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Honors Capstone Project

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Dilution and Overgeneral Memory

Introduction

Autobiographical memory is composed of memories relating to an individual's personal experiences. (Conway, 2002) One model of autobiographical memory proposes it forms a Self-Memory System (SMS; Conway and Pleydell-Pearce, 2000) which is composed of all memories pertinent to our lives combined with our goals and desired self image. The SMS is used to develop a sense of individuality and collective identity. This, in combination with our memories of our past experiences, aids us in forming stable relationships with the people in our lives (Williams, Conway, and Cohen, 2008).

With autobiographical memory having such an influence on who we are, it is no surprise that deficits in autobiographical memory functioning have been related to a series of psychological disorders. Individuals with depression, post-traumatic stress disorder (PTSD), schizophrenia, and the elderly have been found to have a memory deficit called overgeneral

memory (Williams and Broadbent, 1986; Williams, 1992; Tamlyn, McKenna, Mortimer, Lund, Hammond, and Baddeley, 1992; Winthorpe and Rabbitt, 1988). This was first observed by Williams (1984) while interviewing patients to examine the effects of cognitive behavioral therapy for depression. He noticed that patients had a tendency to recall memories in a categorical and general fashion. To test this, he developed the Autobiographical Memory Test (AMT; Williams and Broadbent, 1986). The AMT is a set of ten cue words, 5 pleasant and 5 unpleasant. For each cue word, the participant was instructed to recall a specific memory in one minute (or in more recent uses 30 seconds; Watkins and Teasdale, 2001). When administering the test to clinically depressed patients, he found they were significantly less likely to recall specific memories than controls for both pleasant and unpleasant cue words. For example, for the cue word happy they might say something categorical such as “every Wednesday I play basketball” or general such as “basketball makes me happy.” In contrast, members of the control group would recall a specific memory such as “last Wednesday I won a game of basketball.”

What makes the study of overgeneral memory interesting is that it remains after other depression symptoms subside. In a longitudinal study Brittlebank, Scott, Williams, and Ferrier (1993) found that depressed patients still had low memory specificity after seven months of therapy. In addition, how well the patients performed on the AMT at the start of treatment was a predictor of how successful the treatment would be. Those who recalled less specific memories on the AMT at the beginning of the treatment were at a significantly higher rate of remaining clinically depressed at the end of the seven months. This result has led researchers to look at overgeneral memory as more than just a symptom of depression, but as a possible risk factor for falling into depression. This idea has been supported in several studies where participants were shown to have a greater risk of falling into depression if they had low memory specificity, even

when life stressors were controlled for (Van Minnen, Wessel, Verhaak, and Smeenk, 2005; Anderson, Goddard, and Powell, 2010; Sumner, Griffith, Mineka, Rekart, Zinberg, and Craske, 2011).

Three major theories have been proposed to explain this occurrence, with the true cause believed to lie in a combination of the three (Williams, 2006). The first theory is that overgeneral memory is caused by a deficit in executive control (Williams, 1996; Burgess and Shallice, 1996; Conway and Pleydell-Pearce, 2000; Williams, 2006). According to this theory individuals with depression fail to recall specific memory due to either not having the cognitive resources (Ellis and Ashbrook, 1988) or using a different cognitive strategy when retrieving memories (Hertel and Hardin, 1990).

The second theory is functional rumination. According to this theory, depressed individuals have a tendency to avoid reminiscing on specific memories because they are seen as more painful. Eventually this tendency leads to style of thinking that causes them to recall more categorical and general memories even when pleasant memories are cued. (Williams, 1996; Raes, Hermans, de Decker, Eelen, and Williams, 2003; Herman, de Decker, Peuter, Raes, Eelen, and Williams, 2007; Williams, 2006) Support for this theory has been found in studies that tested how groups with low memory specificity dealt with a stressful task. (Raes et al., 2003; Hermans et al., 2006) In these studies the group with low memory specificity found the task less distressing. This supported the idea that avoiding specific recollection of an even lessens the pain associated with it. Further support has been in studies that linked avoidant style coping (Hermans, Defranc, Raes, Williams, Eelen, 2005) and repressive coping (Geraerts, Dritschel, Kreplin, Miyagawa, and Waddington, 2011) to overgeneral memory.

The third theory is that overgeneral memory is related to rumination (Watkins & Teasdale, 2004; Williams 2006; Williams, Barnhofer, Crane, Hermans, Raes, Watkins, and Dalgleish, 2006; Barnard, Watkin, and Ramponi, 2006). When an individual experiences a stressor, they might overanalyze and overly reminisce on the memory. For example, if they received a poor test score, they may over-think the implications of it and group it with all the failures throughout their life, instead of addressing the concerns with that test. According to the theory, when someone who thinks like this is given a cue word it would activate a string of concerns, as opposed to a single incident. Support for this theory has been found in studies that linked overgeneral memory to scores on tests designed to measure rumination tendencies (Spinhoven, Bamelis, Molendijk, Haringsma, Arntz, 2009; Raes, Hermans, Williams, Beyer, Brunfaut, Eelen, 2006). Rumination has also been found to mediate the relationship between overgeneral memory and prevalence of depression (Raes et al., 2006). Other studies have found that manipulating participants to ruminate causes them to have lower memory specificity (Barnard, Watkins, Ramponi, 2006), and distracting depressed individuals from ruminating causes them to have higher memory specificity (Watkins, Teasdale, and Williams, 2000).

While most researchers argue that overgeneral memory can be explained by a combination of these three theories (Williams, 2006), while doing research on overgeneral memory I observed something that could not be explained by any existing theory. When administering the AMT I noticed that those who had trouble recalling specific memories tended to recall memories from their distant past. In contrast, those who were able to instantly recall specific memories tended to recall recent memories, most of which being from the last few weeks.

Several other studies have looked at this before and found mixed results. A study by McNally, Lasko, Macklin, and Pitman (1995) observed that Vietnam War veterans with PTSD who wore their war regalia to the testing center had lower memory specificity than other veterans with PTSD who did not. This led them to hypothesize that there was a relationship between being psychologically stuck in the past and overgeneral memory. To test this they had the veterans date their memories they gave on the AMT and found that the war veterans who wore war regalia were more likely to recall memories from the time of the war than those who did not wear regalia and healthy controls.

Two other studies have followed up on this and not found the same effect. Stokes, Dritschel, and Bekerian (2004) tested for overgeneral memory in burn victims. Among other things, they wanted to see if their participants had a tendency to recall memories from the time of their injury so they had them date their memories on the AMT. While they did find that distant memories were less likely to be specific, they found the group of burn victims did not recall older memories than a control group of healthy controls. However, their failure to find significant results might have been due to a small sample size (only 12 burn victims and 12 controls), and the time periods they split the memories into. They split all the memories into one of two groups, over a year ago and under a year ago. If they would have made more distinctions between memories of different ages, they might have had better results.

The other study to look at this was by Blix and Brennen (2011). They again had participants date their memories on the AMT and split them into 5 categories; under a week, week to month, month to six months, six months to a year, and over a year. They tested whether a group that had high life stress, as measured by the Impact of Event Scale, recalled memories from the same time period as one that had low life stress. As in the study by Stokes et al. (2004)

they found there to be no difference between these two groups. However, it is worth noting that in their experiment no difference was found in memory specificity between the group with high stress and the one with low stress.

There were three goals of this study. The first was to find support for the findings in the study by McNally et al. (1995) which found a relationship between the age of memories recalled and overgeneral memory. The second was to expand these results to the field of depression, a population for which the age of memories on the AMT has never been tested. Lastly, the third goal of this study was to propose being stuck in the past as a factor relating to the cause of overgeneral memory. We did this through a series of experiments that pit this theory against the theories of functional avoidance and rumination. We did this by showing depressed individuals have high memory specificity when instructed to recall only recent memories and that non-depressed controls have high memory specificity when instructed to recall only distant memories. We also conducted an experiment where we found memories expand and become less specific as they age.

Method

Experiment 1

Participants

A total of 73 undergraduate students between the ages of 18-22 from American University participated. 22 were depressed as indicated by a score of at least 13 on the Beck

Depression Inventory (BDI). Each student who participated was given extra credit for an introductory psychology class.

Materials, Design, and Procedure

The subjects were first given the BDI (Beck, Ward, Mendelson, Mock, and Erbaugh, 1961). This is designed as to test the severity of depression (Stromberg, Backlund, and Lofvander, 2010). The test is twenty-one questions long and scored on a scale from 0-63. A score of thirteen or higher has been used in previous research as an indication of depression (Lasa, Ayuso-Mateos, -Manrique, Dowrick, 2000). After the administering of the BDI the participants were given the Autobiographical Memory Test (AMT; Williams and Broadbent, 1986). The AMT is a list of ten cue words, 5 positive and 5 negative. For each cue word the participant is asked to recall a specific memory in thirty seconds. For this experiment we used two sets of cue words. The first set of cue words were; happy, sorry, safe, angry, interested, clumsy, successful, hurt (emotional), surprised, and lonely. The second set was; amazed, guilty, devoted, grief, hopeful, hopeless, proud, rejected, relieved, and failure. 50 participants were given the first set of cue words and 23 were given the second set. The reason for use of a second set was because both set of cue words were used in Experiment 2 and the results of the first AMT test given were recorded with the results from Experiment 1. After participants had recalled a specific memory from the one of the cue words, they were asked how old the memory was and their answer was recorded in one of the four categories; under a week, a week to a month, a month to a year, and over a year. If the date they gave for the memory was on one of the cutoffs (for example “it was one year ago”) they were asked to place it in one of the four categories.

Experiment 2

Participants

A total of 45 undergraduate students between the ages of 18-22 from American University participated. 13 were depressed as indicated by a score of at least 13 on the BDI. Each student who participated was given extra credit for an introductory psychology class.

Materials, Design, and Procedure

Similarly to Experiment 1, the participants were given a BDI and AMT. However in this experiment they were given both sets of ten cue words. For the first set of ten cue words they performed a task identical to that in Experiment 1. For the second set they were instructed to only give memories that were over one year old. The order of the sets was randomly assigned.

Experiment 3

Participants

A total of 39 undergraduate students between the ages of 18-22 from American University participated. 15 were depressed as indicated by a score of at least 13 on the BDI. Each student who participated was given extra credit for an introductory psychology class.

Materials, Design, and Procedure

The participants were again given a BDI and AMT and similar to in Experiment 2, they were given both sets of cue words. For one set of cue words they were asked to give only memories from within the last month. For the other set they were again asked to recall only memories from over one year ago. The order of the tasks and the sets of cue words were randomly assigned.

Experiment 4

Participants

A total of 37 undergrad students from American University between the ages of 18-22 participated in this experiment. Each student who participated was given extra credit for an introductory psychology class.

Materials, Design, and Procedure

The participants were asked to recall four specific memories from the last two weeks. Two of them were asked to be pleasant, and the other two unpleasant. For each memory they gave a brief description and rated the valence of the memory from 1 (very sad) to 5 (very happy). After that they wrote down what they felt marked the beginning and ending of the event. They then wrote down what the duration of the event was, and what percentage of it they could remember. Three weeks later they were given their descriptions back and answered the same questions for each memory as they had three weeks ago. They were to not try to remember what

their previous answers were, but instead answer the questions in accordance with how they felt about the event now, as opposed to three weeks ago.

Results

Experiment 1

As has been shown in previous research, scores on the BDI was significantly correlated with AMT scores ($r = 0.39$, $p = .002$). As shown in table 1 the depressed group appeared to recall memories from a different time period than the non-depressed group. Of most significance, the depressed group recalled 39.33% of their memories from over one year ago while the non-depressed group recalled only 21.59% of their memories from that time period. In contrast, the non-depressed group recalled 35.39% of their memories from the last week while the depressed group recalled only 19.9% of their memories from that time period. A chi-squared test for independence showed depression and time period of the memory recalled to be significantly dependent on one another ($X^2 = 9.66$, $p = 0.02$).

Table 1: Percent recalled in each time period

	Over a Year	Month-Year	Week-Month	Under a Month
Depressed	39.33	27.17	13.06	19.9
Non-depressed	21.59	27.68	15.13	35.39

Each time period was given a numerical value; 1 for under a week, 2 for a week to a month, 3 for a month to a year, and 4 for over a year. For each participant an average score was calculated for

all the memories they were able to recall specifically. The average score for the depressed group (2.88) was found to be significantly higher than the score for the non-depressed group (2.37, $p=0.01$). Average score was also found to be significantly correlated with BDI ($r=0.30$, $p=0.009$).

Experiment 2

On the first AMT test, where participants were not given any instructions as to when to recall memories from, the depressed group recalled significantly less specific memories than the non-depressed group ($p=0.003$). However, when they were instructed to recall memories from over one year ago, there was no significant difference between the groups ($p=0.5$). The percentage of non-specific memories recalled for each group can be seen in Table 2.

Table 2: Percent recalled on each AMT

	AMT (no time)	AMT (over a year)
Depressed	10.00	10.81
Non-depressed	2.81	8.44

The non-depressed group recalled significantly less specific memories on the second AMT ($t=2.74$, $p=0.01$) while there was no significant difference for the depressed group ($t=0.32$, $p=0.75$). When non-depressed participants were instructed to only recall memories from over one year ago, there was no significant difference between the amount of specific memories they recalled and the amount of specific memories the depressed group recalled on the AMT where there were no time restrictions ($t=0.46$, $p=0.65$).

Experiment 3

As seen in experiment two, when participants were instructed to recall only memories from over one year ago there was no significant difference between the depressed group and the non-depressed group ($t = 0.64$, $p = 0.54$). It is worth noting that in this experiment the depressed group actually recalled slightly more specific memories from over a year ago than the non-depressed group. When the participants were instructed to recall only memories from the last month, there again was no significant difference in the amount of specific memories recalled ($t = 0.23$, $p = 0.82$). Again, the depressed group actually recalled more specific memories than the non-depressed group. The percentages of specific memories recalled can be seen in Table 3.

Table 3: Percentages recalled on each AMT

	AMT (Under a Month)	AMT (Over a Year)
Depressed	3.33	10.00
Non-depressed	3.75	12.08

Both groups recalled significantly less specific memories when they were instructed to recall specific memories from over one year ago (Depressed: $t = 3.57$, $p = 0.003$; Non-Depressed: $t = 3.74$, $p = 0.001$). When they were instructed to recall specific memories from the last month, neither group performed significantly different from the non-depressed group when they took the AMT with no time restrictions (Depressed: $t = 0.22$, $p = 0.82$; Non-Depressed: $t = 0.53$, $p = 0.6$).

Experiment 4

Right now the results are not good, 8 are expanding, 4 remain the same, and 6 are contracting. I still have a lot of participants yet to get back to me but what should I do if these results stay not significant. I feel the other experiments could defiantly stand without this though.

Conclusion

All three goals of this study were met. Experiment 1 showed that individuals with depression tend to recall older memories on the AMT at a high rate than non-depressed controls. This supports the finding in the study by McNally et al. (1995) and expands their results to individuals with depression.

Experiments 2 and 3 found support for the hypothesis that being stuck in the past was a cause of overgeneral memory. As seen in Experiment 3, when the time period of the memory recalled was controlled for, there is no relationship between memory specificity and depression. If functional avoidance could completely explain overgeneral memory, in the Experiment 3 the depressed group would still not have been able to recall recent specific memories because those memories still would have been painful to them and they still would have avoided them. This theory is unable to describe how the depressed group was able to recall specific memory when they were instructed to recall recent memories. If rumination could explain overgeneral memory, the non-depressed group would not have shown reduced memory specificity when instructed to recall only memories from their distant past. This task did not change the ruminating tendencies in the participants, therefore there should have either been no effect, or an equal effect on both group. The rumination hypothesis has no way of explaining a dissociation between the two groups, as was found in this experiment. This set of experiments showed that overgeneral memory is affected by another way of thinking independent of avoidance or rumination.

While further research needs to be done, this supports the idea that being stuck in the past is related to overgeneral memory. The only limitation with this study was the lack of resources to

test different populations known to have overgeneral memory. To further support the link between age of memories and depression, a future study should replicate this study, but with participants that are clinically depressed. However, the strong correlation between the average distance of the memories recalled and BDI score indicate that as severity of depression rose the memories were more distant. Future studies should also look at this in the elderly, those with schizophrenia, and those with PTSD not related to combat. If those groups were to recall older memories then healthy controls it would provide further support for the theory proposed in this study.

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