COMPARING TENDENCY TO RECALL DISTANT MEMORIES TO RUMINATION AND AVOIDANCE AS A CAUSE FOR OVERGENERAL MEMORY

By

David Falco

American University

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Chair: Z. Peynircioglu

Zehra F. Peynircioğlu, Ph.D.

Scott Parker

Nathaniel Herr, Ph.D.

Dean of the College of Arts and Sciences

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ABSTRACT

Overgeneral memory (OGM) can be defined as the tendency to recall categorical or general memories when asked to recall a specific episode. OGM is found in a variety of clinical populations but of most interest has been its relation to depression. The current leading theory on the cause of OGM is the CARFAX model (Williams, 2006). According to the model OGM is caused by a combination of three factors, rumination, avoidance, and executive control. However, one additional factor not included in the CARFAX model, the tendency to recall remote memories, has recently been shown to be a mediator of the relationship between depression and OGM.

The purpose of this study was to compare this alternate factor, the tendency to recall remote memories, to both rumination and avoidance, two factors currently present in the CARFAX model. We investigated this by measuring the participants' level of rumination, avoidance, and tendency to recall remote memories and looked at their correlations to depression and OGM. Further, we looked at how rumination and avoidance correlated with the tendency to recall remote memories in the attempt to establish the tendency to recall remote memories as an independent factor. We found that the tendency to recall remote memories was a stronger predictor of OGM than either rumination or avoidance. In addition, the tendency to recall remote memories was correlated with neither rumination nor avoidance. This study provided evidence that CARFAX model in its current state is unable to account for the relationship between

depression and OGM. Implications for how the CARFAX model may be revised to account for this current research are discussed.

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CHAPTER 1

INTRODUCTION

Overgeneral Memory

Overgeneral memory (OGM) is a memory deficit found in several clinical populations including individuals with depression. It is defined as a tendency to recall memories in a categorical and general fashion even when requested to come up with a specific memory (Tamlyn, McKenna, Mortimer, Lund, Hammond, & Baddeley, 1992; Williams 1984, 1996; Williams & Broadbent, 1986; Winthorpe & Rabbitt, 1988). For example, when asked to come up with a specific memory for the cue word "happy" someone with OGM might say something categorical such as "every afternoon I eat lunch in the courtyard" or general such as "I like lunch." Someone without this memory deficit would instead give a specific memory such as "last Thursday I had pizza for lunch." OGM is typically assessed using the Autobiographical Memory Test (AMT) developed by Williams and Broadbent (1986). In this test the participant tries to recall a specific memory in one minute, or in more recent uses, 30 seconds, in response to pleasant and unpleasant cue words. While there is no concrete threshold for diagnosis, populations with OGM typically recall specific memories to 80-90 percent of the cue words, while control groups tend to recall specific memories for nearly 100 percent of the cue words (Williams, 2007). Although OGM has been found with a variety of clinical populations, the main focus has been on individuals with depression. Indeed, OGM symptoms have been shown to extend across all different severities of depression from inpatients to dysphoric college student (Goddard, Dritschel, and Burton, 1997; Williams, 2007).

What makes the study of OGM particularly important to depression research is that OGM has been found to remain even after other depression symptoms subside. In one study, Brittlebank, Scott, Williams, and Ferrier (1993) found that low memory specificity persisted after seven months of therapy that managed to alleviate all other symptoms of depression. Not only did they find that OGM remained after therapy, but they found that their patient's level of OGM before therapy predicted how effective the therapy would be. The patients who recalled fewer specific memories on the AMT at the beginning of the treatment were more likely to remain depressed after their seven-month therapy session. Similar follow up studies have found that individuals who are not depressed have a greater risk of falling into depression if they have OGM. (Anderson, Goddard, & Powell, 2010; Sumner, Griffith, Mineka, Rekart, Zinberg, & Craske, 2011; Van Minnen, Wessel, Verhaak, & Smeenk, 2005). These studies have led some researchers to see OGM as not just a symptom, but also a marker of depression.

On a theoretical level, perhaps OGM can best be described through Conway's self-memory system (Conway & Pleydell-Pearce, 2000; Williams, 2007). According to Conway, memory is organized in a hierarchical structure. The highest level consists of organizations with respect to time periods in one's life. This could be something like the years spent in college, the time spent at a particular job, or a period of life lived in the same town or house. These time periods are then broken up into extended events, which form the second level of the hierarchy. These extended events could be such instances as a certain vacation or a sports game. Within these extended events is the lowest form of the hierarchy, the specific events. These are single moments in one's memory which are unable to be further condensed. An example of these single momentary actions is a single at bat or the first reaction when receiving a test score. In order for someone to recall a specific memory they first have to go through the first two levels of the

hierarchy. Support for this type of a hierarchical organization of autobiographical memories has been shown in numerous studies (Williams, 1996; Williams, 2006; Williams, 2007).

The current leading theory on the cause of OGM is the CARFAX model (Williams, 2006). According to the model, OGM is a result of an inability to go from the second level of the hierarchy, general events, to the bottom level, specific memories. This inability is caused by a combination of three factors; capture and rumination, functional avoidance, and executive functioning. According to the theory, because of capture and rumination, when someone is given a cue word their rumination tendencies might cause that cue word to activate a string of concerns instead of one general event. This in turn would cause the person to stop at the second level of the hierarchy because general events would only cue further categorical concerns. In addition, the person might *avoid* the bottom level of the hierarchy for fear that specific memories would cause psychological distress. Finally, a person with a disorder such as depression would show deficits in executive function, such as deficits in functional working memory and a lack of cognitive resources. Because of these deficits, the person may not have the cognitive resources needed to inhibit these processes of rumination and avoidance.

In this paper I will focus on the rumination and avoidance factors that are proposed to contribute to OGM, and compare them directly to another factor that we have proposed recently (Falco, Peynircioglu, & Hohman, submitted for publication). Our proposal was based on our findings that depressed individuals show a tendency to recall more remote memories, meaning memories from further back in time, than nondepressed individuals. The implication was that because it is more difficult to recall a specific memory from further back in time for anyone, OGM was an artifact of this tendency for populations with OGM to focus on more remote memories, which in turn mediated the typical observations of greater likelihood of general and

categorical recall. Thus, in relation to depression and OGM, perhaps of more interest is to be able to explain why this tendency arises in the first place. This is beyond the scope of the present paper, however, and the purpose here is to explore remoteness of memories as a true contributing factor to OGM at least on a par with rumination and avoidance.

Functional Avoidance

The functional avoidance factor is defined as the tendency for depressed individuals to avoid reminiscing on specific episodes or specific aspects of what are perceived as painful. Eventually this tendency develops into a style of thinking that encourages more categorical and general memory recall even when pleasant memories are cued (Herman, de Decker, Peuter, Raes, Eelen, & Williams, 2007; Raes, Hermans, de Decker, Eeelen, & Williams, 2003; Willams, 1996, 2006).

There is an extensive body of research on functional avoidance, some supporting it and others not. One line of support has come from linking avoidant and repressive style coping to OGM. (Hermans, Defranc, Raes, Williams, Eelen, 2005; Geraerts, Dritschel, Kreplin, Miyagawa, and Waddington, 2011). For instance, a study by Hermans et al. (2005) measured the relationship between OGM and avoidance as measured by the White Bear Suppression Inventory, the Cognitive Behavioral Avoidance Scale, and the Acceptance and Avoidance Questionnaire. All three measures were shown to be correlated with scores on the AMT, indicating a relationship with OGM. These results were also replicated in a study by Geraerts et al. (2011). However, neither of these studies tested or controlled for depression itself which might have caused the relationship between OGM and avoidance to appear because of its relation

to both factors. A follow up study where depression was controlled for found that the relationship between OGM and avoidance was no longer significant (Spinhoven et al., 2009).

A number of studies have looked to find support for functional avoidance by observing how individuals with OGM deal with a stressful task. One such study by Raes et al. (2003) found support for the theory by testing how individuals with OGM responded to a puzzle task that the participants were told was easy but in reality was impossible to complete in the time they were allotted. They found that those with OGM found the task less distressing than healthy controls. Raes et al. (2003) interpreted these results as evidence that individuals with OGM deal with a stressful event by avoiding it to lessen the immediate emotional distress of the event. While this might have immediate benefits, as seen in subject's ratings of the distress after the puzzle task, Raes et al. (2003) predicted that, over time, it would leave individuals unable to address and move on from a stressful event, potentially resulting in depression or other mood disorders.

A follow up study was performed by Hermans, de Decker, Peuter, Raes, Eelen, and Williams, (2007) to see if the prediction made by Raes et al. (2003) was correct. They looked at how college students with OGM dealt with receiving a poor test score. They observed them over a period of nine weeks and found that, contrary to the predictions in the Raes et al. (2003) study, test takers with low memory specificity rated the test as more distressful than the control group immediately after the test and as less stressful than healthy controls over time. These findings suggested that the students with OGM were not avoiding stressful life events, as indicated by the fact that the student immediately found the memories more distressing. They also suggest that the students were able to successfully cope with the events, as indicated by them finding the events less distressing than controls after nine weeks. This would seem to indicate that the OGM group did not use avoidance to cope with the stressful event.

In addition to the questions surrounding whether individuals with low memory specificity avoid specific events, the very idea that avoidance would lead to OGM has been questioned. The theory of functional avoidance is based upon the idea that recall of general memories is less psychologically distressing then recall of specific episodes. In a study by Philippot, Schaefer, and Herbette (2003), they tested this idea by having subjects keep a diary and then cued memories from that diary using both general and specific cue words. After they cued a memory they had subjects rate their emotional experience of reliving the memory. They found that the participants rated their specific and general memories at roughly the same level of emotional arousal. This would seem to indicate that specific memories were not more psychologically distressing than general memories.

Capture and Rumination

The rumination theory has similarly been looked at in a number of studies that have shown more consistent support than studies on the avoidance theory. Similar to the research on functional avoidance, multiple studies have tried to find support for rumination by looking at how measures of rumination predict OGM. In a study by Raes, Hermans, Williams, Beyer, Brunfaut, Eelen (2006), they looked at how rumination and OGM tendencies prior to therapy for depression predicted the success of the treatment. As had been found in previous studies (Brittlebank et al. 1993), when they looked at OGM alone it predicted the effectiveness of the therapy. However, when they added in rumination as a predictor, OGM was no longer a significant predictor. Rumination influenced the relationship between OGM and result of treatment, supporting the hypothesis that errors in memory specificity are in part caused by rumination. This finding was also supported in a study by Spinhoven et al. (2009) where they

found that not only was rumination a predictor of OGM, but it remained a significant predictor even when depression was controlled for.

Further, studies have found that manipulating rumination tendencies could influence OGM. A study by Watkins, Teasdale, and Williams, (2000) found that by lessening rumination through a distracter task, individuals with depression could recall more specific memories. They did this by having participants answer decentralizing questions traditionally used in cognitive therapy to challenge negative thoughts. The questions focused on the transience of mood states so the participants would avoid thinking of their depression as permanent or a characteristic of themselves--thoughts that are common in depressive rumination. Examples of such questions were "How long does that mood last" and "Do I have different feeling of myself." After answering such questions for eight minutes, they found that participants had higher memory specificity than a control group which did not perform the task. Similar results were found in follow up studies by Teasdale and Williams (2001), and Watkins and Teasdale (2004).

A study by Barnard, Watkins, and Ramponi, (2006) found that the reverse was true, as well; memory specificity could lessen when tasks designed to induce rumination were introduced. They gave their participants a life theme, such as work or home, and then gave them five sentence frames. The frames were designed to have the participants recall multiple categorical memories for each theme. Examples of such frames were "generate as many examples of typical feeling you have while at work as you can" and "generate as many examples as you can of possible activities you would typically be doing at work." For each sentence frame participants were instructed to recall as many categorical memories as they could in thirty seconds. The participants performed this task three times for three different themes, and after each time they completed an AMT. The control group performed the same task; however after

each sentence frame the theme was switched so that they would not overly reminisce on any one topic. When comparing the scores on the AMTs, the experimental group recalled significantly fewer specific memories on each subsequent AMT, whereas the control group was not affected by the task. This showed that overly reminiscing on one topic led to an inability to recall specific memories, supporting the rumination hypothesis. Barnard et al. then performed a second experiment where the sentence frames were changed so that the subjects would no longer reminisce about themselves, but instead answer questions about animals. For example, one sentence could be "generate as many examples as you can of possible activities an animal would typically be doing at a farm." When they switched the task to cause the participants to not reminisce about themselves the task had no effect on OGM. This showed that it was not just reminiscing that caused the decrease in memory specificity, but it had to be reminiscing about oneself, or ruminating.

A follow up study was performed by Raes, Hermans, Williams, and Eelen (2006) where they had participants go through the same task designed to induce categorical thinking as Barnard et al. (2006) and then complete the impossible puzzle task used in the study by Raes et al. (2003). The participants who ruminated rated the puzzle task as more distressing then the control group, indicating that rumination may cause life stressors to be perceived as more distressing. These results showing that rumination causes stressful events to be seen as more distressing, supports the idea that this type of thinking might lead to depression, and are consistent with the findings that show OGM to be a predictor of future periods of depression (Anderson, Goddard, & Powell, 2010; Sumner, Griffith, Mineka, Rekart, Zinberg, & Craske, 2011; Van Minnen, Wessel, Verhaak, & Smeenk, 2005). It should be noted that, for present

purposes, whether rumination might be a cause or result of depression is not of interest; what is of interest is that it is correlated with OGM.

Comparison between Rumination and Avoidance

Spinhoven et al., (2009) compared the efficacy of the two factors of rumination and avoidance to explain OGM, and rumination was found to be the stronger predictor. That is, when they measured participants' tendencies for both avoidance and rumination and then compared the correlations between those measures and OGM while controlling for depression, rumination was a significant predictor of OGM when depression was controlled for but avoidance was not.

Recall of Distant Memories

The current CARFAX model does not include the tendency to recall remote memories as a factor that could be a mediator in the relationship between OGM and depression. Populations that have shown OGM may have a tendency to recall more distant events and OGM may simply be a reflection of this. This tendency was observed in a study by McNally et al. (1996). He compared OGM tendencies of Vietnam War veterans who still wore war regalia and those who did not and found that those who still wore the war regalia recalled fewer specific memories. Interestingly, he observed that the same group also had a tendency to recall more memories from further back in time than the group of veterans who did not wear regalia, specifically from the time of the war. Thus, it appeared that the tendency to focus on the past and recall memories from further back in time and OGM could be related.

Recently, we have found evidence that the tendency to recall remote memories does play a mediationary role in the relationship between depression OGM (Falco, Peynircioglu, Hohman,

submitted for publication). In that study, remoteness or distance of memories recalled was a stronger predictor of OGM than depression, and when distance of memories was controlled for, depression was not a significant predictor of OGM. In addition, when participants were forced to recall distant memories, depression was not a significant predictor of memory specificity. Further, by forcing participants to recall recent memories, not only was depression not a predictor of OGM, but the depressed group actually recalled slightly more specific memories than the control group. Most importantly, depression was not a predictor of OGM when remoteness of memories was controlled for.

Relying on these findings, we proposed that the factors in the CARFAX model may be dependent on individuals with OGM having a tendency to recall more remote memories. It may be the case that rumination and avoidance influence OGM only when an individual is focused on the past, and depressed individuals may be ruminating only about events in their more distant pasts. Therefore, only when they think of memories from their pasts would they get stuck at the second and more general level of Conway's (2000) hierarchy of memories by activating a string of concerns. Further, events in their recent pasts may not be distressing and they may want to avoid specific memories only when they are thinking of memories from the past.

At the very least, in our previous study, even if the tendency to recall recent memories might have been influenced by rumination or avoidance, these two factors by themselves were unable to account for some of the findings. For instance, rumination alone could not account for the fact that even without changing rumination tendencies, the depressed participants were able to recall specific memories when instructed to recall recent memories. Further, if the depressed participants were avoiding specific memories because they caused psychological distress, they

should have continued to avoid these specific memories when asked to recall recent memories unless the process of functional avoidance was dependent on the tendency to focus on the past.

Hypothesis and Purpose of Current Study

The first goal of the present study was to explore whether the tendency to recall distant memories was simply a byproduct of rumination or avoidance, or whether it was in fact a separate influential factor. To this end, of interest was the relationship between the remoteness of memories recalled and measures of rumination and avoidance. Also of interest was whether rumination and avoidance would be better predictors of OGM in depression in participants who do not recall distant memories. According to the original CARFAX model, rumination and avoidance should both remain as significant predictors even in individuals who recall recent memories. If the tendency to recall distant memories is the mediator, however, then rumination and avoidance would be predictors only for participants who recalled distant memories.

The second goal was to compare these three factors (rumination, avoidance, and the tendency to recall remote memories) directly as predictors of OGM. Of interest was how successful they were in predicting OGM both when severity of depression (BDI) was not factored in and when depression was controlled for in a regression model. The purpose was to determine how much of the relationship each variable had with OGM was simply a byproduct of their relationship with depression itself.

CHAPTER 2

EXPERIMENT

Participants

A total of 100 American University students between the ages of 18-22 (mean= 19.26, sd= 0.83) participated in this experiment for extra credit in introductory psychology classes. Twenty participants were shown to have at least mild depression indicated by a score of 13 or higher on the Beck Depression Inventory (BDI), the other 80 showed no depression symptoms. There were 88 female (17 depressed) and 12 male (3 depressed) participants. Participants were recruited through undergraduate psychology courses at American University and fliers posted outside the psychology department office. Students who were interested in participating contacted the experimenter via email. After completion of the experiment they received credit for introductory psychology courses.

Measures

Beck Depression Inventory-II. (BDI; Beck, Steer, and Brown, 1996). The BDI is a 21 item questionnaire used to measure depression. Scores range from 0-63, with 63 being the highest level of depression. The BDI has been used in previous experiments to study the relationship between depression and OGM (Spinhoven et al., 2009; etc.). Typically, a BDI score of at least 13 has been used as an indication of mild depression.

Autobiographical Memory Test (AMT; Williams and Broadbent, 1986). The AMT is comprised of a list of memory cue words, and for each cue word the participant has 30 seconds to come up with a specific memory. The measure of interest is whether a cue word elicits a general or a specific memory. Specificity is determined by previous norms that specify any original episode lasting less than one day in length to be a specific memory (Williams &

Broadbent, 1986). The AMT is used almost exclusively for the purpose of OGM research and is the most commonly used measure of OGM (Williams, 2007). In this experiment, 20 cue words were used; 10 were positive and 10 were negative: *happy, sad, carefree, angry, interested, clumsy, successful, hurt (emotionally), surprised, hostile, amazed, ashamed, devoted, scared, excited, jealous, proud, rejected, relieved*, and *failure.* These particular cue words were chosen because of their use in similar previous studies (Williams and Broadbent, 1986; McNally et al. 1996).

Penn State Worry Questionnaire (PSWQ; Meyer, Miller,Metzger, and Borkovec, 1990). The PSWQ is a 16 item questionnaire used to measure the excessiveness, generality, and uncontrollability of worry. In this study we only used the 11-question worry engagement scale, which had been used in previous studies looking at the relationship between rumination and OGM (e.g., Spinhoven et al., 2009). In this questionnaire, participants are given a set of statements and are asked to rate how typical each statement is on a scale from 1-5. One example of such a statement is "My worries overwhelm me." Total scores range from 11-55. Scores between11-27 indicates relatively low worry, between 28-41 indicate medium worry, and between 42-55 indicate high worry. In past studies this measure has been shown to have good internal consistency (Cronbach's alpha of 0.91), and test-retest reliability of 0.84, (Molina and Borkovec, 1994; Stober, 1995). It was used in this study primarily because of its use in the study by Spinhoven et al. (2009) comparing rumination to avoidance.

The Acceptance and Action Questionnaire (AAQ; Hayes, Strosahl, Wilson, Bissett, Pistorello, Toarmino, et al., 2004). The AAQ is a 9-item questionnaire used to measure avoidant coping style. In this questionnaire, participants are asked to rate the truth of each of the statements presented on a scale from one to seven, with one being "never true" and seven being

"always true". One example of such a statement is "I am able to take action on a problem." Total scores range from 9-63. Averages in clinical samples range from 35.0 to 41.6 and in non-clinical samples from 32.2 to 34.6 (Hayes et al., 2004). In past studies it has been shown to have good internal consistency (Cronback's alpha of 0.84), and test-retest reliability (0.81). It was used in this study because previous research had found it to be correlated with OGM and that correlation had been used as proof of the influence of functional avoidance (Hermans, Defranc, Raes, Williams, & Eelen, 2005) including the study by Spinhoven et al. (2009) which compared rumination and avoidance.

Procedure

Once participants arrived at the human memory lab they were asked to read and sign the informed consent form if they were willing to participate in the study. They then filled out the BDI, and took the AMT. Lastly; they filled out the PSWQ and AAQ in a fixed order. The order of the AMT, PSWQ, and AAQ was fixed to model the order in the study by Spinhoven et al. (2009), which had pitted rumination against avoidance. This study aimed to pit another factor, the tendency to recall remote memories, against these existing factors.

On the AMT, participants were given each cue word and asked for a memory. Before the test, participants were given one example with a neutral cue (*bread*) as practice. Once the actual test started, if a participant initially gave a longer or categorical memory, as in previous research (e.g. Williams & Broadbent, 1986), they were instructed to specify further until they came up with a specific memory until time was up. For example, if they gave an extended memory such as a vacation or a categorical memory such as a class they go to every week, they were asked if they could come up with a specific memory until the memory they recalled fit into the guidelines of being specific. Time was kept using a stopwatch, and if they could not recall a specific

memory by the time the stopwatch read thirty seconds their responses was coded as non-specific. As used in previous research (Williams, 2007), the number of specific memories they recalled was used as a measure of OGM.

After the participants recalled a specific memory on the AMT, they were asked approximately when the memory they recalled had taken place. All specific memories were recorded in one of four categories of time periods; under a week, a week to a month, a month to a year, and over a year. If they initially dated the memories on the cutoff (e.g., "one week ago"), the interviewer asked them to place it into the appropriate category (e.g., "was it over or under 7 days ago"). Distance/remoteness of the specific memories was coded by giving a numerical value to each of the four time period categories, with 1 corresponding to under a week, 2 to a week to a month, 3 to a month to a year, and 4 to at least over a year. These numerical values were then averaged to create a Distance of Memory Score (DMS) for each participant, which measured, by definition, the distance of their specific memories only. This same scoring system was used in the experiment by Falco et al. (submitted for publication) and a similar scoring system was used by McNally et al. (1996) and Blix & Brennen et al. (2011).

Results

Differences between Depressed and Non-Depressed Groups

The differences in depression level, OGM, rumination, and avoidance of the depressed and non-depressed groups are reported in Table 1. The depressed group recalled significantly fewer specific memories then the non-depressed group, $t(98)= 3.47$, $p< 0.01$. In addition, the depressed group had a significantly higher score on rumination, $t(98)= 2.79$, $p< 0.01$ and avoidance, $t(98)= 3.13$, $p< 0.01$ as measured by the PSWQ and AAQ respectively. They also

had a significantly higher score on the DMS, $t(98)= 2.79$, $p< 0.01$, indicating they recalled memories from further back in time. Thus the relationships between depression and rumination, avoidance, OGM, and tendency to recall memories from further back in time were all replicated.

TABLE 1

Differences in Depression Severity (BDI; Beck Depression Inventory, score range 0-63), Overgeneral Memory (AMT; Autobiographical Memory Test, score reported is percent specific memories recalled), Rumination (PSWQ; Penn State Worry Questionnaire, score range 11-55), Avoidance (AAQ; Action and Avoidance Questionnaire, score range 9-63), and Remoteness of Memories (DMS; Distance of Memory Score, score range 1-4) between Depressed and Non-Depressed Groups

Means (standard deviations)

	BDI	AMT	PSWQ	AAQ	DMS
Depressed n = 20	16.70 (5.07)	89.25 (9.90)	41.35 (9.18)	37.6 (6.61)	2.53 (0.62)
Non-Depressed n = 80	5.17 (3.56)	95.44 (6.27)	34.95 (9.18)	32.45 (6.57)	2.03 (0.73)

Correlation between Depression, Overgeneral Memory, Rumination, Avoidance, and Remoteness of Memories

Correlations between depression, OGM, rumination, avoidance, and remoteness of memories can be found in Table 2. As expected, depression was correlated with OGM, as

measured by the AMT, (r= 0.37), t(98)= 3.88, p< 0.01, as well as with rumination (r= 0.39), t(98)= 4.16, p< 0.01 and avoidance (r= 0.50), t(98)= 5.70, p< 0.01 (Spinhoven et al., 2009). Remoteness of memories was also correlated with both depression (r= 0.20), t(98)= 2.03, p< 0.05, and OGM (r= 0.45), t(98)= 4.98, p< 0.01 (Falco, et al. under review). More interestingly, however, is that unlike the findings in the study by Spinhoven et al. (2009), the correlation between OGM and rumination was only somewhat significant (r= 0.17), t(98)= 1.69, p< 0.10, and the correlation between OGM and avoidance was not significant (r= 0.13), t(98)= 1.33, p> 0.10 . This was likely a result of the relatively small number of depressed participants (20) compared to those in the Spinhoven study (300), and the fact that depressed participants in this study were not clinically depressed. But even under these conditions, remoteness of memories was still correlated with OGM even when rumination and avoidance were not, thus lending support to the importance of the remoteness of memories factor. The correlation between OGM and remoteness of memories was significantly stronger than that of either OGM with rumination or avoidance z's(98)= 2.08 and 2.37, ps< 0.05, respectively, using the method developed by Meng & Rubin (1992) to test for the difference between two correlation confidents using Fisher's Z transformations. This suggests that remoteness of memories was a more useful indicator of OGM.

The next step was to look at which variable would still be a significant predictor of OGM when depression, measured as a continuous variable by BDI scores, was controlled for to see if the correlation between each factor and OGM was simply a result of the relationship between each factor and depression. Remoteness of memories was still a significant predictor of OGM when depression was controlled for using multiple linear regression (b= 0.81), t(97)= 4.46, p< 0.01. Rumination and avoidance, however, were not, (b= 0.01), t(97)= 0.31, p> 0.70 and (b=

-0.01), t(97)= 0.60, p> 0.50 respectively. This was in line with the findings of the Spinhoven et al. (2009) studies with regards to avoidance and OGM but not with regards to rumination and OGM when depression was controlled for. This was likely again in part due to the relatively small sample size used in the present study and the level of depression. Nevertheless, of most interest was that remoteness of memories fared better than either avoidance or rumination, and predicted OGM even when depression was controlled for.

To see whether the present data supported our proposal that the CARFAX model depends on a tendency to recall distant memories; we looked at the interaction between remoteness and avoidance and the interaction between remoteness and rumination. In a multiple linear regression model where rumination, remoteness, and the interaction between remoteness and rumination were the independent variables and OGM was the dependent variable, we found that the interaction between remoteness and rumination was significant (b= 0.04), t(97)= 2.29, p< 0.03. We next created the same model only substituting rumination for avoidance and found that the interaction between avoidance and rumination was not significant but did approach significance (b= 0.05), t(97)= 1.83, p< 0.08. These interactions show that the factors of rumination and avoidance have a greater effect on OGM the tendency to recall remote memories is present. This supports our proposal that the mechanism of the CARFAX model is dependent on the tendency to recall distant memories.

Finally, we tested whether the relationship between remoteness of memories and OGM was independent of rumination or avoidance. We found that remoteness of memories was correlated with neither rumination (r= -0.08), t(98)= 0.83, p> 0.4, nor avoidance (r= -0.08), t(98)= 0.77, p> 0.4. This lack of a correlation suggests that the relationship between OGM and

remoteness of memories was not related to rumination or avoidance and there was probably another factor that led depressed participants to recall memories from further back.

TABLE 2

Correlations between Depression Severity (BDI; Beck Depression Inventory, score range 0-63), Overgeneral Memory (AMT; Autobiographical Memory Test, score reported is percent specific recalled), Rumination (PSWQ; Penn State Worry Questionnaire, score range 11-55), Avoidance (AAQ; Action and Avoidance Questionnaire, score range 9-63), and Remoteness of Memories (DMS; Distance of Memory Score, score range 1-4)

	BDI	AMT	PSWQ	AAQ	DMS
BDI	---	.37***	.39***	.50***	.20**
AMT	---	---	.17*	.13	.45***
PSWQ	---	---	---	.52***	-.08
AAQ	---	---	---	---	-.08
DMS	---	---	---	---	---

Note. ***= significant at $p < 0.01$, **= significant at $p < 0.05$, *= significance at $p < 0.10$.

CHAPTER 3

DISCUSSION

McNally et al. (1996) showed a relationship between the time period individuals recall memories from and OGM. We further showed that remoteness of memories had a mediating effect on the relationship between depression and OGM, and proposed that the CARFAX model for the cause of OGM might be dependent on the tendency to recall remote memories (Falco, et al., submitted for publication). The present study extended our previous findings and found that the effect of the tendency to recall remote memories on OGM was stronger than the effect of rumination or avoidance. Further, we found that this effect was not related to avoidance or rumination, which suggests that the current version of the CARFAX model is unable to account for our findings in these past two studies.

According to the current CARFAX model, once individuals with OGM reach the second, general-memories-level of Conway's proposed hierarchy (2009), they activate a string of concerns which cause them to recall further general memories and they avoid going to the lowest level of the hierarchy to avoid painful specific memories (Williams, 2006). In light of our current results, it would seem that an additional factor needs to be added to the model. When the relationship between OGM and the tendency to recall remote memories was looked at in our previous study, it was unclear whether the CARFAX model could account for the relationship because the connection between the tendency to recall remote memories and the factors of rumination and avoidance were unknown. It was possible that currently depressed individuals were avoiding the present because memories in the present were seen as more distressing to them; it was also possible that their general tendency to ruminate on events somehow activated thoughts on past concerns when given a cue word and led them to more remote memories. In this

study, however, we found that rumination and avoidance were not related to the tendency to recall remote memories, and the results supported the idea of at least adding the tendency to recall remote memories as another factor to the model.

To speculate, perhaps the OGM in depressed individuals is caused by an initial tendency to focus on the distant past when going through Conway's (2009) hierarchy of memories. Once an individual is focused on their distant past, the presence of rumination tendencies might then cause him to be stuck at the second level of the hierarchy due to general events cuing further regrets and concerns associated with those events. However, if an individual goes through the hierarchy while focused on present events, even though rumination may still be present, it does not have an effect on the ability to get to the specific episode level of the hierarchy because there are no major unpleasant events in their recent past.

To further speculate, perhaps a direct relationship between OGM and unpleasant life events can explain why rumination emerges as a factor that influences OGM in general. In support of this idea, we know that OGM is also found in populations with PTSD (McNally et al., 1996; Williams, 2007), and memory specificity is lower in victims of traumatic life events even when matched with a control group with similar levels of depression (Henderson, Hargreaves, Gregory, and Williams, 2002). The latter finding suggests that the traumatic event does not result in lower memory specificity indirectly because it makes the participants more depressed, but rather the traumatic event in and of itself results in lower memory specificity. Also, as mentioned previously, OGM is found in populations with PTSD. Along the same lines, it might be the case that most individuals with OGM have some unpleasant life event or events in their past they are fixated on. When going through a hierarchy of memories in order of specificity, it is hitting one of these unpleasant life events that might activate a string of concerns associated with the event

and prevent one from reaching the specific episodes. These life events do not need to be traumatic such as those influencing PTSD; they simply need to be influential enough for someone with ruminative tendencies to get stuck on thinking about them. A real life example might be the college admissions process. If a college student who was not happy with attending his/her current college and who had a tendency to focus on the past was told to come up with a memory for the cue word "sad", one somewhat still salient memory could be the distressing event of the admissions process and everything s/he had associated with it through ruminating about it in the past, such as how s/he could have studied harder for the SATs, how s/he could have written a better essay, and how s/he should have done more extracurricular activities. Because that event cues so many general associations s/he might fail to come up with a specific memory below that general level of thinking. However, even with the same rumination tendencies, a tendency to focus on the present would prevent this from happening because there would likely not be any unpleasant life events in the last few weeks to trigger the process of rumination. Thus, when someone is going through the hierarchy, only if they are focused on the past and they have a tendency to ruminate on these unpleasant life events they might get stuck at those events and be unable to access specific memories When participants are asked to recall recent memories only, they are often forced to recall trivial memories that have not had a major effect on their lives and are unlikely to be ruminated on. For example, that same student in the example above was trying to recall a memory from the last few weeks, there might be nothing related to his college admissions process that occurred in the last two weeks and s/he would instead think back to something more minor such as stubbing a toe or tripping on the stairs.

Thus, rumination may cause participants to get struck at the second level of the hierarchy and be unable to access specific memories, but rumination might only be able to have an effect

on this process when one already has this tendency to focus on the past. Indeed, in this experiment, I found that when I split the participants into two groups based on the time period they tended to recall memories from, rumination was a predictor of OGM only in the group that tended to recall memories from the past.

Similarly, when an individual is focused on the past, avoidance tendencies might cause him to stay at the second level of the hierarchy and avoid recall of specific memories for fear that they might be psychologically distressing. This would also make sense when thinking of the relation between unpleasant life events and OGM. If one has an unpleasant life event in their distant past they might avoid specific memories when thinking of the past for fear of recalling specific memories related to their unpleasant experience; however, there would be no reason to avoid the specific memories in the present because it is less likely that an unpleasant life event has occurred within the last few weeks or, even if it has, it is less likely to have created a hierarchy yet and is still accessible directly. Going back to the college admissions example, if a student is given a cue word and has a tendency to think from the past s/he might initially recall the admissions process and avoid thinking of the actual moment s/he were rejected because that would cause her/him distress. However, if they did not have this tendency to think back to the past s/he might instead recall only their recent more likely to be milder unpleasant events, such as tripping on the stairs, and have no reason to avoid them because they cause no distress. Again, avoidance might have an effect on OGM only when one already has a tendency to focus on the past. Although the median split analysis did not provide support for this idea, there was a higher correlation between avoidance and OGM for the group that had a tendency to recall more remote memories, and possibly the lack of a significant difference reflected only the small sample size and lack of power.

McNally (1996) hypothesized that individuals with OGM might be more likely to recall memories from further back in time because they tend to be psychologically stuck in the past. This research supported that hypothesis, but also showed the tendency to recall memories from further back in time to be unrelated to rumination or avoidance, the two factors that might have explained why some individuals might get stuck in the past. One obvious interesting route for future research then is to explore the bigger question of why this tendency occurs and what, if any, the effect of changing this tendency would have on OGM and possibly even on therapy for depression.

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