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EFFECTS OF DEPRESSED MOOD ON RETRIEVAL OF EMOTIONALLY LOADED WORDS FROM MEMORY

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ABSTRACT

Major depression, as a common psychological disturbance, has different cognitive indications. According to this approach, depressive mood is the consequence of one's interpretation and explanation of information received and his/her mental orientation in decoding and memorizing of the negatively loaded words. This study aims to investigate the relationship between depressed mood and retrieval of emotional words out of memory. The present study is descriptive aiming to compare the performance of depressed and non-depressed groups in retrieval of emotionally positive, negative and neutral words in each retrieval methods (free recall, signed recall, recognition). The statistical community of this study consists of all Payam Noor Students of Yazd Province in 2010. 100 participants were first chosen using cluster sampling method in order to coordinate the participants in this study. 30 people were chosen based on criterion scores in Beck Depression Inventory. To determine the amount of memorizing and recalling the emotionally positive, negative and neutral words by depressed and non-depressed people, three memory tests (recognition, free recall and signed recall), and descriptive statistical indicators and multivariate variance analysis to analyze data were used. The results showed that there is a significant difference between depressed and non-depressed people in recalling emotionally positive and negative words. However, no difference was observed in all tests in terms of recalling emotionally neutral words between the two groups. According to the results obtained, depressed people, unlike non-depressed people, can memorize more negative words and recall emotionally positive words against non-depressed people. Therefore, applying these tests as parallel tools can be useful in recognizing and process of depression treatment.

Key Words: *Depressed Mood, Retrieval, Memory*

INTRODUCTION

Memory is considered one of the most important areas of research in behavioral sciences in the 21st century. Memory, as one of the main cognitive structures, underpins the communications, perceptions, social interactions, thinking and problem-solving (Karami, 2004). Taking into consideration three steps of memory (decoding, storing and retrieval) and the requirements of cognitive structure in each step, several factors may play a role in the quality of memory retrieval of memory, among which people's mood can be one of them (Smith, 2005). Depression, as one of the most common mood disorders, has a main effect on memory function. Some changes will also be created in the behavior, attitude, thought and physiological actions of the person alongside the mood changes (Clark and Christopher, 2002). Many theories have been proposed concerning the cognitive processing in patients with depression disorder, among which cognitive theories related to depression and Beck cognitive inventory (1976-1977) is one of the most important of them. It is supposed in Beck cognitive model that identifying depressed people consists of negative components and beliefs, which this by itself is shaped by one's negative components and beliefs to oneself (as I am valueless) based on some experiences such as loss, failures, etc. in childhood and adolescence. Then, these negative beliefs can affect many cognitive processes (such as attention,

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perception, recall, etc.) in that depressed people distort environmental data in such a way that match their internal beliefs and previous and negative conclusions, and hence these negative beliefs cause biases in information processing among depressed people (Smith, 2005). Following the introduction of cognitive theories, given that mood disorders are emotional and their cognitive explanations, some experts decided to review the role of moods in thinking, judgment and people's cognitions. Therefore, the controversial issue of mood and cognition has been devoted a large body of research in recent years and several theories have been proposed in this regard (Rasti, 2004). Some of these theories have been emphasized on the concept of the priority of cognition over mood (Beck theory (1971) and Lazarus theory (1966)) (Stevens *et al.*, 2008) and it has been indicated that mood will result from the method of cognitive evaluation of the consequences caused by occurrences (LaBar *et al.*, 2005). Or they believe that negative occurrences and memories are decoded as schemas in the memory and then are stilled until similar occurrences with previous ones are arisen. These active schemas affect the interpretation and explanation of new events (Ariksinen, 2006). Contrary to these theories, some others emphasized on the concept of the priority of mood over cognition (Belief Theory (1981) and Zauonk (1980) and they believe that when one is faced with a new situation, a pleasant or unpleasant feeling out of that situation is created within oneself before any cognitive medicine and one's affective state will be changed (Moritz *et al.*, 2005). It has also been indicated that each affective state has a special unit in the memory which all related memory structures will be activated and recalling the information coordinated with the mood will be facilitated (Mor and Winquist, 2002). Although proving this claim that mood changes can affect one's cognitive processes is difficult, this issue is generally accepted. Affective states can have an effect on some of cognitive variables such as free recall and interpretation and explanation of ambiguous events, especially on the process of memory (Kensinger, 2009). The effects of these affective states on memory processes using experimental inculcating of depressed and happy mood have been considered on several studied (Walter *et al.*, 2003). Of the various forms of effects on mood, state-dependent learning memory phenomena and mood-coordinated memory (affective match) can be pointed out. It is maintained in state-dependent learning that people's abilities in maintaining and recalling information is increased when their affective state in the time of retrieval is similar to their affective mood during information decoding (Lewis and Critchley, 2003). This phenomenon have been proven by inculcating different moods in learning conditions (by the use of alcohol and marijuana) and then better retrieval of information learnt in similar affective conditions (Kensinger and Corkin, 2003). Mood-harmonized memory depends on the similarity between mood, the nature of learning materials and it's recalling situations and hereby a better and easier temporal learning will be achieved in which learning materials is coordinated and harmonious with moods. Therefore, if there is a similarity between mood and learning materials while decoding mood and retrievable materials, it will be finally led to memory orientation consistent with mood (Monesters *et al.*, 2009). In a research entitled "study of memory coordinated with mood in depressed people", it has been indicated that there is a significant relationship between depression and the orientation consistent with mood which is hereby depressed people have special orientation towards learning negative materials (Moritz *et al.*, 2005). It has been figured out, in studying the orientation of overt and covert memory among depressed people, that they showed memory orientation consistent with mood in free recall test (as a measure of explicit memory) while no evidence was obtained indicating the orientation in covert memory among depressed people (Mehrtalab and Neshat, 2005). In another study, depressed people showed memory orientation consistent with mood in free recall test and in both reading and self-reference decoding (Mehrtalab, 2003). It has been shown in another study that depressed people in their depression recall more depressing words (Afshar, 1998) and the states of negative emotions or depressive moods is interfered with cognitive abilities such as understanding and recalling which is led to negative memory orientation (Kliegel and Jager, 2006). Also, depressed people assess more negative materials compared with normal people (Collins and Cooke, 2005). The performance of one group of depressed patients in a test of information retrieval of memory was compared with normal control group and it has been

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indicated that normal group retrieve pleasant words than depressed group with more acceleration and identify unpleasant words significantly than depressed people with more acceleration (Rasti, 2004). It has been found out in another study that depressed people are less inclined to recalling positive information than non-depressed people and are more inclined to recall negative information (Kensinger and Schacter, 2006). Therefore, regarding the stages of memory, especially decoding, retrieval and the impacts affective states over these stages and also given the various performances of memory in depressed and non-depressed people and taking into consideration this issue that no coherent study was simultaneously done in the field of investigating and comparing the memory among depressed and non-depressed people in three ways of information retrieval of memory. In order to increase the generalizability of the results of the study obtained before, this study has been organized with the aim of studying the memory performance of depressed people on retrieval of positive, negative and neutral words in three different ways of retrieval (free recall, signed recall and recognition) and its comparison with non-depressed people.

MATERIALS AND METHODS

The present study is descriptive which has been conducted by causal-comparative method. The study population consists of all undergraduate students of Payam Noor University in Yazd province on the academic year 2009-2010. Multistage cluster sampling method was used to choose sampling groups (depressed and non-depressed). Of the 10 Payam Noor Centers in Yazd Province, 5 ones were randomly chosen in the first stage to select cluster one. The second cluster consists of 2010 entrance students to this center in the field of psychology. The cause of making the research community limited was choosing the students who were not familiar with psychology tests and controlling the probable impact of various courses over the results of this research. Given the necessity to use the end-group methods to choose comparison groups, one student was randomly selected in the next stage of each university center as the third cluster of this research. Then Beck Depression Inventory was handed out among students as a tool to identify and classify research groups. Given that at least 30 people are needed for each comparison based on research methodology literature in one hand (Delaware, 2009) and regarding the difficulty to identify depressed people in research community, 187 inventories were completed in this stage. After controlling and deleting incomplete inventories or sham responses, this number is decreased to 141 inventories. To choose groups of depressed and non-depressed people in the next stage of the cutting point, the scores higher than 30 was used to identify depressed people and the scores of lower than 10 was used to identify non-depressed people (Rasti and Taghavi, 2005). According to this criterion and given the maximum 30 people for each group and regarding the variables of age and gender control, people with the similar features in terms of control variables in each depressed and non-depressed group were randomly coordinated. Two tools namely Beck Depression Inventory (1961) for measuring depression level and memory retrieval test were used.

Beck Depression Inventory was first designed by Aron (1961) and then was revised in 1971 and finally published in 1987. This inventory has 21 questions in which the contents of its 15 sentences is related to psychological symptoms and 6 other sentences are related to physical symptoms. Total score of depression is calculated through the total of scores obtained from all sentences and its range is diverse between 0-36. In this inventory, the severity of depression ranged between 0-9 indicates its normality, 0-16 indicates its weak depression, 17-29 indicates its moderate depression and the scores higher than 30 indicates severe depression (Rasti A and Taghavi MR, 2005). The reliability and validity of this inventory was investigated in 1985 and 1979 by Mandelson, Mark and Warbaf, respectively. The validity of this test was determined in Iran by calculating internal correlation coefficient as 84% and reliability coefficient was determined by division method as 70% (Hasanshahi and Goodarzi, 2003) by Goudarzi (2002) in Iran. Kazemi (2003) also calculated the validity of Depression Inventory using Cronbach's alpha who reported a coefficient equivalent to 84% (Seifi et al., 2004). In another part of this study, to measure information

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retrieval of memory, three different tests were used as follows: 1) free recall test was made by Rafiinia (2007). This test includes 36 different words which of these 36 words, 12 words are positively emotional words, 12 words are negatively emotional words and 12 words are neutral. The reliability of this test was confirmed after obtaining the opinions of experts in the field of psychology and psychometrics as well as applying corrections over initial form (Rafieenia *et al.*, 2007). 2) Signed recall test which was provided by Lotfi (1997) which includes 36 words and equally are positive, negative and neutral words. Content validity of this test was confirmed after doing needed revisions by the experts in the field of psychology (Afshar, 1998). 3) Recognition test which was made by Lotfi nia (1993) and includes 36 words of emotionally 12 positive words, 12 negative words and 12 neutral ones. Content reliability of this test was also confirmed by the same tests conducted before (Lotfi Nia, 1994). The scoring method in all 3 tests was in this way that one score was dedicated in each retrieval stage per each recalled word by the subject. In terms of test applications, not only the application of tests in each concerned class was paid attention to, but it was considered that the step for recalling words in each test was 4 minutes. Then, for detracting the subjects from in order to gain no time to review and repeat words, a kind of homework was done between recalling and retrieval stage in applying each test in that each subject should deduce thrice three out of 50 and demonstrate provided geometrical designs during three minutes in signed recalling test and seven times out of seven should be reduced from 1000 during 2 minutes in recognition test. After performing this stage in each retrieval test, the tasks of retrieval were presented. In retrieval stage, the subject, in free recalling test, should recall the words learnt from the first list as much as he/she could for three minutes and words lists in which the first letter of each word written down was presented to the subject in marked recall test to complete it for four minutes and finally the old words should be recalled for four minutes in recognition test out of the a list consisting old and new words. To describe the information collected descriptive statistical indicator and multivariate variance analysis to test research hypotheses using the 16th edition of statistical software in social sciences (SPSS).

Findings

In the present study, 46.7% of the subjects are male and 53.3% of the subjects are female and their mean age is 17.5 and standard deviation is 2.25. Further information regarding mean, standard deviation and variance of people's depression score have been provided separated by levels of age and gender in Table 1.

Table 1: Descriptive indicators of depression score of sample group separated by depressed and non-depressed group based on gender and age variables

Groups		Depressed			Non-Depressed			
Indicators/Features		Mean	Standard Deviation	Variance	Mean	Standard Deviation	Variance	Number
Gender	Female	06.50	1.18	1.40	9.5	1.73	3.00	19
	Male	08.50	1.55	2.40	5.5	1.00	1.00	11
Age	19-22	08.50	1.55	2.40	9.0	1.63	2.67	18
	23-28	06.50	1.18	1.40	6.0	1.09	1.20	12
Total Score		29.56	5.37	0.14	4.0	2.08	4.34	30

As can be seen from Table 1, the mean of depression score among men is more than that of women in depression group and the mean of 19-22 years is more than that of 22-23 years in terms of age. The mean of depression score among women is more than that of men in non-depressed group and the age class of 19-22 years is more than 23-28 years. The mean of depression level in depressed group is 29.56 in terms of depression in both groups and it is equals 4 in non-depressed group. The descriptive indicators of the retrieval of positive, negative and neutral words in each retrieval method separated with both depressed and non-depressed group has been presented in Table 2.

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Table 2: Mean and standard deviation of the score of positive, negative and neutral words retrieval in each retrieval methods separated by two depressed and non-depressed groups

Retrieval Methods	Group	Words Indicator	Positive Words	Negative Words	Neutral Words	Number
Recognition Test	Depressed Group	Mean	4.91	4.56	4.01	30
		Standard Deviation	1.03	1.37	12.1	30
		Mean	5.36	3.56	4.03	30
	Non-Depressed Group	Standard Deviation	1.56	0.01	1.13	30
		Mean	5.36	3.56	4.03	30
		Standard Deviation	1.56	0.01	1.13	30
Signed Recall	Depressed Group	Mean	5.73	3.98	4.09	30
		Standard Deviation	1.66	1.05	1.16	30
		Mean	3.93	5.03	4.1	30
	Non-Depressed Group	Standard Deviation	1.03	1.29	1.17	30
		Mean	5.57	3.71	4.11	30
		Standard Deviation	1.68	1.02	1.19	30
Free Recall	Depressed Group	Mean	4.91	4.56	4.01	30
		Standard Deviation	1.03	1.37	12.1	30
		Mean	5.36	3.56	4.03	30
	Non-Depressed Group	Standard Deviation	1.56	0.01	1.13	30
		Mean	5.36	3.56	4.03	30
		Standard Deviation	1.56	0.01	1.13	30

As can be observed from the mean score of information retrieval in each test mentioned in table 2, the amount of words recalling which is emotionally positive words in all three tests among non-depressed people is more than those of depressed ones and the amount of emotionally negative words in depressed group in all three retrieval tests is more than those of non-depressed people, but no difference was observed in the amount of the retrieval of neutral words .

To analyze the hypotheses related to the comparison of subjects' performance in both depressed and non-depressed groups in words retrieval in each test in the present study, multivariate variance analysis method (MANOVA) was used. Before using this statistical method, the statistical default of Wilks-Lambda was used to determine the significance of the main impact of the variable over the amount of the retrieval of positive, negative and neutral words in all three recognition, signed recall and free recall methods were used and it has been figured out that the general impact of the groups variable on the amount of the retrieval of positive, negative and neutral words in all three retrieval methods were significant and the data collected have enough effect to apply multivariate variance analysis. Summary of variance information analysis of the comparison of subject's groups in terms of the comparison of the retrieval of positive, negative and neutral words in all three tests have been shown in Table 3.

Table 3: Summary of variance analysis of information related to means difference in the retrieval of positive, negative and neutral words in all three retrieval methods

Source of Change	Dependent Variable	Total Square	Degree of Freedom	Total Mean	F	Significance Level
Group (Depressed and Non-Depressed Group)	Positive	38.45	1	38.45	18.70	0.001
	Negative	25.00	1	25.00	14.56	0.002
	Neutral	00.62	1	00.62	00.39	0.531
	Positive	38.40	1	38.40	18.71	0.001
	Negative	18.00	1	18.00	10.30	0.043
	Neutral	00.68	1	00.68	00.40	0.924
	Positive	04.01	1	40.10	21.10	0.001
	Negative	15.00	1	15.00	08.98	0.044
	Neutral	00.60	1	00.60	00.37	0.545

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Taking into consideration the test results, the hypotheses in Table 3, zero hypothesis indicating lack of difference between depressed and non-depressed groups in the retrieval of positive, negative and neutral words in the retrieval test for positive words at the $P < 0.001$ level and for negative words at the $P < 0.01$ level was rejected, but this difference was not significant for neutral words at the level of $P > 0.05$ and its zero hypothesis is therefore rejected. Also, zero hypothesis indicating lack of difference between two depressed and non-depressed groups in the retrieval of positive, negative and neutral words in the signed retrieval test for positive words at the level of $P < 0.001$ and for negative words at the level of $P < 0.05$ was rejected; however, it was not significant in the study of the difference between the amount of signed recall of neutrally loaded words in this section was not significant, and as can be seen from the table, zero hypothesis indicating lack of difference between depressed and non-depressed groups in the retrieval of positive, negative and neutral words in free recall test for the positive words at the level of $P < 0.001$ and for the negative words at the level of $P < 0.01$ was rejected; however, this similar difference with previous tests for the neutral words at the level of $P > 0.05$ was not significant.

RESULTS AND CONCLUSION

The present study was conducted aiming to investigate the effect of depressed mood on the retrieval of positive, negative and neutral words in each retrieval methods (free recall, signed recall and recognition) out of the memory of depressed and non-depressed students of Payam Noor University of Yazd province in the academic year 2009-2010. According to the first hypothesis, there was a significant difference between depressed and non-depressed groups in the retrieval of positive and negative words in the retrieval test, and given Table 2, depressed group identified more negative words and non-depressed group identified more positive words and this difference was not significant in the retrieval of neutral words, and the mean of retrieval in these words between the two groups was no difference which was compatible with the results of research obtained by Glascher and Brasen (2005) (Moritz *et al.*, 2005). According to the second hypothesis, there was a significant difference between depressed and non-depressed groups on the retrieval of positive and negative words in signed retrieval test and this effect was not significant in the retrieval of neutral words, and given Table 2, more negative words was recalled in negative words and positive words were more recalled in non-depressed group, and this difference was not significant in the retrieval of neutral words which was compatible with the study results obtained by Afshar (1997). According to the third hypothesis, a significant difference was achieved between depressed and non-depressed groups in the retrieval of positive and negative words in free recall test, which based on Table (Smith, 2005), depressed group recalled more negative words and non-depressed group used more positive words, and no difference was observed between the retrieval mean of these words which was compatible with the results of study results obtained by Kliegel and Jager (2006) (Kliegel and Jager, 2006). The significance of the difference between depressed and non-depressed groups in the retrieval of positive and negative words in all three retrieval methods (recognition, signed recall and free recall tests) can confirm Beck theory (1976) regarding compatible recall with mood, based on which depressed people are biased towards negative words which is in favor of their mood, meaning that a people's depressed mood affects the memory retrieval out of memory under its processing effects (Rafieenia *et al.*, 2007). Also, these findings can be explained by the theory of network model associating with belief memory (1981), in which activating one emotional unit of memory (showing negative words) cause activating the units associated with it and as a result the information coordinated with mood are involved one's awareness which is consequently led to the bias coordinated with the mood (Rafieenia *et al.*, 2007). This bias in depressed people's memory will play a very important role in the persistence of depression. Depressed people randomly recall depressed-related information, and this in turn makes their depression worse (Rasti and Taghavi, 2005). Therefore, it is people's depressed mood that affects information processing out of memory; or in other words, the structures related to emotional processing of words has facilitating effect which is compatible with Belief Theory (1981) which causes the processing

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of the stimulus consistent with mood will be created more easily (Kensinger and Corkin, 2003). Accordingly, regarding the current research background and the rich theories in the field of significant differences between cognitive patterns and the thought of depressed people and the differential power of the tests applied, this tool can be useful in the identification of depressed people out of non-depressed ones, and in the next stage, using this tool and parallel inventories can be generalized for monitoring the recovery process. Regarding the fact that the results of this study is merely suggested in the fields that Beck Depression Inventory (1961) as diagnosis criterion of people's depression level, it is suggested that this study be performed again using other and newer depression measurement tools on condition that it is internally validated using psychometric indicators for the divergence of these results be tested. In conclusion, it can be indicated that knowing the effect of depressed mood in all three methods of information processing out of memory and being aware that there is mood-consistent memory bias in depressed people, and the existence of negative memory and its preservation and maintenance are the main causes of the persistence and worsening of depression, therapeutic interventions can be reconsidered in that people's cognitions and negative memory can be modified by the manipulation and changing mood and people's emotional state using being motivated to do pleasant activities, entertainment and role play and an effective step is therefore taken to treat this disorder.

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