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Autobiographical Memory Specificity and Emotional Disorder

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The authors review research showing that when recalling autobiographical events, many emotionally disturbed patients summarize categories of events rather than retrieving a single episode. The mechanisms underlying such overgeneral memory are examined, with a focus on M. A. Conway and C. W. Pleydell-Pearce's (2000) hierarchical search model of personal event retrieval. An elaboration of this model is proposed to account for overgeneral memory, focusing on how memory search can be affected by (a) capture and rumination processes, when mnemonic information used in retrieval activates ruminative thinking; (b) functional avoidance, when episodic material threatens to cause affective disturbance; and (c) impairment in executive capacity and control that limits an individual's ability to remain focused on retrieval in the face of distraction.

Keywords: autobiographical memory, specificity, overgenerality, depression, PTSD

Autobiographical memory is the aspect of memory that is concerned with the recollection of personally experienced past events. It is central to human functioning, contributing to an individual's sense of self, to his or her ability to remain oriented in the world and to pursue goals effectively in the light of past problem solving. Such orientation and goal pursuit is particularly important for interpersonal goals, where autobiographical memory arises from and then, in turn, contributes to a shared social world (Conway & Pleydell-Pearce, 2000; Nelson & Fivush, 2004).

Autobiographical memory has been investigated in many different contexts. Research has examined its nature and function (Pillemer, 1998; Rubin, 1996; Wheeler, Stuss, & Tulving, 1997); social factors in its early development (e.g., Nelson & Fivush, 2004; Reese, 2002); the processes that underlie how events are encoded, retrieved, and forgotten (Castel & Craik, 2003; Hertel & Gerstle, 2003; Lancaster & Barsalou, 1997; Schacter & Slotnick, 2004; Tulving, 1983, 2002; Tulving et al., 1994); its role in organizing one's sense of self (Conway & Pleydell-Pearce, 2000; Fivush & Nelson, 2004); and the aspects that are affected by neurological damage (e.g., Burgess & Shallice, 1996; Conway & Fthenaki, 2000; Rugg & Wilding, 2000). The focus of this article is on one feature of autobiographical memory that has been found to be closely linked with the psychopathology of emotion: overgenerality.

This article has five aims. We first describe the phenomenon of overgeneral memory, including the methodology that has been used to elicit it, and explain why it has aroused interest within psychopathology research. Second, we review the research that has investigated overgenerality of autobiographical memory to examine how widespread the phenomenon of overgeneral memory is within psychopathology. Third, we consider what mechanisms may underlie the phenomenon, drawing on a recent model of autobiographical memory by Conway and Pleydell-Pearce (2000). Fourth, we describe an elaboration of their model that focuses on three interacting mechanisms (capture and rumination, functional avoidance, and executive control) in order to account for the data from psychopathology. Finally, we consider how this model can point toward what future research is necessary.

The Phenomenon of Overgeneral Memory

Early research on the role of autobiographical memory in emotional disorders concerned the possibility that memory might be biased by current mood state, a bias that might contribute to the onset or maintenance of affective disorder. Several studies used a Galton cue-word paradigm (Galton, 1883) to demonstrate that a mood-congruent memory bias was present both in naturally occurring states of dysphoria (Lloyd & Lishman, 1975) and in response to experimental manipulations of mood (e.g., Clark & Teasdale, 1982; Teasdale & Fogarty, 1979). Under both circumstances, individuals in a sad mood were shown to recall negative events relatively faster than positive events. These early studies

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demonstrated that autobiographical memory was a tractable phenomenon to study in relation to mood.

However, in extending the mood-congruent memory paradigm to suicidal patients, Williams and Broadbent (1986) found that in addition to being slower to respond to positive cues than controls, the suicidal patients, in many of their responses to both positive and negative cue words, failed to provide a specific memory. Instead, they responded on about half of the trials with a memory that summarized a category of similar events (e.g., "I used to walk the dog every morning"). This was in marked contrast to the responses of hospital and community controls, who were specific on more than 80% of the occasions. The poor performance of suicidal patients on this task could not be explained by general deficits in cognitive processing, as participants in all three groups performed equally well on a task of semantic memory, and the two hospitalized groups were equivalent in semantic processing speed (as discussed later). Rather, the findings suggested that the autobiographical memories of suicidal patients might differ in form as well as in content or speed of retrieval. Although serendipitous, this initial finding of overgeneral autobiographical memory helped to shift the emphasis of research into autobiographical memory, with studies beginning to focus in more detail on the degree of specificity with which personally experienced events are recollected.

Cuing Methodology

Most studies have since used a cuing methodology similar to that used by Williams and Broadbent (1986), involving the presentation of cue words varying in emotional valence (usually referred to as the autobiographical memory test [AMT]).[1] Participants are asked to respond to each word with an event that the word reminds them of. They are told that the event recalled can be important or trivial and recent or from a long time ago, but that it should be a specific event, something that happened at a particular place and time and lasted for a day or less. Participants are given an example of what is meant by *specific* (to the word *enjoy*, it would not be okay to say "I always enjoy a good party" because that does not mention a particular time, but it would be okay to say "Jane's party last Friday"). They are given practice trials to confirm that they have understood the instructions. Williams and Broadbent allowed participants 1 min for each cue to retrieve a specific memory, and later studies allowed 30 s for each response, with failure to respond in the allotted time scored as an omission. Responses are coded as specific if they meet the criterion of specifying a particular event that lasted less than one day and as nonspecific if they do not. In some studies, different types of nonspecific memories are distinguished. Williams and Dritschel (1992) differentiated between memories that were nonspecific by virtue of referring to a whole class of events, so-called categorical memories (e.g., "all the times I've failed exams"), and memories that were overgeneral because they referred to an extended period of time, so-called extended memories (e.g., "my first semester at university"). They showed that group differences between suicidal patients and controls were wholly due to increased retrieval of categorical memories, with no such differences in numbers of extended memories. The early findings from suicidal patients have been replicated in studies by Williams and Dritschel (1988), Evans, Williams, O'Loughlin, and Howells (1992), Williams et al. (1996), and Pollock and Williams (2001). However, the majority of studies have looked at whether overgeneral memory occurs in other types of emotional disorder.

Overgeneral Memory in Affective Disorders

Table 1 summarizes the studies that have examined the specificity of memory in people suffering from affective disorders. Following the early research on suicidal patients, major depressive disorder (MDD) was the next type of emotional disorder to be studied. In MDD, patients experience emotional changes (feelings of extreme sadness and hopelessness), cognitive changes (low self-esteem, guilt, memory and concentration difficulties), changes in behavior and motivation (feeling agitated or slowed down, reduced interest in social or recreational activities), and changes in bodily functioning (sleep, eating, and sexual problems; loss of energy). Major depression is generally diagnosed when a persistent and unreactive low mood and/or an absence of positive affect are accompanied by a range of symptoms, the number and combination needed to make a diagnosis being operationally defined (*International Classification of Diseases*, World Health Organization, 1992; *Diagnostic and Statistical Manual of Mental Disorders*, American Psychiatric Association, 1994). Lifetime risk for major depression is around 12% for males and 20% for females (Kessler et al., 1994).

Table 1 shows, first, that overgeneral memory is a consistent characteristic of patients with a diagnosis of MDD. Eleven studies show a significant difference between depressed patients and matched controls, yielding a mean effect size (Cohen's *d*) of 1.12 (interquartile range [IQR] = 0.44). Table 1 also shows that overgeneral memory occurs in other types of affective disorder, such as postnatal depression (Croll & Bryant, 2000); in currently euthymic patients with previous episodes of MDD or bipolar disorder[2] (Mackinger, Loschin, & Leibetseder, 2000; Mackinger, Pachinger, Leibetseder, & Fartacek, 2000; Scott, Stanton, Garland, & Ferrier, 2000); and in samples with subclinical levels of depression (often referred to as *dysphoria* to distinguish it from more severe major depression described earlier; Goddard, Dritschel, & Burton, 1997; Moffitt, Singer, Nelligan, Carlson, & Vyse, 1994; Ramponi, Bar-

[1] Although most studies make use of a word-cuing task, the phenomenon of overgeneral retrieval has been found using not only words but also scenarios (e.g., "Recall a time when a neighbor helped you with a practical problem"; Moore, Watts, & Williams, 1988; Williams et al., 1996), and free recall (e.g., "Recall as many episodes from your life as you can in ten minutes"; Winthorpe & Rabbitt, 1988). Adding activity cues (e.g., "going to a concert") to cue words makes no difference to the specificity of retrieval (Williams, 1988).

[2] A diagnosis of bipolar disorder is made if a patient has experienced one or more episodes of depression and one or more episodes of mania. Manic episodes are characterized by elevated, expansive, or irritable mood for a period of at least 1 week, accompanied by three or more of the following symptoms: inflated self-esteem or grandiosity; less need for sleep; increased talkativeness; flight of ideas; increased distractibility; increased engagement in goal-directed activities (socially, sexually, or at work or school) or psychomotor agitation; and increased engagement in risky pleasurable activities (e.g., spending sprees, sexual indiscretions, foolish business investments). These symptoms must have caused significant impairment in normal functioning for a diagnosis to be made.

Table 1
Summaries of Studies on Overgeneral Memory in Affective Disorders and Suicidality

Study	Sample (no. female)	Cues (time per cue in seconds)	Variable	Findings	Estimated effect size (*d*)
J. M. G. Williams & Broadbent (1986)	25 (17) overdose patients (OP) 25 (17) hospital controls (HContr) 25 (17) community controls (Contr)	5 pos. 5 neg (60)	Prop. OG	OP > HContr = Contr Group × Valence interaction due to OP recalling more general memories that HContr and Contr to pos but not to neg cues	0.70[a]
Moore et al. (1988)	17 (17) depressed patients (DP) 17 (17) controls	8 pos, 8 neg scenarios	OG	DP > Contr Group × Valence interaction due to DP recalling more general memories than Contr to pos but not to neg cues	1.18[b]
J. M. G. Williams & Dritschel (1988)	24 (16) OPs 16 (13) ex-overdose patients (Ex-OP) 24 (15) panel controls	10 pos, 10 neg (30)	S	OP = Ex-OP < Contr Group × Valence interaction due to OP tending to recall less specific memories to pos than neg cues and Ex-OP and Contr tending to show the opposite pattern	1.19[a] (OP vs. Contr) 0.92[a] (Ex-OP vs. Contr)
J. M. G. Williams & Scott (1988)	20 (13) depressed inpatients (DI) 20 (13) controls	5 pos, 5 neg (60)	S	DI < Contr Group × Valence interaction due to DI recalling less specific memories to pos than neg and Contr recalling less specific memories to neg than pos cues	1.84[b]
Puffet et al. (1991)	21 (15) DPs 21 (15) controls	10 pos, 10 neg (60)	S	DP < Contr DP recalled less specific memories to pos than neg; no difference in Contr	1.17[b]
Evans et al. (1992)	12 parasuicide patients (PS)	5 pos, 5 neg (60)	S	PS < Contr	0.91[b]
Moffitt et al. (1994)	90 (61) undergraduate students divided into high- and low-depression groups by median split of depression scores on Multiple Affect Adjective Checklist	Participants wrote down either 1 pos or 1 neg memory that was "personally significant and emotionally evocative"	Percentage of participants producing general or singe-event memories in the pos and neg memory condition	High-depressed wrote down more summary memories in the pos condition than low-depressed participants; no differences in neg condition	0.66[a]
Kuyken & Dalgleish (1995)	33 (33) DPs 3 (33) controls	5 pos, 5 neg (60)	OG	DP > Contr for both pos and neg cues	0.61[a]
Goddard et al. (1996)	16 (12) DPs 16 (12) hospital controls	5 pos, 5 neg (60)	S	DP < Contr	1.00[a]
J. M. G. Williams et al. (1996)	24 (16) OPs 24 (15) hospital patients 24 (16) panel controls (HP)	5 pos, 5 neg, 5 neutral	S	OP < HP + Contr	0.61[b]
Goddard et al. (1997)	16 (5) dysphoric students (Dys) 16 (8) nondysphoric students	5 pos, 5 neg (60)	S	Dys < Contr	1.12[b]

Table 1 (*continued*)

Study	Sample (no. female)	Cues (time per cue in seconds)	Variable	Findings	Estimated effect size (*d*)
Brewin et al. (1998)	21 severely depressed cancer patients (SDC) 32 mildly depressed cancer patients 62 nondepressed cancer patients	5 pos, 5 neg (60)	OG	SDC > Contr	0.53[a]
Kaney et al. (1999)	20 (5) patients with persecutory delusions (PD) 20 (5) DPs 20 (5) normal controls	6 pos, 6 neg (unclear whether instructions stressed that memories should be specific)	S	PD > DP = Contr	0.09[a]
Croll & Bryant (2000)	13 women with postnatal depression (PND) 13 nondepressed mothers	6 pos, 6 neg, 6 neutral	S	PND < Contr	2.10[b]
Mackinger, Kunz-Dorfer, et al. (2000)	17 previously depressed women (PDW) 18 never-depressed women	6 (60)	S	PDW < Contr	0.83[b]
Mackinger, Pachinger, et al. (2000)	21 PDWs 18 never-depressed women	6 pos, 6 neg (60)	S	PDW < Contr for neg cues	1.05[a]
Scott et al. (2000)	41 (27) euthymic bipolar patients (EBP) 20 (11) controls	5 pos, 5 neg	Ratio S/OG	EBP < Contr	0.60[b]
Dalgleish et al. (2001)	14 patients with seasonal affective disorder (SAD) 15 controls	5 pos, 5 neg (60)	OG	SAD = Contr for pos cues SAD < Contr for neg cues	0.33[a]
Goddard et al. (2001)	30 (25) DPs 30 (25) controls assigned to either primed or unprimed conditions	5 pos, 5 neg (60)	S	DP < Contr	1.54[b]
Pollock & Williams (2001)	24 (14) suicide attempters (SA) 24 (14) psychiatric controls (PContr) 24 (14) normal controls	6 pos, 6 neg, 6 neutral (60)	S	SA < PContr < Contr	2.72[b]
Wessel et al. (2001)	93 (51) outpatients with primary diagnosis of MDD or AD 31 (16) AD + no history of MDD 20 (13) AD, MDD in remission 25 (12) AD + MDD 17 (11) MDD 24 (12) control	5 pos, 5 neg (written, 120)	S	Diagnosis of MDD predicted specificity after demographic variables were controlled for	1.24 (MDD vs. Contr)[b]
Arntz et al. (2002)	Mixed patient sample: 19 (6) depression 11 (6) anxiety disorders 9 (6) BPD 10 (6) other personality disorder	5 pos, 5 neg (written, self-paced)	S	Diagnosis of depression predicted number of specific memories after controlling for demographic variables	Insufficient information

(*table continues*)

Table 1 (*continued*)

Study	Sample (no. female)	Cues (time per cue in seconds)	Variable	Findings	Estimated effect size (*d*)
Barnhofer et al. (2002)	15 (12) DPs 15 (12) controls	2 pos, 2 neg (think-aloud modification, 120)	OG-C	DP > Contr	1.34[b]
Nandrino et al. (2002)	16 DPs > 3 episode 16 DPs, 1st episode 32 controls Assessed at T_0 and T_1 (28 days after)	10 pos, 10 neg (60)	Prop. OG (omissions excluded)	T_0: DP (recurrent) = DP (1st episode) > Contr T_1: DP (recurrent) > DP (1st episode) = Contr	Insufficient information
Park et al. (2002)	96 adolescents with MDD (49 full diagnostic criteria, 38 partial, 9 full remission) 22 nondepressed adolescent psychiatric patients 33 community controls	6 pos, 6 neg	Prop. OG-C	Full MDD > Contr Remitted MDD > Contr for pos cues	0.90[a]
Burnside et al. (2004)	22 PDWs with history of childhood sexual abuse 19 never depressed women with history of childhood sexual abuse	5 pos, 5 neg, 5 neutral (60)	OG-C	PDW < Contr Group × Valence interaction due to PDW giving fewer categorical memories to neg cues than Contr and no differences in responses to pos cues	−0.44[b]
Iqbal et al. (2004)	13 postpsychotic depression participants (PPD) 16 no postpsychotic depression participants (PPD within 1 year of onset of first episode of psychosis)	5 pos, 5 neg (60)	OG	PPD > Contr	0.04[b]
Kremers et al. (2004)	83 (77) patients with BPD, of which 47 were depressed and 36 were nondepressed 26 (15) DPs 50 (50) controls	5 pos, 5 neg	S	Depressed BDP = DP < Contr	0.94[b]
Mansell & Lam (2004)	19 (13) patients with bipolar depression in remission (BD) 16 (9) patients with unipolar depression in remission (UD)	1 pos, 1 neg	S	BD < UD for neg cues, but not for pos	0.93[a]
Ramponi et al. (2004)	16 (10) dysphoric participants (BDI > 8) (DysP) 16 (10) controls (BDI < 9)	10 pos, 10 neg, 10 neutral (30)	S	DysP < Contr	0.92[b]

Note. Cues: pos = positive; neg = negative. Variables: OG = overgeneral memories; S = specific memories; C = categorical memories; Prop. = proportion; MDD = major depressive disorder; AD = anxiety disorder; BPD = borderline personality disorder.
[a] Effect size estimate based on data for positive and negative cue words. [b] Effect size based on main effect.

nard, & Nimmo-Smith, 2004).[3] The overall mean effect size for the 28 out of 30 studies in Table 1 for which sufficient data were available to compute Cohen's *d* statistic is 0.94 (IQR = 0.57)—a large effect size.

Failures to replicate overgeneral memory in currently depressed patients are relatively rare. Kaney, Bowen-Jones, and Bentall (1999) found no evidence of overgeneral memory in a group of depressed patients with delusional disorders, and Iqbal, Birchwood, Hemsley, Jackson, and Morris's (2004) study of postpsychotic depression found no overall main effect, though there was an effect for positive cue words. A third failure to replicate comes from a study on seasonal affective disorder (SAD), in which depression is experienced more in fall and winter than in spring and summer. Dalgleish, Spinks, Yiend, and Kuyken (2001) compared participants with SAD (in the depression phase) with control participants and did not find a difference in memory specificity. However, SAD differs from other forms of depression in that patients often do not have a history of life events or chronic difficulties, which may be an important etiological factor for overgenerality (as addressed later).

In summary, the overwhelming majority of studies have shown that overgeneral memory is closely associated with depression or depressive symptoms. The phenomenon occurs whether specificity or overgenerality is used as an outcome variable and whether studies examine depressed or suicidal patients or dysphoric nonclinical samples.

Overgeneral Memory and Trauma

In 1995, Kuyken and Brewin conducted one of the first studies to examine the role of traumatic experiences in the etiology of overgeneral memory. Comparing depressed women with and without a history of childhood sexual abuse, they found those who reported a history of abuse retrieved significantly more overgeneral memories than the depressed patients who did not report such a history. These data indicated that level of overgeneral memory might be related to experience of trauma in addition to a diagnosis of depression. Since the study by Kuyken and Brewin, a number of other published studies have, as their main focus, examined the relationship between autobiographical memory specificity and reports of trauma or trauma reactions. The data are summarized in Table 2. The studies include both reports of sexual and physical abuse, which are important but difficult to verify, and also traffic accidents, war trauma, cancer diagnoses, and burn accidents, which were verified. They include nonclinical samples (Henderson, Hargreaves, Gregory, & Williams, 2002) as well as clinical samples. Clinical samples include depressed adult inpatients (Hermans et al., 2004), eating disorder patients (Dalgleish et al., 2003), adolescent inpatients with emotional disorders (de Decker, Hermans, Raes, & Eelen, 2003), survivors with acute stress disorder following a traffic accident (Harvey, Bryant, & Dang, 1998) or following a cancer diagnosis (Kangas, Henry, & Bryant, 2005), and patients suffering from posttraumatic stress disorder[4] (PTSD; e.g., Vietnam veterans; McNally, Lasko, Macklin, & Pitman, 1995; McNally, Litz, Prassas, Shin, & Weathers, 1994). The mean effect size for those studies showing a significant association between trauma and overgeneral memory is 1.13 (IQR = 0.72).

The data suggest that a history of traumatic experiences is closely linked to the occurrence of overgeneral memory deficits, and this occurs despite the fact that individuals are not being asked to retrieve memories related to their trauma. However, as studies of war veterans (McNally et al., 1994, 1995), traffic accident victims (Harvey et al., 1998), and cancer patients (Kangas et al., 2005) show, the mere presence of a history of trauma is not sufficient. These studies included control groups that had been exposed to the trauma but for whom there was no prolonged emotional disturbance or PTSD, and in these groups, an overgenerality memory deficit was not found. This suggests that the relation between trauma and specificity of memory is moderated by qualitative aspects of the trauma (e.g., how severe and prolonged the trauma was; Hermans et al., 2004) and the way in which people cope with it (e.g., by attempted avoidance; Kuyken & Brewin, 1995). People's reactions to trauma may also be a function of age. Willebrand et al. (2002) found that adult burn victims did not differ from controls in memory specificity. However, if burns are sustained in childhood, memory specificity is compromised (Stokes, Dritschel, & Bekerian, 2004). The finding concerning the relevance of the *nature* of the trauma is important because research has found that usually, as time passes, negative events tend to lose their capacity to provoke negative affect, a phenomenon referred to as the *fading affect bias*. It is noteworthy that this effect is less pronounced in individuals with dysphoria than in healthy controls (e.g., Walker, Skowronski, Gibbons, Vogl, & Thompson, 2003), and so in addition to being more likely to have experienced negative events, individuals with depression and PTSD are more likely to continue to experience high levels of negative affect in response to event recollection.

Although the majority of studies have found evidence of an association between memory specificity and trauma, there are some that have failed to replicate this effect (Arntz, Meeren, & Wessel, 2002; Kremers, Spinhoven, & Van der Does, 2004; Peeters, Wessel, Merckelbach, & Boon-Vermeeren, 2002; Wessel, Meeren, Peeters, Arntz, & Merckelbach, 2001; Wilhelm, McNally, Baer, & Florin, 1997). However, these studies either involved low

[3] The suggestion that a coexisting depressive disorder may produce overgeneral memory in individuals with other forms of psychopathology is supported by findings in other patient groups. For example the only study to date that has examined memory specificity in obsessive–compulsive disorder (OCD) compared outpatients with OCD with healthy controls and found that the OCD patients were less specific (Wilhelm, McNally, Baer, & Florin, 1997). However, further analysis indicated that medicated OCD patients were less specific than unmedicated patients and that the depressed medicated patients were the least specific of all, strongly suggesting that it was depressive symptoms, rather than OCD per se, that accounted for the differences between groups.

[4] PTSD is diagnosed in individuals who have been exposed to a traumatic event during which they experienced intense fear, helplessness, or horror experiences and who persistently reexperience the event (e.g., through dreams, flashbacks, reliving the event, distress, or physiological arousal in response to internal or external cues that remind them of the event); show persistent avoidance of stimuli associated with the trauma; show a numbing of responsiveness; and have symptoms of increased arousal (e.g., difficulty sleeping, hypervigilance, irritability, exaggerated startle response). These symptoms must be present for at least 1 month and cause significant distress or impairment in functioning. Acute stress disorder is diagnosed if the duration of symptoms is less than 3 months.

Table 2
Summaries of Studies on Overgeneral Memory and Reported Trauma

Study	Sample (no. female)	Cues (time per cue in seconds)	Variable	Findings	Effect size estimate (*d*)
McNally et al. (1994)	39 (0) veterans with PTSD 10 (0) veterans without disorder	10 pos, 10 neg, (60); half of the cues taken from Williams & Dritschel (1988)	Prop. OG	PTSD = no PTSD for all cues PTSD > no PTSD for cues taken from Williams & Dritschel	— 0.79[a]
Kuyken & Brewin (1995)	19 MDD no abuse 9 MDD with CSA only 10 MDD with CPA only 18 MDD with CSA and CPA	5 pos, 5 neg (60)	OG	CSA > no CSA CPA = no CPA	0.68[b] —
McNally et al. (1995)	19 (0) veterans with PTSD 13 (0) veterans without PTSD	10 pos, 10 neg (60)	Prop. S	PTSD < no PTSD	0.78[a]
Wilhelm et al. (1997)	36 (16) patients with OCD 24 (10) controls	10 pos, 10 neg (60)	Prop. S	No significant relation with self-reports of trauma on THQ r_{PS} = .26	0.53[a]
Wessel et al. (2001)	93 outpatients and 24 controls	5 pos, 5 neg (written test)	S	No significant relation with self-reports of trauma on CTQ	—
Arntz et al. (2002)	19 (6) MDD 11 (6) AD 9 (6) BPD 10 (6) other personality disorders	5 pos, 5 neg (written test)	S	No significant prediction by self-reports of trauma on CTQ after controlling for demographic variables and diagnostic status	—
Henderson et al. (2002)	22 female students with history of CSA 57 female students without history of CSA	6 pos, 6 neg, 6 neutral (written test)	S	CSA < no CSA	0.86[a]
Wessel et al. (2002)	25 (25) patients with various disorders who had been exposed to war atrocities 15 (6) controls who had been exposed to war atrocities (Contr)	10 pos, 10 neg (60)	Prop. S	Patients > Contr	1.55[b]
Willebrand et al. (2002)	18 (2) burn patients (BP) 18 (2) controls	10 pos, 10 neg (30)	Prop. S	BP = Contr	0.37[a]
Dalgleish et al. (2003)	39 patients with eating disorders 21 controls	5 pos, 5 neg (60)	OG	Correlation between self-report of trauma on MOPS abuse and overgenerality following neg cues: .40*[D]	0.87[c]
de Decker et al. (2003)	28 inpatient adolescents	5 pos, 5 neg (30)	S	Correlations between self-report of trauma on CTQ, total: −.60**	1.50[a]
Peeters et al. (2002)	25 patients with MDD	5 pos, 5 neg (written)	S	Self-reports of trauma on CTQ predicted specific recall of neg words	0.62[d]
Kremers et al. (2004)	83 outpatients with BPD	5 pos, 5 neg (60)	Prop. S	Correlation with self-reports of trauma on CTI: .04	0.08[a]
Stokes et al. (2004)	12 (12) burn-injured adolescents (BI) 12 (12) controls	5 pos, 5 neg (60)	S	BI < Contr	1.48[a]
Hermans et al. (2004)	18 (13) inpatients with MDD	5 pos, 5 neg (30)	S	Correlations with self-reports of trauma on the TQ physical abuse: −.71** (Total: −.20)	2.01[a] 0.41[a]
Raes, Hermans, Williams, & Eelen (2005)	27 (27) high-specific students 25 (25) low-specific students	5 pos, 5 neg (30)	S	Correlations with self-report of trauma on the TEC (within low-specific), emotional abuse: −.55**	1.32[a]

Note. Dashes indicate insufficient information to estimate effect size. Cues: pos = positive; neg = negative. Variables: OG = overgeneral memories; S = specific memories. Prop. = proportion; PTSD = posttraumatic stress disorder; MDD = major depressive disorder; CSA = childhood sexual abuse; CPA = childhood physical abuse; OCD = obsessive–compulsive disorder; THQ = Trauma History Questionnaire; CTQ = Childhood Trauma Questionnaire; AD = anxiety disorder; BPD = borderline personality disorder; MOPS = Measure of Parental Style; CTI = Childhood Trauma Interview; TQ = Trauma Questionnaire; TEC = Traumatic Experiences Checklist.
[a] Effect size for main effect. [b] Effect size estimate based on data for positive and negative cues. [c] Effect size based on positive cues only. [d] Effect size based on negative cues only.
*$p < .05$. **$p < .005$.

levels of trauma or focused on depression or personality disorders rather than trauma as their primary research question.

Although the studies in Tables 1 and 2 suggest that the phenomenon of overgeneral memory is associated with a diagnosis of depression and with a history of trauma and abuse, overgenerality is not merely a marker of any psychopathology: It does not occur in general anxiety disorder (Burke & Mathews, 1992), social phobia (Wenzel, Jackson, & Holt, 2002), or blood and spider fearful individuals (Wenzel, Jackson, Brendle, & Pinna, 2003), and it was not found in a mixed group of anxiety disorder patients (Wessel et al., 2001), even when the cue words used reflected the current concerns of the participants (e.g., Wenzel et al., 2003). Unlike dysphoria, in which overgenerality is found, it is not found in individuals with high trait anxiety (Richards & Whittaker, 1990). In borderline personality disorder, although one early study found more overgeneral memory in such patients (Jones et al., 1999), other studies that have taken account of comorbid diagnoses have not found it (Arntz et al., 2002; Kremers et al., 2004). In conclusion, overgenerality is relatively specific to those emotional disorders that involve depression, PTSD, or both.

Why Is the Overgeneral Memory Phenomenon Important?

Interest in overgeneral memory has been fostered by findings suggesting that the phenomenon is closely associated, and might have a causal link, with other important aspects of psychological functioning. It has been found to be associated with (a) impaired problem solving (Evans et al., 1992; Goddard et al., 1996; Goddard, Dritschel, & Burton, 1997; Raes, Hermans, Williams, Demyttenaere, et al., 2005; Scott et al., 2000), with specificity of memory moderating the effect of negative mood disturbance on problem-solving performance in previously suicidal patients (Williams, Barnhofer, Crane, & Beck, 2005); (b) problems in imagining future events, with overgenerality for past events predicting nonspecificity in specifying future events (Williams et al., 1996); and (c) delayed recovery from episodes of affective disorders (Brittlebank, Scott, Williams, & Ferrier, 1993; Dalgleish et al., 2001; Harvey et al., 1998; Peeters et al., 2002; though see Brewin, Reynolds, & Tata, 1999, for a failure to replicate).

The phenomenon has also been seen as important because memory remains overgeneral in those with a history of emotional disorder, even if not currently in an episode (Mackinger, Loschin, & Leibetseder, 2000; Mackinger, Pachinger, et al., 2000; Williams & Dritschel, 1988). This is significant because it means that the phenomenon can be observed without needing to be activated by low mood and might therefore act as a between-episode "marker" of future vulnerability to depression. More recent studies are consistent with this notion: Overgeneral memory assessed when one is not depressed predicts later mood disturbance. This has been found for premenstrual dysphoria (Mackinger, Kunz-Dorfer, Schneider, & Leibetseder, 2001), postpartum depressed mood (Mackinger, Loschin, & Leibetseder, 2000), depressive symptoms following life events in students (Gibbs & Rude, 2004), and emotional reactivity following a failed in vitro fertilization treatment (van Minnen, Wessel, Verhaak, & Smeenk, 2005).

Methodological Limitations

In this section we consider a number of methodological problems that exist in some of these studies that may limit the conclusions that may be drawn from them.

Number and Content of the Words Used as Cues

There is great variation in the number of cues used across the different studies. For example, in the 30 affective disorders studies reported in Table 1, the minimum number is a single cue used to investigate memory of 90 undergraduates, by Moffitt et al. (1994); the maximum is 30 cues, used by Ramponi et al. (2004). Across the studies, however, there is no significant correlation between number of cues used and the effect size found, $r(28) = .27$. The content of the cues may be more problematic, in that studies have tended to use the same or similar lists of cue words. Although this means that it is easier to compare across studies, possible idiosyncrasies in the words used might give rise to anomalous findings that are repeated across studies. On the other hand, those studies that have used different cuing procedures (e.g., Moore et al., 1988, which used vignettes such as "Recall a time when a neighbour helped you with a practical problem") have reported large effect sizes (1.15 in this study), suggesting that the phenomenon is relatively robust across different cuing procedures.

General Intelligence or Memory Ability

It is possible that differences in levels of IQ or memory account for the nonspecificity observed, and not all studies have taken adequate account of this possibility. Nevertheless, those studies that have controlled for number of years in education, IQ, semantic processing speed, or semantic fluency (e.g., Park, Goodyer, & Teasdale, 2002; Williams & Broadbent, 1986; Williams & Scott, 1988) have found that group differences remain even after matching for such variables. On the other hand, mixed conclusions emerge from those studies that have explored possible associations between overgeneral autobiographical memory in depression and performance in other memory domains. Wessel, Merckelbach, and Dekkers (2002) included a set of neuropsychological tests on semantic and episodic memory in their study of autobiographical memory in patients with various psychiatric diagnoses (predominantly PTSD). Performance on these tests, however, did not add any explanatory variance in the prediction of autobiographical memory specificity beyond general participant characteristics (such as IQ), and such characteristics had been found by the same authors not to account for differences between depressed and nondepressed patients (Wessel et al., 2001). Williams and Dritschel (1992) reported significant associations between healthy controls' poor performance on verbal category fluency tasks (semantic memory) and greater overgeneral categorical memory retrieval, though the absolute levels of correlation were low, and an earlier study in suicidal patients had found no such correlation (Williams & Broadbent, 1986). A study of psychiatric inpatient adolescents suffering from a variety of psychological disorders, by de Decker, Hermans, Raes, and Eelen (2003), reported moderate but statistically nonsignificant correlations between immediate and delayed story recall (episodic memory) and number of specific memories and found no correlation between nonspecificity and a measure of working memory central executive capacity.

However, Ramponi et al. (2004) tested autobiographical and episodic (recognition) memory in a dysphoric and nondysphoric group. The episodic memory task involved presenting emotionally neutral words for a subsequent recognition test using a remember–know procedure. They found that specificity of autobiographical

retrieval was found to be positively related to remembering (which requires recollection of contextual detail—the circumstances in which the word was previously seen) but not to knowing (which does not). Furthermore, they found that depressive rumination, the tendency to ponder repeatedly on the reasons and implications of one's (depressed) feelings (Nolen-Hoeksema, 1991), was related to poor performance on both the autobiographical and the episodic memory task.

Recent data extend this conclusion. Raes, Hermans, Williams, Demyttenaere, et al. (2006) found that autobiographical memory specificity was not related to performance on a range of memory tasks, including semantic memory (fluency tasks) and episodic memory (verbal learning, delayed free-recall), suggesting that overgeneral autobiographical memory was not merely a reflection of a general memory deficit linked to depression. On the other hand, they did find, as predicted, a close association with a measure of source memory—that is, misassignment of correctly recognized words to the "wrong" (distractor) list—and that both overgeneral memory and poor source memory were associated with rumination (even after partialing out depression).

We conclude that although overgenerality in autobiographical memory is likely related in some cases to general memory deficits, it is not wholly explained by such deficits. It is associated with those aspects of memory that depend on recalling contextual detail.

Depression and Trauma History Confounded

A third possible methodological limitation is that the published studies have tended to examine either depression (see Table 1) or patients with a history of trauma (see Table 2). Authors naturally attribute differences found between the clinical and control groups to the variable of interest (depression or trauma), and few studies have examined both (though see Kuyken, Howell, & Dalgleish, 2006). In particular, no study has used a 2×2 design to examine people who either have or do not have depression, with or without a history of trauma. For example, studies that examine patients with PTSD do not report whether these patients have a history of major depression, although such information is necessary in order for us to be confident that variance in overgenerality is attributable to a history of trauma, rather than to major depression. Although the balance of findings suggest that trauma is likely to be important in understanding the development of overgeneral memory, further investigation of this issue is clearly required. Such studies would be important for the additional reason that, at the moment, it is unclear why a *diagnosis* of depression is associated with overgeneral memory whereas the *severity* of symptoms within depressed groups does not correlate with the degree of overgenerality (Burnside, Startup, Byatt, Rollinson, & Hill, 2004; Henderson et al., 2002; Hermans et al., 2004; Jones et al., 1999; Kremers et al., 2004; Kuyken & Brewin, 1995; Laberg & Andersson, 2004; Merckelbach, Muris, & Horselenberg, 1996; Peeters et al., 2002; Phillips & Williams, 1997; Raes, Pousset, & Hermans, 2004; Wessel et al., 2001; Williams & Broadbent, 1986; Williams & Dritschel, 1988; Williams et al., 1996). One possibility is that it is the degree to which a person has suffered or remains preoccupied with prior trauma or adversity that is critical, rather than other aspects of depressive symptomatology. Future studies on depressed or previously depressed groups, with and without trauma history, are required to disentangle these contributing factors.

Retrospective Assessment of Trauma

A limitation associated with some of the studies examining trauma and memory specificity is that trauma was assessed retrospectively. As such, the actual presence of a history of adversities is difficult to verify. In other studies, however, trauma was documented by means of case records (Meesters, Merckelbach, Muris, & Wessel, 2000), or the adversities were of a more observable nature, like war trauma (de Decker, 2001), cancer diagnoses (Kangas et al., 2005), and burn accidents (Stokes et al., 2004).

Too Few Longitudinal Studies

Another, more general limitation is that in most studies, because trauma and memory are examined cross-sectionally (instead of longitudinally), it is not possible to determine the causal relationship between overgeneral memory deficits and the experience of trauma. Difficulties in being specific may be an aftereffect of trauma or of depression (the scarring hypothesis) or, alternatively, may be an antecedent, making the development of depression or PTSD more likely following a negative event (the vulnerability hypothesis).

Evidence in favor of the scarring hypothesis comes from Stokes et al. (2004), who found greater nonspecific memory in adolescent burn victims compared with controls. Evidence in favor of the vulnerability hypothesis comes from the few longitudinal studies that have assessed specificity of memory before participants become depressed (Gibbs & Rude, 2004; Mackinger, Loschin, & Leibetseder, 2000; Mackinger, Pachinger, et al., 2000; van Minnen et al., 2005). However, because in three of these studies (Mackinger, Loschin, & Leibetseder, 2000; Mackinger, Pachinger, et al., 2000; van Minnen et al., 2005) *prior* trauma experiences and history of prior depression were not comprehensively assessed, one cannot exclude the additional possibility that level of memory specificity (i.e., the level of vulnerability) is explained by a prior history of adverse experiences. Of course, even if overgeneral memory arises from the scarring effect of prior adversity, it may still play an important role in acting as a mediator between that adversity and future psychological functioning. If environmental adversity is found to have long-term impact on an individual, then it can do so only by producing either long-term changes in the environment or long-term changes in the individual. Overgenerality in memory may be just such a long-term effect.

In conclusion, we still cannot be sure the extent to which overgeneral memory prior to trauma renders people vulnerable for developing emotional problems following trauma experience or how much the trauma itself negatively affects memory specificity. More longitudinal prospective studies that make detailed assessment of individuals before and after trauma are required to resolve this issue.

Summary

In this section we have reviewed a number of methodological issues in the research on overgeneral memory. Studies vary in the extent to which each is able to take account of these limitations in its design. However, what is clear from the data is that, notwithstanding the methodological noise and variety across the studies, the effects are remarkably consistent and the effect sizes large. In the next section we turn to what mechanisms might explain the phenomenon.

Mechanisms Underlying Overgeneral Memory Retrieval

Early accounts (Williams, 1996) explained overgeneral memory retrieval within the framework of *descriptions theory* (Burgess &

Shallice, 1996; Norman & Bobrow, 1979). This theory conceptualizes voluntary retrieval 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" (M. D. Williams & Hollan, 1981, p. 87). An underlying assumption of descriptions theory is that autobiographical memories are stored as records of events and that these records are organized in hierarchies leading from general to more specific event representations.

The distinction between general and specific event representations is not new (see Barsalou, 1988; Neisser, 1986; Nelson, 1988). Everyone needs access to both episodic information and general summary information to navigate successfully through the interpersonal and instrumental demands of daily living. In many situations, such as the ubiquitous restaurant situation, general scriptlike knowledge will be adequate (*enter, find a seat, examine menu, order, eat, pay, leave*). But restaurants do differ one from the other—some have their menus written on a blackboard on the wall, and some demand ordering food at the bar, and so waiting for the waiter to deliver a menu or take an order will lead to frustration. For a successful restaurant experience, we need to have access both to our general restaurant scripts and to the episodic memories, the "tags" that differentiate this one from others and allow us to take account of any particular peculiarities (Schank & Abelson, 1977).

Although the notion of a hierarchical representation of autobiographical knowledge has remained an integral aspect of autobiographical memory models (Burgess & Shallice, 1996), it has become increasingly clear that retrieval of autobiographical memories is not restricted to the matching of static records but involves the construction of memories from a pool of available memory components or features. Recent models consequently stress the role of central executive control in the activation and inhibition of memory components as well as the importance of the current motivations and goal structure of the individual. One of the most comprehensive models of this type is the self-memory model by Conway and Pleydell-Pearce (2000), an account derived from research on autobiographical memory in nonclinical groups. We describe this model in some detail and then evaluate evidence from the clinical literature to see how the model can be elaborated to account for the data from psychopathology. Finally, we return to examine the implications these findings have for future research into this aspect of memory.[5]

Conway and Pleydell-Pearce's Self-Memory System

Conway and Pleydell-Pearce (2000) described autobiographical memories as "transitory dynamic mental constructions generated from an underlying knowledge base" (p. 261). Their model includes three levels of representation within the autobiographical knowledge base (see Figure 1). The highest level consists of representations of prolonged periods of time with relatively distinct start and end points, referred to as *lifetime periods* (e.g., "when I lived in Cambridge"). At an intermediate level, *general event* descriptions represent repeated events (e.g., "driving to work in the mornings") or single events (e.g., "my holiday in Egypt"), again in the form of relatively abstract, conceptual summaries of experience. The hierarchy is nested such that general event representations (assumed to be the preferred or default level of access into the autobiographical memory knowledge base) are associated with the specific lifetime periods in which they occurred: For example, the general event "taking my children to playgroup" would be associated with the lifetime period "when my children were small." They are also associated with information encoded at the lowest level, referred to as *event-specific knowledge* (ESK). ESK differs from general event and lifetime period representations in that it consists primarily of more concrete sensory–perceptual aspects of unique events, often including visual imagery rather than abstract, conceptual, verbal summaries of past experience.

It is suggested that the autobiographical knowledge base undergoes continuous fluctuation of activity, as environmental and internal cues activate aspects of stored representations. The retrieval of a specific autobiographical memory occurs when the knowledge base settles into a stable state, with simultaneous and coordinated activity in the stored representation of an event at the ESK, general event, and lifetime period levels.

The Conway and Pleydell-Pearce (2000) model, as well as other accounts (e.g., Burgess & Shallice, 1996), suggests that these patterns of activation can be generated via two different processes: a generative retrieval process and a spontaneous form of retrieval following direct activation of autobiographical knowledge. *Generative retrieval* refers to top-down search processes involving the use of verbal/abstract (conceptual) representations, corresponding to the "intermediate descriptions" of Norman and Bobrow (1979). The first stage of generative retrieval involves the specification and elaboration of mnemonic cues using verbal associations, which will form the basis for memory search (e.g., *happy*: "my dog, Tessa"). Criteria to evaluate the degree to which activated representations match retrieval specifications are also established at this stage. Once the search criteria are specified, lifetime period ("when I lived in Stockton") or general event level knowledge ("I used to take her for walks") is rapidly activated, with general event knowledge appearing to be the most common point of entry into the memory system. Activation then spreads through the knowledge base from general event representations to ESK ("One day we went for a walk in the woods and she chased a rabbit").[6]

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[5] Although the explanations of overgeneral memory to be considered focus on the normative cognitive psychology literature, we acknowledge that there may be parallel explanations in cognitive models of depression—either cognitive resource models (e.g., Ellis & Ashbrook, 1988; Hertel & Rude, 1991; Zacks & Hasher, 1994) or models based on negative self-representations or schemas (e.g., Beck, Rush, Shaw, & Emery, 1979). We take the opportunity in later sections, in which we examine the predictions from Conway and Pleydell-Pearce's (2000) model for overgeneral memory, to illustrate how this approach is compatible with these cognitive models of depression and psychopathology.

[6] Although generative retrieval is generally conceived as a strategic process, it is important to note that it is, in large part, concerned with the guidance of associative processing components. Supervisory executive capacities are needed in order to set up the retrieval model based on task analysis, and this retrieval model is held in working memory during the retrieval process. At the same time, however, activation of elements within the knowledge base occurs automatically and follows an associative pattern in which activation is channeled by the indices of the knowledge structure. During this stage, effortful processes are required to evaluate the automatically activated knowledge and to guide the search while inhibiting further processing of irrelevant knowledge. Effortful processing is also necessary to maintain a specific memory once the search has resulted in a stable pattern of activation in the knowledge base.

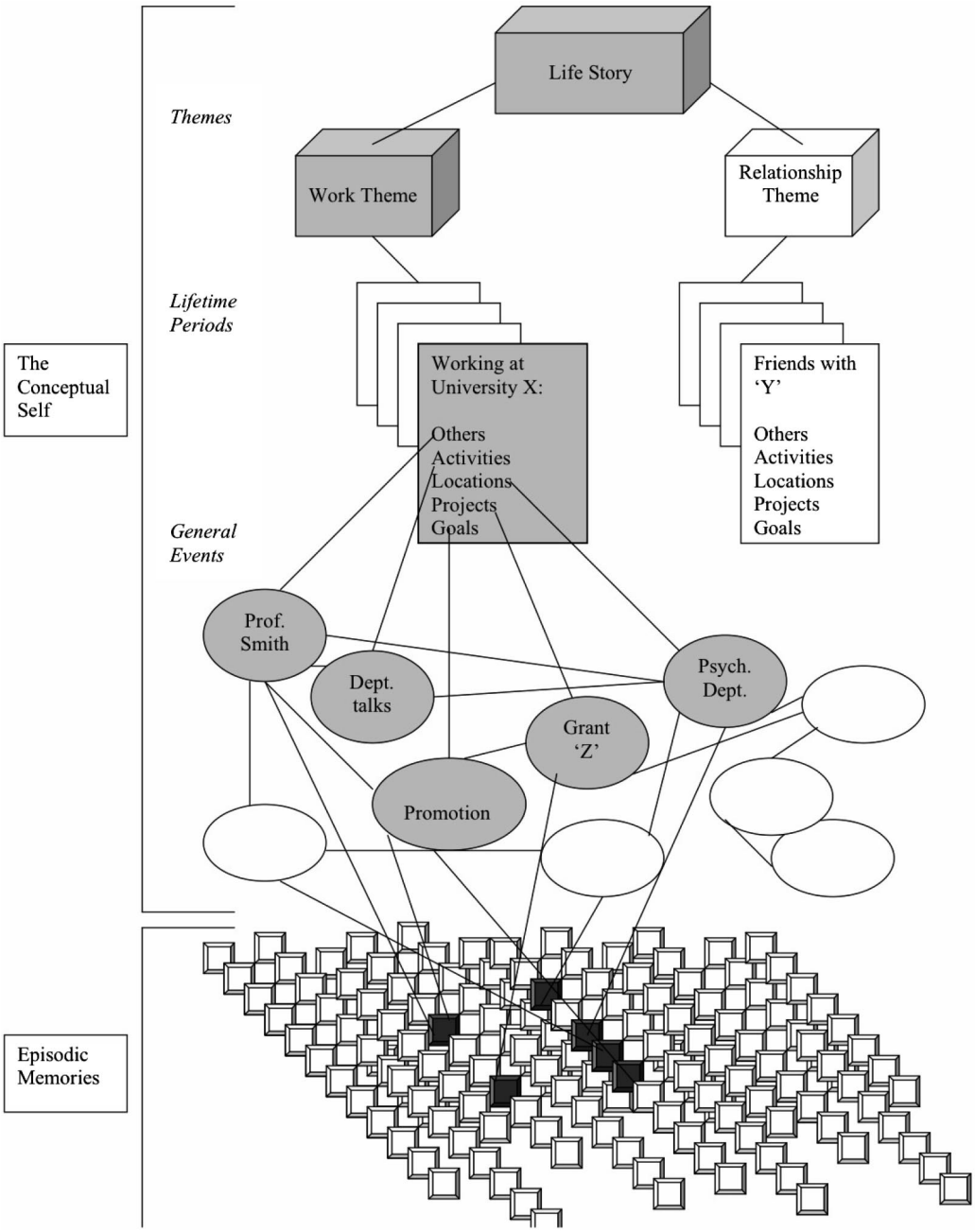

Figure 1. Hierarchical structure of autobiographical memory. From "Memory and the Self," by M. A. Conway, 2005, *Journal of Memory and Language, 53,* p. 609. Copyright 2005 by Elsevier. Reprinted with permission.

Supervisory executive processes evaluate the degree to which currently active representations match the search criteria and progressively refine the pattern of activation. Indeed, because activation spreads both from one general event description to other related general event descriptions and from single general event descriptions to a large number of elements of ESK, it is assumed that supervisory executive processes are required to inhibit activation of irrelevant representations, allowing the system to settle into a stable state.

Direct retrieval, in contrast, corresponds to the subjective experience of spontaneous recollection and arises when an internal or environmental cue produces immediate activation of ESK. Because, according to Conway and Pleydell-Pearce (2000), ESK is typically linked to only one general event level representation, which in turn is linked to only one lifetime period (see Figure 1), a coordinated pattern of activation is quickly established, and there is less need for inhibitory control from central executive resources. As a result, direct retrieval is more rapid and less resource demanding than generative retrieval, although for both forms of retrieval it is suggested that the activated pattern must be linked to an individual's active goal structure for a memory to be formed. Consistent with the Conway and Pleydell-Pearce model, Berntsen (1998) has demonstrated that memories recollected as a conse-

quence of direct or "involuntary" retrieval tend to be more specific and less rehearsed than memories that are deliberately recollected in response to cue words.

The self-memory system. Conway and Pleydell-Pearce (2000) suggested that autobiographical memory needs to be seen in terms of its relationship to an individual's sense of self and of its central importance in guidance of goal-directed activity. From this perspective autobiographical memory can be viewed as one part of a larger "self-memory system" (for further elaboration, see Conway, 2005; Conway, Singer, & Tagini, 2004) with two functions: to maintain adaptive correspondence (the creation of a relatively accurate record of ongoing experience to be used to guide goal pursuit) and to ensure self-coherence (to develop an integrated and meaningful representation of one's self and one's life story that is consistent with goals and values).

The working self. Central to the self-memory system of Conway and Pleydell-Pearce (2000) is the *working self*. The working self operates a number of coordinated control processes that initiate and monitor goal-directed activity and create a model of the psychological present. The autobiographical knowledge base and conceptual self together form the *long-term self*. The conceptual self contains abstract self-knowledge such as attitudes, beliefs, and self-guides, which are constrained by and associated with the general event, lifetime period, and self-schema representations of the autobiographical knowledge base. The episodic memory system, lower in the hierarchy, contains sensory–perceptual ESK, which, if relevant to ongoing goal processing, becomes linked to stored representations in the autobiographical knowledge base and is available for later retrieval (when activated in conjunction with general event, lifetime period, and life-story representations of the event). As well as determining which aspects of ESK become integrated with the autobiographical memory base (being retained for later retrieval), the working self influences which episodic memories are retrievable at any given point in time, retrieval being dependent to a large degree on the extent to which episodic memories are consistent with and relevant to the current goals of the working self.

Conway and Pleydell-Pearce (2000) assume that ongoing experience that is not relevant to active goals is unlikely to be integrated into the autobiographical knowledge base. Similarly, experiences that are relevant to ongoing goal processing but challenge self-coherence to an unacceptable degree are also unlikely to be integrated into the long-term self (see, e.g., Dalgleish, 2004, for a discussion).

How Does Conway and Pleydell-Pearce's Model Explain Overgeneral Memory?

Conway and Pleydell-Pearce (2000) suggested that overgeneral memory arises when individuals truncate their search during generative, top-down retrieval at too high a level, when only general descriptive information has been accessed. This hierarchical component of their model is the aspect that most closely maps onto the original descriptions theory of Norman and Bobrow (1979) and explains why memories are nonspecific rather than simply slowed down or fragmented. Normally, individuals have some strategic control over how much of the memory "hierarchy" needs to be searched in order to meet the requirements of the task specificity. Depressed and suicidal patients access an intermediate description but stop short of a specific example. Their memory aborts the search for a specific event prematurely, when only the general description stage has been reached. This truncated search, called by Conway and Pleydell-Pearce a *dysfacilitation* of the retrieval process, is assumed to underlie the retrieval of overgeneral memories. Why does such dysfacilitation occur?

Because episodic memories (ESK) are "experience-near" summary records containing sensory–perceptual and conceptual affective features of an experience, these are assumed to be represented primarily in analogue form and usually in visual imagery. For Conway and Pleydell-Pearce's (2000) model, therefore, one very important property is that when they enter consciousness they hijack attention. Because of this, their entry into consciousness must be carefully coordinated, not least in order to maintain focus on current goal pursuit. Individuals who have experienced traumatic events or adversity that challenges fundamental beliefs about self and world are likely to be most prone to interruption of ongoing processing by such sensory representations. Conway and Pleydell-Pearce assume, therefore, that truncated search represents a passive avoidance reaction that arises because representations of past trauma and adversity, encoded within the episodic memory system, create negative affect as the retrieval search begins to elicit perceptual–sensory fragments of aversive events (cf. Williams, 1996). These fragments, because of the affect they threaten to create and associated interference with attention and pursuit of current goals, always elicit attempts from higher executive systems to inhibit them. Such inhibition we call *functional avoidance*, as it is originally learned because it reduces or avoids short-term affective disturbance, though as we shall see, this affect regulation comes at a long-term cost.

Conway and Pleydell-Pearce's (2000) model allows for the possibility that overgeneral memory might arise from functional avoidance at both encoding and retrieval. For example, it suggests that if ESK is not consistent with current working self at the time of encoding, it will not become linked to stored representations in the autobiographical knowledge base and therefore will not be available for later retrieval. If there is an encoding failure, ESK will be impoverished in individuals with depression (and other conditions) so that any preponderance of categorical responses to word cues will arise because autobiographical information is more likely to be *encoded* in abstracted ways in these groups.

If overgeneral memory does arise because memories are encoded in a permanently impoverished or inaccessible form, then it should be difficult to bring about change through laboratory manipulation or clinical intervention. However, in a series of studies, Watkins and colleagues have shown that laboratory manipulations that prevent rumination in depressed participants result in more specific memory (Watkins & Teasdale, 2001, 2004; Watkins, Teasdale, & Williams, 2000), indicating that to some degree, the specificity of memory recall depends on the activation of a particular mental state or mode of processing at the time of recall. Second, a clinical procedure known to reduce risk of relapse and recurrence in patients that have experienced episodes of depression in the past (mindfulness-based cognitive therapy; Segal, Williams, & Teasdale, 2002) reduces overgenerality in autobiographical memory (Williams, Teasdale, Segal, & Soulsby, 2000). This effect was independent of change in mood over the course of the treatment program. Each of these studies suggests that it is a failure to

retrieve ESK, rather than a failure of encoding, that is responsible for overgenerality in memory.

We have seen that Conway and Pleydell-Pearce's (2000) model of autobiographical memory explains overgenerality by a truncation of the retrieval search (dysfacilitation) when the initial activation of ESK threatens to increase affective disturbance or challenge current priorities of the working self. This explanation is similar to the affect regulation model proposed by Williams (1996), though much more clearly elaborated in terms of the maintenance of self-coherence. Like Williams's affect regulation model, Conway and Pleydell-Pearce's account places functional avoidance at the heart of their explanation of overgeneral memory. However, although functional avoidance explains the association of overgeneral memory with trauma history, it gives relatively less weight to the fact that the phenomenon is observed in depressed patients even in the absence of trauma (Wessel et al., 2001). In the next section, we describe a model, CaR-FA-X, that elaborates features of the Conway and Pleydell-Pearce model to suggest three mechanisms—*capture and rumination* (CaR), *functional avoidance* (FA), and *impaired executive control* (X)—that, alone or in combination, underlie overgeneral memory. We begin by examining the functional avoidance aspect, which remains central to our model.

CaR-FA-X: Explaining the Mechanisms Underlying Overgeneral Memory

Functional Avoidance

Conway and Pleydell-Pearce's (2000) explanation of overgeneral memory is that the recollection of general descriptions may produce less affect than the recollection of specific episodic memories, thus enabling current goal pursuit to be maintained in the face of potential deflection. Remaining at the level of more general information reduces the impact of potentially emotional material. Such a *functional avoidance hypothesis* would be consistent with current models of PTSD (Brewin, 2001; Brewin, Dalgleish, & Joseph, 1996; Ehlers & Clark, 2000; Foa & Kozak, 1986). These models converge on the view that intrusive images or memories and flashbacks arise from the relatively automatic activation of mnemonic material related to the trauma (e.g., Brewin et al.'s, 1996, "situationally accessible memories," similar to Conway and Pleydell-Pearce's "direct retrieval"). This direct activation of ESK interrupts concurrent processing and results in a number of strategies to exercise top-down control to attempt to avoid such high-risk situations and memories.

For instance, when retrieving even relatively neutral events, someone who has experienced a traumatic event may discover that ESK brings about negative affect. For instance, consider the following protocol from a patient in response to the cue *summer*. She was thinking back of summer holidays and found "hot summer evenings" coming to mind. Further specifying on this theme, she began to retrieve a specific summer evening when, although already after 10:00 p.m., the temperature was still agreeable, and she was sitting outside with friends talking about the new puppy she had bought. Subsequently, however, this triggered another memory from that same summer when she was assaulted when walking the dog in the neighborhood park. From a learning perspective, the very act of specifying memories from the general event descriptions level to the level of ESK was followed by a negative consequence. This contingency then becomes the basis for passive avoidance. Next time, when thinking about warm summer evenings, the person will more likely choose to remain at the level of the general description.

We suggest that the association between negative affect and specific retrieval can develop into the passive avoidance of aversive ESK—avoidance of the sensory and perceptual fragments of an event that, if activated, might produce large and catastrophic increases in mood disturbance. A strategy of truncating the search before accessing such specific representations will, if it avoids such aversive consequences, be negatively reinforced. The result is cognitive avoidance: the dysfacilitation of a cognitive process that is expected to lead, if not truncated, to aversive consequences. We suggest that dysfacilitation as an avoidant coping style is a process that is shaped by contingencies and takes some time to develop. For some persons it might remain a flexible and helpful strategy in warding off negative emotions, whereas for others it might develop into an inflexible and habitual response pattern (Raes, Hermans, Williams, & Eelen, 2006). Although it is possible that this functional memory strategy is governed by consciously controlled processes, we do not exclude the possibility that it is a response that is shaped without the involvement of conscious monitoring. In the next section, we review data that support the view that truncated search is a functional process, based on principles of passive avoidance.

Correlational evidence for this view stems from a number of studies that have included the Impact of Event Scale (IES; Horowitz, Wilner, & Alvarez, 1979). The IES is a 15-item questionnaire with two subscales that assess two stress reactions that are commonly associated with PTSD: the amount of intrusions (7 items) and avoidance (8 items). A number of studies have revealed a significant correlation between IES avoidance and autobiographical memory responses: The higher the score on the avoidance scale is, the more overgeneral is the participant (e.g., Kuyken & Brewin, 1995; Raes, Hermans, Williams, Brunfaut, et al., 2006; Stokes et al., 2004; Wessel et al., 2002). Brewin et al. (1999) failed to replicate this correlation with avoidance. Although many of the depressed patients in their study had encountered stressful events, it is unclear whether this group was characterized by a particular history of trauma or other adversities.

In a more direct test of the relation between overgeneral memory and avoidance, Hermans, Defranc, Raes, Williams, and Eelen (2005) suggested that if individuals retrieve memories in a less specific way to avoid negative memories, one might predict that these nonspecific individuals will—in general, and as compared with more specific persons—also rely more on an avoidant style in dealing with thoughts, feelings, problems, and situations. In other words, individuals with a less specific retrieval style are expected to engage in more avoidant behavior in general. This is exactly what was observed. The less specific the participant was, the higher were the scores on a range of avoidance questionnaires. This was demonstrated for a variety of coping behaviors, ranging from social behavioral avoidance (Cognitive Behavioural Avoidance Scale; Ottenbreit & Dobson, 2004) and experiential avoidance (Acceptance and Action Questionnaire; Hayes et al., in press) to thought suppression (White Bear Suppression Inventory; Wegner & Zanakos, 1994). Together with the data from the IES, these results are consistent with the assumption that overgeneral auto-

biographical memory might be used as a way of regulating affect through passive avoidance (Hermans et al., 2005).

Until recently, however, there was no independent *experimental* evidence that suggested that a functional affect regulating mechanism might explain the overgeneral memory phenomenon. At a minimum, any such functional avoidance theory requires that, at some point, a person who tends to retrieve memory more specifically would risk experiencing greater affective disturbance. Otherwise, there is no motivation for the negative reinforcement of a less specific retrieval style. Raes, Hermans, de Decker, Eelen, and Williams (2003) showed just such evidence. They found that degree of mood disturbance following experimental manipulation of frustration using a tangram puzzle task (in which the participants—student volunteers—thought they were doing badly) was greater in those participants with a more specific retrieval style. These results illustrate the possible payoff for people with a less specific retrieval style: They are less emotionally aroused by a negative personal experience. As such, these results are consistent with a functional avoidance perspective on reduced specificity of autobiographical memory.

Raes, Hermans, Williams, and Eelen (2006) replicated these results and additionally showed that participants who were low in specificity tended to be high repressors (defined as a combination of low trait anxiety and high defensiveness on the Marlowe–Crowne Social Desirability Scales; Crowne & Marlowe, 1964). Even when repression scores were covaried, however, specificity of memory still predicted the affective reaction to failure on a puzzle task.

What Are the Limitations of the Functional Avoidance Model?

A clear pattern has emerged, showing that various types of trauma are associated with a reduction in specificity of autobiographical memory, making the functional avoidance account of overgeneral memory a plausible one. Nevertheless, some critical examination of such a functional avoidance perspective on reduced specificity of autobiographical memory is warranted.

Are there data that contradict the functional avoidance hypothesis? One possible issue is the pattern of valence effects. If overgeneral memory arises from a "stop" rule introduced at a point in the retrieval search where fragments of unpleasant memories begin to be accessed, then we might expect that such overgenerality would be more likely to be shown in response to negative cues than positive cues. This does not occur. Whereas the data summarized in Tables 1 and 2 confirm the general phenomenon in depressed and traumatized groups, studies have found mixed evidence with regard to whether specificity varies with the valence of the cue word. In fact, early studies found that overgenerality was more likely to occur for *positive* memories. However, this valence effect has not been consistently demonstrated in later studies, and a meta-analysis of 14 studies concluded that such patients are overgeneral in their memories following both positive and negative cues, with overgenerality for positive and negative memories being highly intercorrelated (van Vreeswijk & de Wilde, 2004). We are now able to examine the more extended list of studies in Table 1. Out of the 30 studies reported, the majority (18) reported a main effect for the difference between depressed and control participants. Of the studies that also reported a significant interaction between group and cue valence, 8 out of 9 found that *positive* cues elicited more overgeneral memories (Dalgleish et al., 2001; Moffitt et al., 1994; Moore et al., 1988; Park et al., 2002; Puffet, Jehin-Marchot, Timsit-Berthier, & Timsit, 1991; Williams & Broadbent, 1986; Williams & Dritschel, 1988; Williams & Scott, 1988), with only one finding this effect more for negative cues (Mansell & Lam, 2004). Overall, the studies that reported sufficient data to compute effect sizes for different cue-valence conditions show that differences between depressed and control participants in overgenerality to positive cues yield an effect size of 0.91, whereas that for negative cues is 0.48.

A similar pattern emerges when we examine the Table 2 studies, in which participants' actual or reported history of trauma has been recorded and where a functional avoidance model would be most likely to predict overgenerality to negative cues. Of the 12 studies in Table 2, only 2 reported that overgenerality in response to negative cues was associated with trauma (Dalgleish et al., 2003; Peeters et al., 2002), 9 reported that trauma history is associated with both valences, and 1 reported that negative cues elicited more *specific* memories (Burnside et al., 2004). The only difference between the pattern of these studies and those for depression is that none of the trauma studies shows significantly increased overgenerality for positive cues, though the mean effect sizes for those studies of trauma that give sufficient information to compute them were 0.97 for positive and 0.82 for negative cues. However, the predominant finding for both domains (depression and trauma) is that overgenerality is found for both positive and negative cues. To what extent does this pattern of data raise difficulties for any model that explains nonspecificity in terms of truncated search (dysfacilitation) due to functional avoidance alone?

In fact, valence effects may not challenge a functional avoidance model as much as it first appears. This is because positive words might just as easily trigger negative memory fragments that then need to be inhibited. Cue word valence does not necessarily mirror the valence of the memories elicited. As in our earlier example, the positive cue word *summer* elicited very specific traumatic memories. As a matter of fact, for many emotionally disturbed patients, negative memories are often the result of emotionally discrepant cues (e.g., *happy*, *relaxed*). We suggest that an effective avoidance strategy can never be selective. Given that the associative pathways of human memory are often rather unpredictable, overgeneral memory as an avoidance strategy can be successful only if it is applied not just with respect to the traumatic (or, more broadly, negative) memories but to memory in general. If a person does not want to remember the assault that he or she experienced when visiting an uncle in the summer of 1969, then it does not help to be overgeneral only for cues like *trauma* or *rape*. Even positive or neutral words, like *holiday* or *journey*, might lead to these specific painful memories. In a sense, this is true for all forms of avoidance. For instance, if a socially anxious person wants to be sure not to be confronted with unpleasant social situations, there will be a need to avoid all social interactions, including those that seem inherently pleasant, like parties and other festivities. If one does not want to be confronted with painful social situations, one has to avoid them all. We suggest that the same may hold for painful specific memories: If one wants to be sure not to encounter painful episodic memories about the past, one has to be nonspecific for all memories.

A similar conclusion has been reached by researchers in the field of repression. For example, Blagov and Singer (2004) found a correlation between repressive defensiveness (as measured by the Weinberger Adjustment Inventory—Short Form) and memory specificity, with higher defensiveness being associated with fewer specific memories recalled. However, higher defensiveness did not interact with valence of the memory: It was not related to the number or specificity of positive or negative memories recalled. It also was not related to the content of the memories. Consistent with the current model, Blagov and Singer suggested that repression may be about an initial preemptive screening to avoid any type of specific material—good or bad—as this is the most effective blanket kind of defense. Material that gets through the screen, according to Blagov and Singer, may be sanitized of its emotional power and immediacy, despite its putative valence and content.

Why, then, do some studies show greater overgenerality to positive cues? One possibility is that this is simply a mood-congruence effect. It is known that depressed mood reduces the availability of positive mnemonic material (Eich, 1995; Williams, Watts, MacLeod, & Mathews, 1997), and this may reduce the material that is available to elaborate the search cues if patients are tested while in a dysphoric mood.[7] If this were the case, then if patients are tested when *recovered*, we should see a reversal in the positive–negative pattern of overgenerality. Only three studies have examined patients in remission and compared them with healthy controls (Mackinger, Loschin, & Leibetseder, 2000; Mackinger, Pachinger, et al., 2000; Williams & Dritschel, 1988). In each case, ex-patients remained more overgeneral overall, but in each study, responses to positive cues were relatively less overgeneral than responses to negative cues (effect sizes of 0.63 vs. 1.21, 0.72 vs. 1.38, and 0.75 vs. 1.10 for positive vs. negative cues, respectively), as predicted by a mood-congruence hypothesis.

We have seen that whereas the findings that overgenerality is shown in response to both positive and negative cues might seem to present a problem for a functional avoidance account, the inherent ambivalence of cues and mood congruence could together explain the pattern of data. There is, however, another reason why some cues may elicit overgeneral memories in some individuals: the fact that the cue represents a current concern that gives rise to rumination. Because there is a large amount of evidence that rumination is a core feature of depression (Nolen-Hoeksema, 1991), it is important to consider how it may affect overgenerality. It is to this aspect that we now turn.

The "Capture" of Retrieval by Abstract–Conceptual (Ruminative) Structures

Conway and Pleydell-Pearce's (2000) self-memory model is consistent with multiple-memory models (such as Johnson's Multiple Entry Modular Memory System; Johnson, 1992), in which memory can have both semantic and perceptual representations. Further, it assumes that early stages of retrieval use more conceptual processing: Many of the intermediate descriptions that are used to aid retrieval in autobiographical memory are conceptually based self-representations, including personal semantic memories (names of friends, teachers, ex-colleagues, etc.; Dritschel, Williams, Baddeley, & Nimmo-Smith, 1992), self-referential attributes, and/or abstracted representations of generic aspects of the self and experience (Conway et al., 2004). There is some evidence to suggest that this predominance of conceptual self-relevant information in the early stages of memory search may lead to difficulties with the retrieval of specific memories in two circumstances: first, in individuals who possess highly activated or elaborated repertoires of emotion-related self-representations, and second, in individuals prone to rumination (repetitive and passive thinking about one's symptoms of depression and the possible causes and consequences of these symptoms; Nolen-Hoeksema, 1991). We examine each of these groups in turn.

Individuals suffering from depression represent a group in whom emotion-related conceptual self-representations are highly active. These representations can be regarded as similar to the "negative self-schemas" described by traditional cognitive therapy models of depression (e.g., Beck et al., 1979; see Segal, 1988). Because cue words on the AMT are often emotional words, they may be more likely to activate conceptual, abstract information in individuals who are depressed and for whom negative self-representations are already in a state of heightened accessibility. Rather than aiding the memory search process, this may result in individuals' becoming "captured," resulting in difficulties in progressing to the retrieval of specific autobiographical memories. Consistent with this, Singer and Moffitt (1992) found, in a study of autobiographical memory in students, that a request for personally significant memories relevant to one's self-understanding increased the number of summary (i.e., overgeneral) memory narratives retrieved, relative to standard instructions.

Over time the tendency to be "captured" may increase further as a result of *mnemonic interlock* (Williams, 1996). Mnemonic interlock refers to the suggestion that if early truncation of the search process at the intermediate description level is followed by further abortive attempts at retrieval, the conceptual network of intermediate descriptions will become increasingly elaborated. The result may be that in future attempts at retrieval, initial cues become more and more likely to activate intermediate descriptions, which then simply activate other intermediate descriptions, rather than sensory–perceptual episodic detail. Seen from a multicomponent memory perspective, if people rehearse events in more semantic ways, the semantic representations will be strengthened and make that representation more likely to be retrieved than the perceptual representation. This may be exacerbated in the context of inefficient cognitive control (Hertel, 2004) or diminished capacity (discussed later) and may result in individuals' finding themselves moving across rather than down the memory hierarchy.

Recent data support the operation of such mnemonic interlock. Barnhofer and colleagues examined the sequence of retrieval elements during generative retrieval in response to a cue word. They

[7] Although most experiments focusing on overgenerality in memory do not report latencies, as these are confounded with the time taken by the experimenter in prompting participants whose first response is nonspecific, early studies did examine latency to each successive response. Williams and Broadbent (1986) found that suicidal depressed participants showed a latency bias (being slower to respond with a specific event to positive cues), even following a prompt. Some nondepressed control participants gave an overgeneral memory as their first response but were able to access a specific memory after prompting in around half the time that it took suicidal patients after similar prompting (10.8 s vs. 19.1 s). This suggests that positive retrieval for such patients is more difficult at each stage of the retrieval process.

found that depressed patients show an increased transitional probability of retrieving a second intermediate description following retrieval of a first intermediate description, relative to matched nondepressed controls (Barnhofer, Jong-Meyer, Kleinpass, & Nikesch, 2002). The proposal, therefore, is that for depressed individuals, accessible self-related conceptual knowledge is more likely to form the basis of responses to memory cues. Instead of continuing to search for appropriate sensory–perceptual details, depressed individuals are more likely to mistakenly retrieve self-related conceptual knowledge (which is highly accessible; Conway & Bekerian, 1987) as a memory response on the task, leading to an increased proportion of categorical responses associated with depression.

Capture errors are particularly likely to occur in those individuals who are prone to rumination, which is linguistic in nature. Experimental evidence for a link between overgeneral memory and rumination comes from a series of studies by Watkins and Teasdale (Watkins & Teasdale, 2001, 2004; Watkins et al., 2000). In these experiments, ruminative thinking was either experimentally exacerbated or reduced, using standard manipulations (Lyubomirsky & Nolen-Hoeksema, 1995). The rumination manipulation involved both abstract, analytical thinking about causes, meanings, and implications and increased self-focused attention (e.g., "Think about why you feel the way you do"). The distraction manipulation increased concrete sensory–perceptual processing by asking participants to focus on non-self-focused images (e.g., "Think about the face of the Mona Lisa," "a raindrop falling down a window pane"). Results in depressed patients showed that memory was significantly more specific following distraction than following rumination.

In two further experiments, the authors examined whether it was the elevated abstract, analytical processing component or the elevated self-focus component of rumination that maintained overgenerality in memory. In a study with individuals with major depression, Watkins and Teasdale (2001) compared several different types of induction: abstract (ruminative) self-focus (e.g., "Think about why you feel the way you do"), nonabstract (experiential) self-focus (e.g., "Focus your attention on your experience of the way you feel inside"), abstract non-self-focus (e.g., philosophical items like "Think about what equality means"), and nonabstract non-self-focus (e.g., "Think about a raindrop falling down a window pane"). They found that degree of self-focus did not affect specificity of memory recall (but did influence degree of depressed mood), whereas degree of abstract–analytical thinking did influence memory specificity (but not mood), with the two more sensory–perceptual conditions decreasing overgenerality in a subsequent cue-word AMT. This was the first study to suggest that overgenerality is related to an abstract–analytical style of thinking and that it is reduced by switching attentional focus to more sensory–perceptual experience. The effect of degree of abstract thinking on specificity of memory was replicated and extended in a second study, which used experiential and analytical inductions that focused on identical self-related content and differed only in the instructions about how to process this content (e.g., for analytical, "Think about the causes, meanings, and consequences of . . . "; for experiential, "Focus your attention on your experience of . . . "; Watkins & Teasdale, 2004). Thus, it appears, at least for depressed patients, that more abstract–analytical thinking increases the likelihood of overgenerality of memory.

In this section we have discussed different routes to capture errors during autobiographical memory retrieval. Can the capture phenomenon be more closely defined? If capture by self-related information does operate in memory retrieval, we should predict that the more any cue used in an autobiographical memory task maps onto abstract self-related concerns, the more the cue will tend to elicit an overgeneral response. A recently completed study on previously depressed people in our lab confirms this prediction (Crane, Barnhofer, & Williams, in press). We assessed self-guides (characteristics that the person sees as an "ideal" or "ought" or "feared" aspect of themselves; Carver, Lawrence, & Scheier, 1999) 1 week before autobiographical memory was measured and found that the greater the overlap between memory cues and their own idiosyncratic self-guides, the more overgeneral participants were in their responses to those cues. Two other studies are also consistent with the relation between overgenerality and self-relevance. First, Spinhoven, Bockting, Kremers, Schene, and Williams (in press) showed that the more that patients with a history of depression (Study 1) and personality disorder (Study 2) endorsed constructs assessed by questionnaire measures of dysfunctional attitudes and beliefs, the greater was the overgenerality of responses to cues in the AMT that matched those constructs. Second, Barnard, Watkins, and Ramponi (2006) showed that inducing normal participants to repeatedly return to the same higher order theme during a category generation task increased overgeneral memory, relative to inducing category generation that shifts across themes, but that this effect occurred only for self-related themes. Thus, one aspect of rumination, perseveration on a theme, can induce overgeneral memory, but only when it is self-related.

Overgeneral Memory as a Consequence of Reduced Executive Resources

We turn now to the third mechanism that may contribute to overgeneral memory alongside functional avoidance and capture/rumination: reduced executive resources. Conway and Pleydell-Pearce's (2000) model assumes that generative retrieval (as with all effortful cognitive tasks) requires the use of limited executive resources. The model suggests that capacity deficits may affect several stages of generative retrieval, including the definition and holding in working memory of a retrieval model, the control processes that inhibit irrelevant autobiographical knowledge during the search (thus avoiding capture errors, addressed in the previous section), and the holding in working memory of a final search result, all of which are thought to rely strongly on executive processing.

This analysis of the potential impact of reduced executive capacity on generative retrieval in Conway and Pleydell-Pearce's (2000) model echoes the sorts of arguments proposed in cognitive resource models of depression. Ellis (e.g., Ellis & Ashbrook, 1988), in his resource allocation model of cognitive processing in depression, proposed that the profile of cognitive performance in depressed individuals could be broadly explained by the notion of reduced executive resources.

Hertel (e.g., Hertel & Hardin, 1990) expanded on this resource allocation model view and proposed that depressed individuals lacked initiative when performing cognitive tasks, such that performance deficits could be overcome by providing the depressed individuals with information about the optimal way to complete a given task. Generative retrieval of autobiographical memories

within the Conway and Pleydell-Pearce (2000) model requires the establishment of intermediate search descriptions to appropriately map the memory space to be searched. Lack of cognitive initiative is therefore likely to impede this process. Finally, Zacks and Hasher (1994) proposed that depressed individuals have difficulties inhibiting interfering cognitive material when seeking to perform cognitive tasks. With the Conway and Pleydell-Pearce framework, it is easy to see how this would lead to vulnerabilities during generative retrieval, which requires appropriate inhibition of mnemonic material from other stages of the memory hierarchy while a suitable specific memory is located. Deficits in this ability to inhibit interfering information may contribute significantly to the capture errors discussed in the previous section.

The idea that these various aspects of executive processes can contribute to the emergence of overgeneral retrieval within the framework of Conway and Pleydell-Pearce's (2000) model is therefore intuitively appealing, and numerous data are consistent with this account. Studies of young children show that the ability to retrieve and report specific memories in a coherent narrative occurs with the development of supervisory control processes during the age of 3 to 4 years (Fivush & Nelson, 2004), and research in elderly groups and groups suffering from brain damage (Baddeley & Wilson, 1986) has provided evidence that this ability is impaired by reduced working memory capacity. For example, Winthorpe and Rabbitt (1988) found that elderly patients who showed reduced working memory performance in a sentence span task were more likely to be overgeneral in their recall of events from their lives. Similar findings have been reported in a study in normal controls, in which Williams and Dritschel (1992) found a negative association between performance in a word fluency task and retrieval of overgeneral memories.

In a related vein, data from studies by Roberts and colleagues showed that in dysphoric participants, overgeneral memories were produced more often during the latter half of the test administration, thus suggesting that these errors may in part be related to difficulties in keeping in mind a retrieval model in the face of increasing fatigue with associated diminution of executive resources (Roberts & Carlos, 2006). Ramponi et al. (2004) found that greater overgenerality in autobiographical recall was shown by participants who showed reduced "remember" recognition responses in a remember–know memory paradigm but that overgenerality did not correlate with "know" recognition responses.

Given that generative retrieval of autobiographical memories relies heavily on effortful processes, these results seem unsurprising. However, not all of the data are so clear cut. Two early studies that used tasks to control for executive capacity differences did not find significant effects on overgenerality. Williams and Broadbent (1986) gave two control semantic memory tests to their suicidal and control patients to check whether any deficit in autobiographical memory might be accounted for by general cognitive deficits. The first was a semantic fluency task in which participants generated as many instances (in 1 min each) of the categories *vegetables* and *boy's names* as they could. In the second task (later published as the Speed and Capacity of Language Processing Test; Baddeley, Emslie, & Nimmo-Smith, 1992), the time taken by participants to answer (true or false) to a series of 50 "silly sentences" was assessed (e.g., "Pork chops are meat," "Doctors are always sold in pairs"). The results showed that overgeneral memory was not simply due to an overall general deficit in semantic fluency or processing speed. Similar findings were reported by Williams and Scott (1988). In a third study, in which processing capacity was directly manipulated, Goddard, Dritschel, and Burton (1998) investigated autobiographical memory in normal volunteers under conditions of a secondary choice reaction-time task and found that the additional load increased categorical recall, but only in men and only when the secondary task was more difficult. What might explain these failures to find associations between executive processing and overgenerality?

Generative retrieval requires processing capacity for both the setting up of a retrieval model and its comparison with retrieved information; it also critically requires the *inhibition of irrelevant information* to protect against interference. Although reductions in processing capacities may affect all of these subprocesses, failures of inhibitory control are most pronounced. Evidence for this comes from a series of studies by Dalgleish et al. (in press). Dalgleish et al. argued that if a central problem in specific memory retrieval is a failure to inhibit interfering information leading to capture errors, as proposed by Hasher and Zacks (1979) and Zacks and Hasher (1994; see Feldman-Barrett, Tugade, & Engle, 2004, for a discussion), then numbers of overgeneral memories on the AMT should be most clearly associated with performance on executive tasks that also provide a measure of "errors" due to interference from irrelevant information that should have been inhibited. In a series of studies in dysphoric individuals, Dalgleish et al. demonstrated that this was indeed the case: Levels of memory overgenerality correlated highly with levels of task errors on a range of executive paradigms with little or no relationship to autobiography, memory, or emotion while, in most cases, being unrelated to overall performance levels on these tasks. In particular, they were able to show that overgeneral errors correlated with tasks in which irrelevant material needed to be inhibited (the Emotional Stroop Test) and not with a task that merely requires sufficient executive capacity overall (a test of explicit memory of equivalent difficulty).

These studies help to pinpoint the subprocesses within generative memory retrieval that might be most closely implicated in the phenomenon of overgeneral memory. However, it is important to note another reason for sometimes finding little association with executive function: that autobiographical events can also be recollected spontaneously. Such directly retrieved memories are more often specific in nature (Berntsen & Hall, 2004). One would therefore predict that the impact of any reduction in available executive resources on specific memory retrieval would be reduced or even absent in situations where there were significant levels of direct retrieval of specific memories. There are some data that support this prediction. Williams et al. (2006, Study 3) required participants to retrieve autobiographical memories while performing random button pressing as a secondary task, as generation of a random pattern has been suggested as a paradigmatic example of a task requiring high levels of central executive control (Baddeley, 1996). They found that this task did interfere with specific memory retrieval, but only when participants were attempting to recall memories to low imageable cues, which are more likely to require using generative (top-down) retrieval.

Because the impact of executive capacity deficits on specificity of recollection is likely to be, in part, a function of the balance of generative versus direct retrieval, future studies examining the effects of capacity impairments on retrieval will need to take

account of the method of retrieval participants are likely to be using when interpreting their findings.

Executive Resources, Capture/Rumination, and the Valence Effect

The data suggest that executive resources play an important role in the generative retrieval of specific autobiographical memories and that deficient resources reduce the amount of cognitive control that is possible. We can now see how the two processes we have outlined, capture/rumination and executive control, contribute to functional avoidance in accounting for the fact that overgenerality is as likely to occur for positive as for negative cues. Dysphoric and depressed people are as likely to have their attention captured by positive as by negative stimuli so long as the cue maps onto a "self-guide" (Crane et al., in press; Spinhoven et al., in press). In particular, rumination is often triggered by a discrepancy between actuality and a desired state or goal (Martin & Tesser, 1996). Within this framework, as we have seen, a positive cue word could signal to a depressed person the absence of a personally meaningful state and, in turn, activate further rumination. That is, if a depressed person sees the cue *happy*, it is just as likely to elicit self-referent ruminative thinking ("Why can't I handle things better?"; Treynor, Gonzalez, & Nolen-Hoeksema, 2003) as is a negative cue. Reduced executive control implies that an impaired ability to inhibit prepotent (self-referent, ruminative) responses will make it even more difficult for the individual to maintain focus on the goal of retrieving a specific event.

Integrating Across Different Components of Overgeneral Memory in Conway and Pleydell-Pearce's Model

We have seen that Conway and Pleydell-Pearce's (2000) theory of why autobiographical memory may be overgeneral, if confined to truncated search (dysfacilitation) due to avoidance of unpleasant ESK, will not explain all of the data. However, by taking account of other aspects of their model, one develops a more comprehensive account. Thus, categorical memory may represent truncated hierarchical search, exacerbated by capture by conceptual structures. These impairments are themselves compounded by reduced processing resources and by the continuing impact of early trauma and adversity on the self-memory system. It is now possible to see how these mechanisms interact to explain their impact on memory (see Figure 2).

First, overgenerality is most likely to occur when retrieval is top-down (generative). This is because such retrieval requires the formation of conceptual intermediate descriptors (similar in form to overgeneral memories), which facilitates memory search through the hierarchy. Any factor that truncates or disrupts the generative search process is therefore likely (in a significant proportion of cases) to lead toward inappropriate overgeneral responses. Second, generative retrieval involves effortful search that (a) uses conceptual self-related information (e.g., "What sort of thing makes me happy?") and (b) requires the inhibition of irrelevant information produced by the search process ("I've never been happy; people keep rejecting me"). Reduced executive capacity and diminished cognitive control will therefore compound a tendency to become captured by abstract conceptual self-representations and will diminish strategic task-oriented processing. Depressed individuals have increased access to conceptual self-relevant information (negative self-schemas such as "I am worthless and inadequate"; Segal, Williams, Teasdale, & Gemar, 1996), and rumination leads to chronic activation of such generalized mental representations ("Why do I have problems other people don't have?"; Nolen-Hoeksema, 1991). Inhibition of habitual, ruminative responses is even more difficult when there are highly elaborated conceptual representations of the self that are

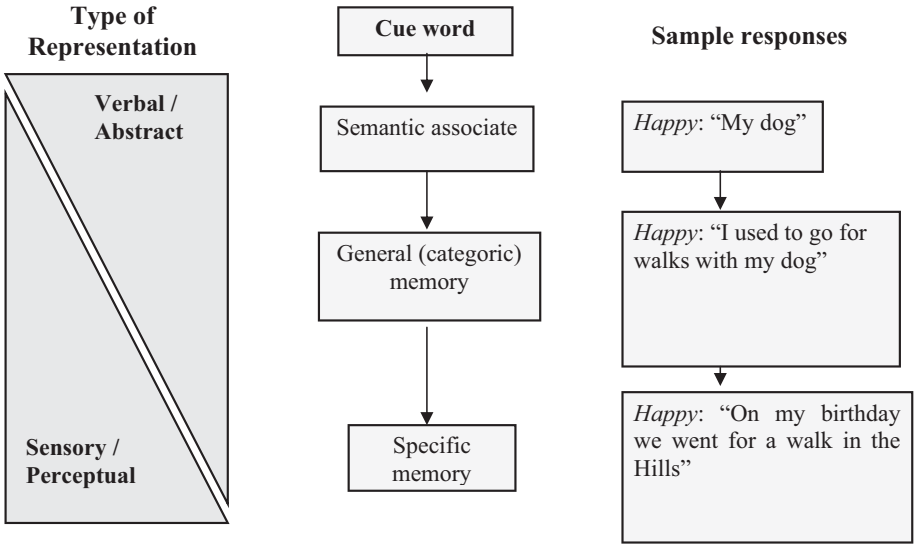

Figure 2. Hierarchical processes in generative retrieval. The figure shows schematically what is assumed to occur in cue word retrieval. Retrieval starts with elaborating the cue semantically and moving through generating generic descriptions to more specific mnemonic material. Early in generative retrieval, more verbal–abstract code is involved, and more sensory–perceptual code is used later in the process.

readily available and need to be accessed as the first stage of the memory search process. We have also seen that in addition to the difficulty in generative retrieval, some individuals (those who have experienced trauma such as road traffic accidents) are additionally likely to truncate the search process if episodic knowledge tends to evoke highly negative affect. In these cases, stopping short of episodic retrieval is functional (Raes et al., 2003) and is negatively reinforced by the nonoccurrence of expected aversive consequences. In addition, some trauma gives rise to a large number of long-lasting intrusions that reduce available resources for autobiographical memory search, thus further compounding the problem.

Each of the components of the CaR-FA-X account has evidence consistent with it. We have seen that categorical memory appears to represent truncated hierarchical search due to functional avoidance exacerbated by capture by conceptual structures. These impairments are themselves compounded by reduced processing resources and by the continuing impact of early trauma and adversity on the self-memory system. However, the processes we have reviewed rarely occur in isolation from each other. In the next sections we show how the processes we have described may combine in clinical groups. In particular, we show that trauma may affect (a) executive capacity, (b) the probability of capture errors, and (c) depression.

Trauma and Reduced Executive Capacity

We have so far discussed reductions in executive capacity predominantly as a function of depressed mood (Ellis & Ashbrook, 1988; Hertel & Hardin, 1990; Zacks & Hasher, 1994) or as due to the performance of secondary tasks (Williams et al., 2006). However, there are also data indicating impaired cognitive processing across a number of generic tasks in traumatized populations (e.g., Moradi, Taghavi, Neshat-Doost, Yule, & Dalgleish, 2000). This literature implies that the experience of trauma may also lead to overgeneral memories indirectly via reduced executive resources. This is perhaps unsurprising, given that traumatized individuals report frequent intrusive thoughts, images, nightmares, and flashbacks regarding their trauma as well as consequent attempts to prevent these experiences using a range of strategies, such as avoidance of trauma reminders (see Dalgleish, 2004). Both the overriding of ongoing processing by trauma-related intrusions and any effortful attempts to control such experiences are likely to lead to a diminution of executive resources to apply to other tasks.

Numerous data are consistent with this analysis. In their prototypical study of trauma and overgeneral memory, Kuyken and Brewin (1995) showed that self-reported frequency of intrusions of abuse correlated with overgenerality of recall on the AMT. This finding has since been replicated a number of times (as noted earlier). In summary, a history of trauma may lead to overgenerality not only because of passive avoidance of emotion-related ESK but because intrusion of traumatic information reduces available executive resources.

Trauma and Capture Errors

We have discussed how overgeneral memories may result from capture errors (which we have so far associated mostly with depressive states) and/or from passive avoidance of specific distressing information. Here we illustrate how the experience of trauma may lead the individual to become vulnerable to capture errors in three further ways.

First, the effects of trauma on reducing available executive resources (discussed above) will mean that it is more difficult to inhibit interfering cognitive information during the generative retrieval process, thus resulting in that information forming the basis of capture errors. Second, the experience of trauma is itself likely to lead to relatively accessible negative self-schemas (Dalgleish, 2004; Ehlers & Clark, 2000). Such schemas will also "capture" cognitive processing during generative retrieval in particular autobiographical domains, leading to overgeneral responses as capture errors. For example, an individual may react to uncontrollable persistence of posttraumatic stress symptoms such as intrusions, flashbacks, and nightmares with a schematic model of the self as "useless" or "crazy" because of the inability to simply "get over" the trauma (Ehlers & Clark, 2000). Third, trauma itself is associated with an increased tendency for individuals to ruminate about the upsetting event, in an attempt to make sense of what happened, to reconcile an event with their self-concept, or to avoid a recurrence of the event. Brief self-report measures of rumination about an identified traumatic event (e.g., "Do you go over and over what happened again and again?") are elevated in patients with PTSD compared with nonclinical controls (e.g., Spasojevic & Alloy, 2002). Furthermore, rumination several weeks after the trauma predicts the persistence of PTSD at 6 months (Murray, Ehlers, & Mayou, 2002), 1 year (Ehlers, Mayou, & Bryant, 1998), and 3-year follow-up (Mayou, Ehlers, & Bryant, 2002). In summary, capture errors may occur whenever information needed for the memory search matches information that is self-schematic. Whenever individuals then ruminate about what has happened to them, reduced capacity/control will reduce the ability to inhibit further task-irrelevant information.

Trauma and Depression

A final way in which the different processes underlying overgeneral memory may combine is that many of the different diagnoses (see Tables 1 and 2) co-occur. Comorbidity of depressive states along with diagnoses such as PTSD and acute stress disorder is very common (Brewin et al., 1996). Further, even in the absence of a comorbid depressive disorder, significant symptoms of depression are also associated with the experience of trauma (e.g., Nolen-Hoeksema & Morrow, 1991). These overlaps in symptomatology mean that another route to overgenerality of memory in trauma survivors is via depressed mood, with its consequent effects on capture errors and executive capacity.

In addition, there is an increasing body of evidence to suggest that depression is associated with intrusive and avoidance symptomatology regarding prior distressing life events (Dalgleish & Power, 2004), with studies revealing few differences between clinically depressed individuals and those with PTSD in terms of the nature of these symptoms (Reynolds & Brewin, 1998). This suggests that overgeneral memory may result from the fact that in individuals with depression, executive resources are tied up in dealing with intrusive memories of past distressing experiences and their implications. Consistent with this, our review has shown that overgeneral memory is not found in anxiety disorders (apart from PTSD). Anxious patients are, in general, concerned with possible future threats, most often physical harm to self or others

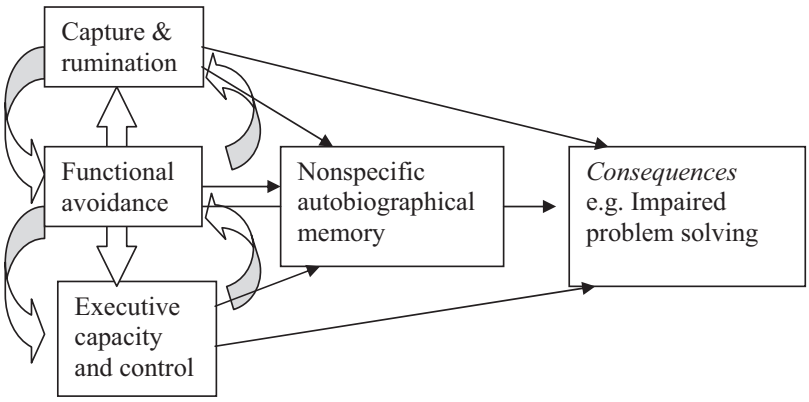

Figure 3. The CaR-FA-X model: Three processes contributing to overgeneral memory—capture and rumination (CaR), functional avoidance (FA), and impaired executive capacity and control (X)—can each have effects on cognition and behavior (e.g., problem solving), either independently or through their individual or combined effect on autobiographical memory.

from external sources or from imminent collapse or illness, rather than with self-referential implications of their past.

In summary, comorbidity between different diagnoses, as well as overlap in psychopathology across diagnoses, means that a one-to-one link between different types of mental disorder (e.g., major depression or PTSD) and different types of memory impairment is unlikely.

CaR-FA-X: Consequences for Psychological Functioning

In the light of these overlaps both in clinical phenomenology and in underlying mechanisms, we suggest that all three mechanisms are likely to contribute both to overgenerality in autobiographical memory and, independently, to those aspects of cognitive functioning that have been found to be affected by such overgenerality (problem solving, imagining the future, and persistence of emotional disturbance; see Figure 3). However, this raises the question of whether overgenerality in memory is part of the causal sequence in bringing about such consequences, as we have assumed, or is a mere epiphenomenon.

Problem Solving

We have seen that, consistent with the idea that accessing episodic detail of prior experiences may be crucial in generating and evaluating current problem-solving strategies, many studies have found that low specificity of memory is associated with impairment in social problem solving. This occurs in depressed (Goddard et al., 1996, 1997; Raes, Hermans, Williams, Demyttenaere, et al., 2005), suicidal (Evans et al., 1992; Pollock & Williams, 2001; Sidley, Whitaker, Calam, & Wells, 1997), and currently euthymic bipolar patients (Scott et al., 2000). These studies assessed interpersonal problem-solving ability using the Means–Ends Problem Solving Test (MEPS; Platt & Spivack, 1975), in which participants are presented with short vignettes including the beginning and ending of a problem situation (e.g., being avoided by friends and being liked by them again) and asked to describe the most effective way to solve the problem.[8] Responses are usually rated for the number of means reported (i.e., the number of single instrumental steps toward the goal), as well as for overall effectiveness. The above studies have found significant associations between memory specificity and both of these measures.

However, because these studies are correlational, it remains possible that both specificity of autobiographical memories and quality of problem-solving performance might be determined by third factors. For example, Watkins and Baracaia (2002) have found that rumination impairs problem solving in depression, and so the apparent effect of overgeneral memory on problem solving may be mediated by rumination. Two types of evidence can be sought to check the causal relevance of overgeneral memory. The first involves using regression methods in which both overgeneral memory and other possible mediators are examined for their ability to uniquely predict problem-solving impairments. Raes, Hermans, Williams, and Eelen (2005) used such methods in a sample of depressed patients, examining both memory and rumination, and found that overgeneral memory accounted for the relation between rumination and problem solving.

The second strategy for examining the causal status of memory specificity is to experimentally manipulate retrieval style in the laboratory. Williams et al. (2006, Studies 4 and 5) examined nondepressed undergraduates in which specific and categorical retrieval styles had been induced experimentally. In one study this was done by explicitly instructing participants to retrieve specific events or categorical events; in the second study it was accomplished by using cue words that were either low imageable (known to elicit overgeneral memories; Williams, Healy, & Ellis, 1999) or high imageable (known to elicit specific memories). After the

[8] One limitation of this methodology for examining problem solving is that it depends on participants' ability to report how they would solve problems, rather than observing what they would actually do. This raises questions about ecological validity, as well as raising a possible confound concerning improved specificity being associated with better ability to report what one would do. The relationship of memory specificity and real-world problem solving remains to be examined. Nonetheless, the MEPS is a well-established measure of social problem solving that reliably discriminates between groups that have been determined to differ in actual real-life problem solving (e.g., depressed patients vs. controls; Marx, Williams, & Claridge, 1992).

memory style induction, participants were given the MEPS test. Results showed that induction of overgeneral memory in the first phase of the experiment significantly reduced the level of problem-solving performance in the test phase. These findings do not exclude the critical importance of other processes, such as rumination, but they do suggest that lack of specificity in memory, however it comes about, can play a causal role in reducing problem-solving capacity.

Ability to Imagine Future Events

Williams et al. (1996) found that suicidal patients were generally poorer than controls at generating specific events that might happen to them in the future, and that this difficulty was correlated with overgenerality in memory. To examine direction of causation, they followed up their finding with two studies in which specific and categorical retrieval styles were experimentally induced (using both the instruction and imageability memory induction methods referred to earlier). Results showed that participants who were induced to be categorical in their retrieval for past events in the study phase of the experiment generated less specific future events during the test phase. Participants who were induced to be specific in their memory in the study phase produced more specific future events in the test phase. These data show that overgeneral memory can have a causal link to the ease with which a person generates specific future events. This is clearly important, as the ability to anticipate potential impending events and experiences is critical for the day-to-day planning of activities (Ajzen, 1998).

Overgenerality and the Development and Course of Affective Symptoms

Several prospective studies have examined whether overgeneral memory predicts how long an episode of depression or a posttraumatic stress reaction will persist (Brittlebank et al., 1993; Dalgleish et al., 2001; Gibbs & Rude, 2004; Harvey et al., 1998; Mackinger et al., 2003; Mackinger, Loschin, & Leibetseder, 2000; Mackinger, Pachinger, et al., 2000; Peeters et al., 2002). However, none of these studies assessed other likely mediators of the effect of overgenerality on the persistence of emotional disturbance, and so we cannot be sure from these studies alone that other factors (such as rumination) do not play a central role.

An alternative approach is to see whether modifying the tendency to be overgeneral *reduces* the persistence of emotional disorder. Serrano, Latorre, Gatz, and Rodriguez (2004) examined the impact of increasing the specificity of positive memories over a 4-week intervention in elderly depressed patients. The results showed that (a) the treatment significantly reduced overgenerality (particularly in response to neutral cues), (b) it significantly reduced hopelessness and depression (compared with a no-treatment control), and (c) the effect on mood was mediated by the increased specificity of memory. Taken together, these studies provide relatively strong evidence that overgeneral memory, along with other variables, is an important causal factor in maintaining depression and that modifying it may have beneficial consequences.

Future Research on Overgenerality and the CaR-FA-X Model

The account that emerges from examining overgenerality in autobiographical memory in the light of Conway and Pleydell-Pearce's (2000) model suggests a number of methodological issues to be addressed and hypotheses to be tested in further experiments. There are three streams of further work that are suggested by this review. The first stream is research that can address the methodological limitations that have been identified in relation to the assessment of memory; the second stream addresses etiological questions; the third stream examines new predictions arising from CaR-FA-X.

Methodological Issues

Addressing the overdependence on a single paradigm. We have seen that most studies use the cue word technique, and many use the same subset of words. Future studies need to diversify in the methodology used to assess overgenerality, using vignettes, pictures, and diaries to complement existing methods. In particular, research might seek ways to examine involuntary as well as voluntary processes in autobiographical recall as, for example, Schlagman and Kvavilashvili (2005) have begun to do. This would allow greater specification of the contexts in which we expect overgenerality to occur. For example, the processes described in the CaR-FA-X model, involving only top-down retrieval processes, would have little impact on involuntary memory, and so the model would predict no overgenerality in such memory responses, even in depressed patients.

Addressing the breadth of memory assessed. Most studies have used only an autobiographical memory task, in the absence of other tests of memory. This is understandable in clinical studies where the amount of time available for testing is limited, but future studies should increase the range of alternative memory measures used to see whether nonspecificity of memory is uniquely predictive of the dependent variable of interest. In particular, memory and other cognitive tests should be chosen to test specific hypotheses, for example, concerning the particular aspect of memory that might explain overgenerality (e.g., the assessment of source memory: Raes, Hermans, Williams, Demyttenaere, et al., 2006; or remember–know recognition tests: Ramponi et al., 2004). If future research were to use more specific, hypothesis-driven tests of memory functioning, it would make it possible to examine the association between different subcomponents of memory and other psychological variables. For example, no study has yet examined the relation between specificity of autobiographical memory, source memory, and individual difference in the detail with which people describe a visual scene. It is possible that some individuals are prone to describe only the gist of a scene and that this tendency pervades a number of aspects of their memory encoding and retrieval, which would then affect source memory, remember versus know judgments, and autobiographical memory specificity. The questions such a study would ask are these: Would the online description of a complex visual scene be more overgeneral in such patients? Would it vary depending on the affective valence of the material? Would it be more overgeneral if a patient had less executive capacity or was performing a secondary task?

Etiology

The second stream of future research would address the methodological challenges involved in addressing the etiological questions—for example, to what extent depression, trauma, or both are

involved in the development of overgeneral memory (Kuyken et al., 2006). We have seen that even those prospective studies that have shown overgenerality assessed prior to or shortly after a trauma to predict the later time course of emotional disturbance are unable to tell us whether this "preexisting" overgenerality was caused by an even earlier period of depression, trauma, or adversity. Nor do they generally assess a range of other possible mediators of later disorder (e.g., rumination or executive functioning) sufficient to check whether overgenerality uniquely predicts future course. Future studies should address both of these caveats by careful assessment of the history of depression, trauma, and adversity and/or by the deliberate recruitment of groups of participants with or without such a prior history. The range of variables assessed should include alternative possible mediators of the predicted effects, taking account of possible multicollinearity in the data.

Predictions From CaR-FA-X

The third stream of future research is to test new predictions arising from the CaR-FA-X model. A number of predictions might be tested: (a) that AMT cues selected to map onto an individual's core concerns or dysfunctional schema are more likely to elicit overgeneral memories in traumatized populations via capture errors similar to the effects seen in those with prior depression (Crane et al., in press; Spinhoven et al., in press); (b) that the effect of cue word type will be moderated by availability of executive resources (i.e., personally relevant cues are more likely to lead to overgeneral memory under conditions of cognitive load); (c) that individual differences in executive capacity, independent of psychopathology, are likely to relate to degree of overgeneral memory; (d) that overgeneral memory would be reduced or normalized in depressed individuals by providing them with a "search blueprint" for generative retrieval (e.g., first identify an appropriate lifetime period; then, within that period, identify a particular category of experiences; and then use that to locate ESK), in ways analogous to Hertel's approach with other cognitive tasks (e.g., Hertel & Hardin, 1990; cf. Hertel, 2004); (e) that manipulating cue word content on the AMT to increase the amount of direct retrieval should interact with the effects of executive resources such that differences in available resources become increasingly irrelevant with greater levels of direct retrieval; or (f) that overgeneral memory should shift in response to interventions that reduce the accessibility of negative self-schemas, break ruminative processing cycles, and/or train individuals in executive control of cognitive processing.

Concluding Remarks

The foregoing review has suggested that individuals with depression and PTSD retrieve overgeneral memories when attempting to retrieve memories of specific events. This phenomenon is a reliable feature of these diagnostic groups and can be found in other (though not all) emotional disorders. The phenomenon of overgeneral memory ranks alongside other memory deficits known for many years to be associated with depression but goes beyond these in several ways.

First, overgeneral memory is a hitherto unrecognized consequence of trauma and adversity, even in the absence of depression. The significance of this is that negative experiences or trauma in the past can have effects on the retrieval of events that have nothing to do with the trauma itself, owing to a general tendency to truncate memory search. We have seen that these effects can be reversed given certain retrieval conditions and therefore cannot be explained in terms of permanent damage to the processes underlying encoding. Given that generic retrieval is a normal part of development, and its retention as one possible mode of retrieval is required as part of normal memory function (e.g., as an intermediate stage in the recollection of specific episodes and as the target of retrieval for scriptlike situations), it is more likely that individuals discover that overgeneral memory is adaptive in gating out unwanted affect. Such functional avoidance is central to understanding the mechanisms underlying overgenerality in memory.

Second, however, we have seen that a functional avoidance theory is not sufficient to explain all of the data. We have suggested that the memory impairment may also result from capture and rumination. Overgeneral memory can be seen as a type of capture error arising because of the activation, by the intermediate descriptions that are required for voluntary retrieval, of task-irrelevant material in the self-memory system. Patients with depression and PTSD are particularly vulnerable to this interruption of on-task processing owing to a combination of the presence of salient (and more distracting) self-referent information, on the one hand, and a tendency to ruminate, on the other.

Third, each of these two factors, avoidance and capture/rumination, interacts with impairment in a third major mechanism underlying memory retrieval: executive control. Reduced executive control results in a failure to inhibit competing information. The result is a greater likelihood of retrieval being "hijacked" by task-irrelevant material.

Fourth, in whomever it is found, overgeneral memory is associated with, and has been found in some cases to have a direct causal relation to, important "downstream" consequences. The research shows that overgeneral memory is an important factor in affecting a person's problem-solving ability and his or her ability to generate specific images of the future. It predicts the course of emotional disorders, being associated with poorer outcome in depression, PTSD, and a number of other conditions. But it affects not only how effectively people cope with serious emotional disturbance but also how they regulate their emotions in the face of more normal life events, such as the birth of a child (Mackinger, Loschin, & Leibetseder, 2000).

We have seen that there are a number of methodological issues that limit the conclusions that can be made from many of the studies taken individually. But across the studies as a whole, a consistent picture emerges: that the *way* one remembers one's past is as important as *what* is remembered; that the specificity of memory can be affected by and can affect a number of psychological variables; that it is part of the causal sequence in facilitating or impairing important aspects of psychological functioning such as problem solving and one's ability to imagine the future; that it can be modified by treatment; and that, when it is modified, it reduces depression and hopelessness.

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