantly from each other on either HS or the BDI. There was no significant group difference on the FAS [$F(2,69) = 1.5$, $MS_e = 7.12$, n.s.], suggesting that the groups were comparable on overall level of cognitive performance.

As well as being equivalent on hopelessness, depression, and verbal fluency, the two control groups did not differ significantly from each other on any of the subsequent measures to be reported (mean F value on all possible main effects and interactions between the two control groups = .06). There is therefore reason to assume that the control groups were drawn from the same population. For the sake of clarity and economy of presentation, the two control groups were collapsed to form one control group in the analyses reported here.

Memory Task

A specific memory was defined as a response that, as confirmed by the subject, referred to an event that had happened at a particular place and time and lasted no longer than a day. (Sufficient details were obtained from the subject at the time to check whether a specific event had been retrieved.) The number of specific memories provided in response to cues (Table 3) was analyzed within a group (overdose, controls) × cue (positive, negative, neutral) ANOVA. There was a significant main effect of group [$F(1,70) = 5.7$, $MS_e = 1.60$, $p < .05$]. The overdose group provided fewer specific memories ($M = 3.7$, $SD = 1.19$, $SE = 0.24$) than the control group ($M = 4.2$, $SD = 0.90$, $SE = 0.13$).

There was also a significant main effect of cue valence [$F(2,140) = 6.8$, $MS_e = 0.74$, $p < .01$]. Newman-Keuls tests showed this to be due to more specific memories being produced in response to neutral cues ($M = 4.3$, $SD = 0.93$, $SE = 0.11$) than either positive cues ($M = 3.9$, $SD = 1.12$, $SE = 0.13$, $p < .05$) or negative cues ($M = 3.8$, $SD = 1.09$, $SE = 0.13$, $p < .005$). There was no significant group × cue interaction ($F < 1$).

These results replicate those of previous studies in that they show that overdose subjects are less able to produce specific memories in response to cue words. This was not due to the overdose group failing to respond to the cues. The mean number of items on which subjects failed to respond was 0.5, 0.3, and 0.2 for positive, negative, and neutral cues, respectively, for the overdose group, and 0.1, 0.4, and 0.2 for the control group.

Future Task

Subjects' responses were rated for level of specificity: specific, intermediate, and general. This took into account whether reference was made to specific times and places, and degree of detail provided, such as named people where appropriate. Examples of the three categories are given in Table 4. Responses were rated blind and a randomly selected 20% subsample of responses were rated by a second rater. The agreement between the two raters was 81%.

Table 2
Means and Standard Deviations of Hopelessness Scale (HS), Beck Depression Inventory (BDI), and Fluency Task (FAS)

	Group					
	Overdose		Hospital		Panel	
	M	*SD*	*M*	*SD*	*M*	*SD*
HS	11.2	6.1	2.7	2.0	3.6	2.1
BDI	27.9	10.8	7.0	4.3	5.5	3.9
FAS	8.1	3.1	7.5	2.4	8.9	2.2

Table 3
Means and Standard Deviations for Number of Specific Memory Responses by Group and Cue Type in Experiment 1

	Group			
	Overdose		Controls	
Cue Valence	*M*	*SD*	*M*	*SD*
Positive	3.50	1.38	4.12	0.86
Negative	3.50	1.18	3.88	0.99
Neutral	4.04	1.00	4.38	0.84

Note—Maximum number = 5.0.

Following Baddeley and Wilson (1986), ratings of responses were converted into a scale of specificity in which a specific response scored 3 points, an intermediate response scored 2 points, a general response 1 point, and omissions scored 0. The mean specificity score for each subject for each of the three categories was then entered into a group (2) × cue (3) ANOVA. The group means are shown in Table 5.

There was a significant main effect of group [$F(1,70) = 4.82, MS_e = 12.13, p < .05$] as the overdose subjects ($M = 9.36$, $SD = 2.39$, $SE = 0.49$) were less specific than the controls ($M = 10.90$, $SD = 2.44$, $SE = 0.50$). There was also a significant main effect of cue [$F(2,140) = 16.75$, $MS_e = 2.89, p < .001$]. Post hoc tests revealed that neutral cues ($M = 10.90$, $SD = 2.33$, $SE = 0.27$) produced more specific responses than either positive ($M = 10.12$, $SD = 2.65$, $SE = 0.31$) or negative cues ($M = 9.26$, $SD = 2.26$, $SE = 0.27$). Positive cues also produced more specific responses than negative cues (Newman-Keuls, all $ps < .01$). The group × cue interaction was not significant ($F = 1.39$, n.s.). The number of items on which subjects failed to respond was low in both groups: 0.7, 0.6, and 0.6 for positive, negative, and neutral cues, respectively, for the overdose group, and 0.4, 0.7, and 0.3 for the control group.

Relation of Memory Specificity and Future Specificity

Pearson correlation coefficients were computed to examine the association between memory and future responses. Across all subjects, there was a significant correlation between number of specific memories and the specificity of future items generated [$r(70) = .57, p < .001$]. Those who gave more specific memories also gave more highly specific future items. This was true for both overdose and control groups. Specificity of memory and of future events correlated .60 in the overdose group ($df = 22$, $p < .01$) and .52 in the control group ($df = 46$, $p < .001$). Within the overall relationship between memory and future specificity, there was no distinctive relationship according to the valence of the items. The correlation between memory specificity and future specificity was calculated for shared-valence categories (i.e., positive with positive, negative with negative, and neutral with neutral) and across-valence categories. The average within-category correlation was .29 ($df = 22$, n.s.) and .29 ($df = 46$, $p < .05$) for overdose and control groups, respectively. The average between-category correlation was .38 ($df = 22$, n.s.) and .32 ($df = 46$, $p < .05$) for overdose and control groups, respectively. Thus, although there was a general relationship between memory and future specificity, this cut across the valence of the items.

Relation of Specificity to Depression

Finally, we examined the association between depression (as measured by the BDI) and specificity for memory and for the future. The correlations between depression and specificity of memory for overdose and control subjects were small and nonsignificant [$r(22) = .01$ and $r(46) = -.09$, respectively]. For specificity of future, the correlations were again small and significant only for the control group [$r(22) = -.22$, n.s., and $r(46) = -.30$, $p < .05$, for the overdose and control groups, respectively].

Discussion

This experiment examined whether suicidal subjects have difficulty in generating specific images of the future and whether such difficulty is related to retrieval style for autobiographical memory. In order to examine this question, we needed to replicate previous findings of nonspecificity in memory in suicidal patients (Evans et al., 1992; Williams & Broadbent, 1986; Williams & Dritschel, 1988). We found that, as predicted, overdose subjects were more general than controls both in their memory and in their imaging of the future events. Correlational analysis of the relation between past and future specificity revealed that both overdose and control subjects showed significant association between specificity of memory and the specificity with which a future event could be generated.

These data are correlational, so the association between impairment in imaging specific past events and specific future events may have been be due to a third variable. The most obvious third variables are depression and a general processing deficit due to the aftereffects of the overdose. For example, it is possible that diminished motivation to mobilize resources to the task might account for the deficits, consistent with the suggestion of Ellis and Ashbrook (1988) and Hertel and Hardin (1990) that depressed subjects show poor memory partly because of limited attentional resources. However, if this accounted for the present results, one would expect the more depressed subjects to show greater impairment in specific retrieval. However, we found no suggestion of an association between depression and memory specificity in either the overdose or the control

Table 4
Examples of General, Specific, and Intermediate Future Event Responses to a Positive and a Negative Cue

Try and picture a situation in the future where, (a) "you make a mistake"		
General: "I'll always be making mistakes."	Intermediate: "Perhaps giving a friend the wrong advice."	Specific: "My law exams in October."
(b) "someone pays you a compliment"		
General: "A friend could."	Intermediate: "Someone at work may say I've lost weight."	Specific: "Next week from my husband when I have my hair cut again."

Table 5
Means and Standard Deviations for Level of Specificity of Future Events in Response to Positive, Negative, and Neutral Cues in Experiment 1

	Group			
	Overdose		Controls	
Cue Valence	*M*	*SD*	*M*	*SD*
Positive	9.50	2.34	10.44	2.96
Negative	8.79	2.28	9.50	2.24
Neutral	9.79	2.54	11.46	2.12

Note—Maximum specificity score = 15.0.

group, so depression is unlikely to have mediated the association between memory and future specificity, found in both groups.

Although the possibility of general processing sluggishness due to the overdose cannot be ruled out for this study, it seems unlikely, first because the correlation between specificity for the past and the future held up for the control group, where there were unlikely to be large individual differences in processing deficiency. Second, we had included a verbal fluency task (FAS) to assess differences between the groups on general cognitive processing. We found no differences between the groups on the FAS, suggesting that the groups were comparable on overall levels of cognitive performance. On the other hand, the FAS may have been too easy a task to discriminate between the clinical and control groups in this study. For this reason, and because we could not rule out the possibility that the results might have been due to other variables mediating both past and future specificity, the second experiment used only nonclinical subjects and experimentally manipulated specificity of recall. The aim was to see if induced generic or specific retrieval style (in the induction phase) would have the predicted effect on specificity of future events (in the test phase).

EXPERIMENT 2

Method

Design

The overall design was a 2 (group: specific memory induction, generic memory induction) × 3 (valence: positive, negative, neutral) factorial design. The first factor was measured between subjects, and the second factor was measured within subjects. In addition, an extra between-subject factor (List A/B or List C/D) was used to balance for list type, and an extra within-subject factor (old vs. new cues in the test phase) was used to examine effects of repetition of cues from induction to test phases. However, because no analyses including these additional factors revealed significant main effects or interactions involving them, they will not be reported further.

Subjects

Forty subjects (28 females) were recruited from the Undergraduate Subject Panel of the University of Wales, Department of Psychology. They were randomly allocated to two groups (specific and generic induction groups; each $n = 20$). Subject mean age did not differ across groups (Ms = 23.9, SD = 5.2, and 27.1, SD = 7.8, for the specific and generic induction groups, respectively). Nor did the groups differ in their scores on the BDI (Ms = 7.2, SD = 4.7, and 8.7, SD = 6.3, for the specific and generic groups, respectively).

Materials

Six words were added to the words used in Experiment 1 to make a pool of 36 words, 12 negative, 12 positive, and 12 neutral (Table 1). The addition of these words did not affect the matching on frequency or emotionality variables. The cues were presented within lists, each containing 12 cues (4 positive, 4 negative, and 4 neutral). Half the subjects received Lists A (for the induction phase) and B (for the test phase), and the other half received Lists C (for the induction phase) and D (for the test phase). Six of the twelve cues used in the test phase (two positive, two negative, two neutral) were "old," that is, they were repetitions of cues used in the induction phase.

Procedure

Subjects were run in groups of 10. They were told that they would be taking part in some short "mood and imagery" tasks, and that they would be required to remember things from their past and picture situations in the future, in response to cues. Examples of the type of cue that would be used and the type of response that was required were provided for the induction phase. The subjects completed a mood assessment (BDI). They were required to complete this in three sections; before the induction phase, and before and after the test phase. This separated induction and test phases and emphasized the link between each task and mood assessment, rather than the link between the memory phase and the test phase. Any questions were dealt with before the experiment began. All cues were presented via an overhead projector and were simultaneously spoken aloud by the experimenter. No time limit was imposed for subjects to complete their responses.

Specific induction procedure. Subjects were instructed to produce real memories that had occurred at a particular time and place, in response to the 12 cues. As in Experiment 1, the words were presented within sentences. The following instructions were given:

> I will be showing you a number of sentences. For each one, I want you to remember an event from your own life that the sentence reminds you of. Any event will do as long as it is a single event that lasted less than a day, and occurred at a particular time and place. The events can have occurred at any time in your life, they may be important or trivial, but they should be real events. You only need write down enough information to show that these instructions have been fulfilled. All responses will remain completely confidential and anonymous. For example, if the sentence presented was, "Try to remember an occasion in the past when you felt unhappy," you might respond with, "Sitting having coffee on my first day at university on my own." Do you have any questions?

Generic induction procedure. This condition used the same cue words embedded in sentences as the specific induction. However, in this condition, subjects were instructed to try and remember the "type of event" that the cue brought to mind.

The following instructions were given:

> I will be showing you a number of sentences. For each one, try to think of the type of event that comes to mind. By type of event, I mean the sort of thing that happens to you or has happened to you in the past. You only need write down enough information to show that these instructions have been fulfilled. All responses will remain completely confidential and anonymous. For example, if the sentence presented was, "Try to think of the type of event that makes you unhappy," you might respond with, "I feel bad when my brother and I don't get along." Do you have any questions?

Test phase. This phase used four positive, four negative, and four neutral cues embedded in sentences as in Experiment 1. The following instructions were given:

> In this task, there will be some sentences, and to each one, try and imagine a *future* event. It might be in the distant or near future, important or trivial. You should write down the first thing that comes to mind in response to the sentences. I would now like you to complete some more questions to assess your mood.

Subjects were not given examples of the type of image required, as this might have interfered with the effects of the induction phase. Any questions were answered by repeating the relevant part of the instructions.

After completing both phases, subjects were given a postexperimental questionnaire and a list of definitions (Table 4) detailing the kind of responses that would be defined as specific (score 3), intermediate (score 2), and general (score 1). They were required to rate their own responses. The response protocols from 8 subjects (4 from each group) were selected at random (192 responses in all) and were scored blind by an independent judge. The results of a Pearson product moment correlation suggested that the subject's own ratings were a reliable indicator of specificity [$r(190) = .97$] and these were used in the analyses.

Results

Check on Success of Induction Procedures

Means and standard deviations of generality scores for responses given during the induction phase are shown in Table 6. A 2 (group: specific induction, generic induction) × 3 (valence: positive, negative, and neutral) ANOVA was conducted. This showed a large main effect for group [$F(1,38) = 95.23$, $MS_e = 4.87$, $p < .0001$], confirming that the experimental manipulation had succeeded in producing more specific event memories following specificity induction, and more generic memories following generic induction. There was no significant main effect for valence or for the interaction of group and valence [Fs(2,76) = 0.58 and 0.51, $MS_e = 2.29$].

Effect of Specific Versus Generic Retrieval on Specificity of Images of Future

Means and standard deviations of generality scores for responses given during the test phase are shown in Table 7. A 2 (group: specific induction, generic induction) × 3 (valence: positive, negative, and neutral) ANOVA was conducted. This showed a significant group main effect [$F(1,38) = 5.6$, $MS_e = 12.3$, $p = .023$] due to the specific induction group responding with more specific images of the future ($M = 9.50$, $SD = 1.88$, $SE = 0.42$) than the generic induction group ($M = 8.32$, $SD = 2.74$, $SE = 0.61$). The main effect for valence was also significant [$F(2,76) = 3.43$, $MS_e = 2.37$, $p = .04$], due to responses to negative cues being significantly more general ($M = 8.23$, $SD = 2.59$, $SE = 0.58$) than positive responses [$M = 8.95$, $SD = 2.2$, $SE = 0.49$; $t(39) = 2.53$, $p = .02$] and neutral responses [$M = 9.05$, $SD = 2.62$, $SE = 0.59$; $t(39) = 2.25$, $p = .03$]. Positive and neutral responses did not differ from each other ($t = 0.28$).

Postexperimental Questionnaire

Subjects were asked to say, in their own words, what they thought the experiment was about. Many subjects thought the central feature was depression; others thought it was about self-esteem, optimism, or stress. No one reported the true nature of the experiment, and no response mentioned specificity at all.

Table 6
Means and Standard Deviations for Level of Specificity of Past Events in Response to Positive, Negative, and Neutral Cues in Induction Phase of Experiment 2

	Induction Type			
	Specific		Generic	
Cue Type	*M*	*SD*	*M*	*SD*
Positive	11.05	1.15	6.90	1.62
Negative	11.10	1.41	7.40	2.23
Neutral	11.25	0.97	7.30	2.70

Note—Maximum specificity score = 12.00.

Table 7
Means and Standard Deviations for Level of Specificity of Future Events in Response to Positive, Negative, and Neutral Cues in Test Phase of Experiment 2

	Induction Type			
	Specific		Generic	
Cue Type	*M*	*SD*	*M*	*SD*
Positive	9.70	1.17	8.2	2.70
Negative	9.00	2.18	7.45	2.78
Neutral	9.80	2.30	8.30	2.74

Note—Maximum specificity score = 12.00.

Discussion

This experiment found that it is possible, through instruction, to manipulate the level of specificity with which subjects recall information from their past. Following the retrieval of specific or generic memories, when later required to generate images of the future in response to cues, subjects responded with more specific or more general images, depending on the type of memory they had retrieved in the induction phase. We first discuss two possible limitations of these findings and then discuss the more general implications.

First, it is possible that the generic memory cuing may not have cued autobiographical memories, as such, but rather, personal semantic memories (Conway, 1990). However, the experiment was attempting to analogize the sort of responses shown by depressed and suicidal patients. In this it was successful. Whether these are true autobiographical memories or personal semantic memories is an important question but is beyond the scope of this paper (for a discussion of this issue, see Williams, 1996). The important point is that suicidal and depressed people make this type of response when asked for a memory. The results of this experiment suggest that, when induced to retrieve similar generic memorial information, normal subjects later produce less specific images of the future.

Second, it is possible that the test phase results were due to subjects' remembering the instructions for the induction phase, rather than being influenced by the mode of retrieval itself. Although this explanation cannot be ruled out, the experimental instructions and the delivery of the BDI before each phase were designed to orient subjects to the relation between mood and the different tasks, rather than to connections between the memory and future tasks themselves. The fact that no subject mentioned specificity in the postexperimental questionnaire, or any link between the two phases of the experiment, suggests that this orientation was successful. Further, the size of the group differences and pattern of data from the future imaging task was similar to that in Experiment 1. The size of the difference between specific and generic induction conditions in the future task (mean effect size, $d = 0.56$) was similar

to that between the overdose and control subjects in Experiment 1 (mean effect size, $d = 0.46$), and all groups in both experiments showed a tendency to be more general in imaging future negative events. This strengthens the argument that the two experiments were studying similar processes.

Nevertheless, the possibility that these results were simply due to demand characteristics in which the memory instruction contaminated the futures instruction cannot be ruled out because the experimental procedure for specific and generic induction was so explicit. Such contamination might have arisen both during the experiment and afterward when subjects were rating their own protocols for level of specificity. The third experiment therefore used an alternative manipulation of specificity in the induction phase that did not involve giving subjects explicit instructions to be specific or generic. Following the experiment, the protocols were independently rated for level of specificity to avoid possible contamination of future event self-ratings from self-ratings of memory protocols.

EXPERIMENT 3

Method

This experiment manipulated retrieval style by making use of previous observations that imageability of words used to cue autobiographical memory affects the specificity of the response. Cue words rated high on imageability (Paivio, Yuille, & Madigan, 1968) are more likely to result in specific event recall. By contrast, words rated low in imageability are more likely to result in the recall of more generic and summarized events (Williams, 1988). Allocating subjects to one of two conditions in which they retrieve events cued either by high-imageable or low-imageable words should ensure that different levels of specificity of recall are produced in the induction phase without the need for any explicit instructions about which level of specificity is required. In the test phase, the same cues were used for all subjects for the production of future event scenarios.

Design

The overall design was a 2 (group: specific induction, or high-imageability cues, and generic induction, or low-imageability cues) × 3 (valence: positive, negative, neutral) factorial design. The first factor was measured between subjects, and the second factor was measured within subjects.

Subjects

Thirty-four subjects (29 females and 5 males) were recruited from the Undergraduate Subject Panel of University of Wales, Department of Psychology. They were randomly allocated to two groups, specific and generic induction ($n = 17$ in each group). Mean age did not differ across groups ($Ms = 25.70$, $SD = 9.1$, and 21.82, $SD = 5.2$, for the specific and generic induction groups, respectively).

Materials

Eighteen cue words high in imageability were selected from Paivio et al.'s (1968) norms and matched for frequency with 18 cue words selected for their low imageability (Table 8). For the test phase, 18 cue words (6 positive, 6 negative, and 6 neutral) from Experiment 2 (Table 8) were used.

Procedure

Subjects were run in groups of 8 or 9. Subjects were told that they would be participating in a short memory experiment and that they would be required to remember events from their past and imagine situations in the future. All cues were presented using an overhead projector and simultaneously spoken aloud by the experimenter. Subjects were given 1 min to complete their responses.

Table 8
High- and Low-Imageability Cue Words Used in Induction Phase and Cue Words Used in Test Phase in Experiment 3

Induction Phase		
Specific (High Imageability)	Generic (Low Imageability)	Test Phase
butterfly	thought	laughing
mountain	greed	friendly
cloud	moral	proud
house	attitude	relaxed
painting	wisdom	enthusiastic
fire	obedience	helpful
grass	explanation	argument
library	boredom	failure
letter	hearing	nervous
lake	legislation	blame
factory	mood	lonely
teacher	permission	embarassed
baby	law	shop
nun	effort	advice
poetry	duty	package
robbery	knowledge	music
sea	upkeep	conversation
bouquet	worth	traveling

Specific induction procedure (high-imageability cue words). Subjects were instructed to produce real memories that had occurred at a particular time and place in response to 18 cue words. The level of specificity was left open, and an example of both types of responses was provided. The following instructions were given:

> I will be showing you a number of cue words. For each one I want you to remember an event from your life that the word reminds you of. The events can have occurred at any time in your life and they may be trivial or important. You need only write down enough information to show that these instructions have been fulfilled. All responses will remain completely confidential and anonymous. It is, however, important to provide memories to all the cue words. For example, if the cue word was *choir*, you might respond with, "Attending a choir service last year that was filmed by the BBC," or "Attending choir services at school." Are there any questions?

Generic induction procedure (low-imageability cue words). Subjects in this condition were similarly instructed to produce real memories that had occurred at a particular time and place in response to 18 cue words. The level of specificity was left open, and an example of both types of responses was provided. The following instructions were given:

> I will be showing you a number of cue words. For each one I want you to remember an event from your life that the word reminds you of. The events can have occurred at any time in your life and they may be trivial or important. You need only write down enough information to show that these instructions have been fulfilled. All responses will remain completely confidential and anonymous. It is, however, important to provide memories to all the cue words. For example, if the cue word was *justice*, you might respond with, "Remembering being told that a friend was banned from driving for 2 years," or "Following the Criminal Justice Bill debate in the papers and on television." Are there any questions?

In both induction sessions, the order of examples (specific and general) provided was counterbalanced to reduce experimenter bias.

Test phase. This phase used the same positive, negative, and neutral cue words (6 of each) as those used in Experiment 2. As in the previous experiments, these cue words were embedded within plausible sentences. Subjects were not given examples of the type of image required, as this might have interfered with the effects of the

induction phase. After completing both phases, subjects were debriefed and thanked for their participation.

Following the experiment, response protocols for both the memory and future phases were scored by the experimenter. An independent blind rater scored a random selection of responses from 10 subjects (180 responses in all). The results of a Pearson product moment correlation showed that the experimenter's ratings were a reliable measure of specificity when compared with the independent ratings [$r(178) = .82$]. Thus the experimenter's ratings were used in all analyses.

Results

Check on Success of Induction Procedures

The number of specific memories provided by the specific induction (high-imageable cues) and generic induction group (low-imageable cues) was analyzed using a one-way ANOVA. There was a significant main effect of group [$F(1,32) = 57.65, MS_e = 20.81, p = .0001$]. As predicted, the high-imageable cues produced more specific memories than the low-imageable cues. Each subject's specificity score could vary between 0 and 54 (18 items, each with a maximum score of 3). The mean specificity score of the subjects in the specific induction (high-imageable cues) group was 41.52 ($SD = 3.98, SE = 0.97$). The equivalent mean for the generic induction (low-imageable cue) group was 29.64 ($SD = 5.07, SE = 1.23$). The experimental manipulation had succeeded in producing more specific memories following specificity induction and more generic memories following generic induction.

Effect of Specific and Generic Retrieval on Future Images

The means and standard deviations of specificity scores for responses given during the test phase are shown in Table 9.

A 2 (group: specific induction, generic induction) × 3 (cue valence: positive, negative, and neutral) ANOVA was conducted. This revealed a significant main effect of group [$F(1,32) = 31.41, MS_e = 9.55, p < .0001$] that was due to the fact that the group that had received the specific induction procedure generated more specific images of the future in the test phase ($M = 13.7, SD = 2.29, SE = 0.56$) than the group that had undergone the generic induction ($M = 10.23, SD = 2.06, SE = 0.50$). There was also a significant effect of cue valence [$F(2,64) = 11.17, MS_e = 26.51, p < .0001$]. Neutral cues produced more specific memories ($M = 12.97, SD = 2.15, SE = 0.52$) than did positive cues ($M = 11.44, SD = 2.14, SE = 0.51$) or negative cue valences ($M = 11.44, SD = 2.24, SE = 0.54$), respectively. There was no significant interaction between group and cue valence [$F(2,64) = .81, MS_e = 2.37, p = .44$].

Table 9
Means and Standard Deviations for Level of Specificity of Future Events in Response to Positive, Negative, and Neutral Cues in Test Phase of Experiment 3

	Induction Type			
	Specific (High Imageability)		Generic (Low Imageability)	
Cue Type	*M*	*SD*	*M*	*SD*
Positive	12.94	2.27	9.94	2.01
Negative	13.41	2.29	9.47	2.18
Neutral	14.64	2.31	11.29	1.99

Note—Maximum specificity score = 18.00.

Discussion

The aim of this experiment was to examine whether the specificity with which the future is imaged could be affected by the specificity of retrieval from the past when no explicit instructions have been given in the induction phase. Cue words differing in imageability were used during the induction phase and the method proved to be successful in inducing subjects to retrieve events from their past with relatively greater or lesser degrees of specificity. In the test phase, subjects were required to imagine possible future events, and the results showed that the specificity of these scenarios was affected as predicted by the memory induction. Subjects who had been induced to recall specific events from the past were more likely to generate more specific future event scenarios. Because no explicit instructions about level of specificity had been given at any point, these results cannot have been due to subjects recalling an instruction to adopt a certain retrieval style. Further, because subject protocols were rated independently, there was no possibility of contamination between subjects' self-ratings of past and future event specificity.

GENERAL DISCUSSION

These experiments examined the possibility that specificity in generating images of the future is influenced by specificity in retrieval from autobiographical memory. First, we examined the prediction that suicidal subjects would have difficulty picturing the future in a specific way and examined whether any such difficulty in picturing the future would be more evident for positive or negative futures. The results of Experiment 1 provided clear support for the first hypothesis: Suicidal subjects did have difficulty picturing the future in a specific way compared to matched controls, a difficulty that affected their responses to positive, negative, and neutral cues. Second, the degree of difficulty in generating specific images of the future was found to be correlated with the extent to which subjects failed to retrieve specific autobiographical memories from their past.

Given the correlational nature of the first experiment, in the second and third experiments we used experimental induction of different retrieval styles. Consistent with prediction, subjects who had been induced to retrieve specific events from their past were more likely to generate more specific images of the future than were subjects who had been induced to retrieve generic memories. Experiment 3 confirmed that induction of specific or generic retrieval style might be implicit, yet still have the effect of affecting the specificity of future imagined events. Although each experiment might be individually interpreted in alternative ways, taken together they offer strong prelimi-

nary evidence for the link between specificity of retrieval and specificity of imaging the future.

What processes underlie this association? Williams and Dritschel (1988, 1992) have suggested that overgeneral responses in autobiographical memory represent intermediate "categoric" descriptions into which personal memories are nested at encoding and thereafter used at retrieval. According to descriptions theory, retrieval is characterized as "a process in which some information about a target item is used to construct a description of the item and this description is used in attempts to recover new fragments of information" (Williams & Hollan, 1981, p. 87). The theory assumes that a person encodes only a limited amount of possible information (an incomplete list of properties or a partial image). To encode or retrieve any packet of information, a partial description is formed that provides an initial entry point into the memory, the description acting as an index for the memory packet. The major stages in such a retrieval process are "find a context," "search," and "verify." Reiser et al. (1985) made use of the same framework in studies looking at the priming of autobiographical events using activities or general actions. In their context-plus-index model, experiences are retrieved by accessing the knowledge structure used to encode the event, and then by specifying features that discriminate an event with the target features from others indexed within that context. The retrieval query is then elaborated using information contained in the knowledge structures to predict and further direct the search using additional features of the to-be-retrieved event. In depressed and suicidal patients, these "organizing contexts" or "categoric descriptions" used in the encoding and retrieval of personal memories have clear implications for how the system is affected and in turn affects psychopathology. We suggest that our patients access an "intermediate description" but stop short of a specific example. It is this truncated search that is responsible for overgeneral memory responses (the "mnemonic interlock" phenomenon, in which intermediate mnemonic descriptions begin to cue other intermediate descriptions rather than specific events, Williams, 1996).

Why is it that, if recollection involves a categoric intermediate description, it is vulnerable to becoming blocked? If retrieval of specific episodes is to succeed, the categoric description process needs at some point to be inhibited so that contextual (time and place) information can be introduced in the mnemonic search. Williams (1996) has reviewed evidence from developmental psychology and from studies of elderly and brain damaged groups to show how the ability to inhibit these relatively automatic categoric description processes develops during the third and fourth years of life, and how this ability is affected by reduced working memory capacity in old age and in brain damage. In each of these groups, generic autobiographical memory is the result. In emotionally disturbed groups, mnemonic interlock is due to the same truncated search. The search is aborted either because subjects find it too effortful relative to their working memory capacity, or because they have learned that more specific recollections cause more affective disturbance (Williams, 1996; Williams & Dritschel, 1992).

We suggest that people use the same intermediate descriptions in generating images of possible futures. Given the task of thinking about future events, subjects use the cue to generate intermediate descriptions that summarize a large amount of information that can be used to construct a model of the future. This stage involves using the same process as that used in recollection. Both memory and future tasks require subjects to ask the intermediate question, "What sort of activity makes me happy?" in response to the cue word *happy*. Thereafter, the construction of specific models of the future rely on accessing specific event representations from memory. In the absence of specific information from autobiographical memory, the subject is more dependent on these general descriptions as the database for generating images of the future.

These processes have important clinical implications. Evans et al. (1992) have found that the production of effective solutions in an interpersonal problem-solving task is inhibited by overgenerality in autobiographical memory. The present study raises the possibility that this may occur because nonspecificity in recalling the past limits the ability to image the future in a specific way. If this is the process that blocks active problem solving, then it may play an important role in turning life events into crises of suicidal proportions. Research by McNally and his colleagues has shown that Vietnam veterans with Post-Traumatic Stress Disorder have difficulty in retrieving specific event memories (McNally, Litz, Prassas, Shin, & Weathers, 1994). The present findings suggest that the resulting deficit in imagining the future concretely may help to explain some part of the difficulties that this group has in solving current life problems, and why this group remains a high suicide risk. Both for this group, and more generally for suicidal individuals, psychological treatments will need to take account of such processes if they are to succeed in reducing the probability of further suicidal behavior (MacLeod et al., 1992).

Although we have focused on the influence of recalling the past on imageability of the future, it should be noted that there are many other aspects of future-directed thinking that contribute to psychopathology. Nonspecificity about the future may combine with a range of other aspects of judgment; the probability of certain events occurring, whether they are imminent or long-term, and the degree of control over whether they occur, might determine affective disturbance (Williams, Watts, MacLeod, & Mathews, 1988). Further, it may matter a great deal whether people are able to engage in effective causal reasoning, that is, whether they can think of the steps necessary to bring about a positive future. However, each of these other processes is dependent on an individual's ability to construct a possible future scenario that can be the subject of subsequent judgment and reasoning processes. Like autobiographical memory retrieval, an individual will not need on every occasion to construct a specific event representation for the future. The question about how long a jour-

ney will take, with which this paper started, may best be answered at the general description level, which summarizes event information. Another question, such as whether, on this occasion, there will be sufficient time to do something else en route, may well require more specific event information. Our findings suggest that the ability to access the level of specificity required by the context is an important aspect of cognition.

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