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Comparing Theory of Mind and False Memory in Schizophrenia and Healthy Individuals

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K E Y W O R D S: Schizophrenia, Cognitive Theory of Mind, Emotional Theory of Mind, False Memory

Abstract: Schizophrenia is a variable but disruptive disorder that engages cognition, emotion, perception and other aspects of behavior. This study aims at comparing the Theory of Mind (ToM) and False Memory in people with schizophrenia and healthy individuals. This study is a causal – comparative and prospective research. The study sample included all patients with schizophrenia who were hospitalized in the first quarter of 2015 in the Health and Welfare Centers in Ardabil. From among this population, 30 patients with schizophrenia and 30 normal subjects were selected by convenience sampling. To collect the data, the Comic Strips Test for cognitive component of Theory of Mind, Mind Reading through Eye Movements for emotional component of Theory of Mind, and Roediger–McDermott (DRM) paradigm for investigating False Memory were used. Research data were analyzed using Multivariate Analysis of Variance. Results of the analysis showed that each of the variables of Cognitive Theory of Mind and Emotional Theory of Mind in patients with schizophrenia was significantly lower than that of healthy subjects. Besides, patients with schizophrenia had more false-positive memory errors than healthy people. With explaining the damaged cognitive and metacognitive bases in schizophrenia patients, clinical knowledge can be developed for more recognition of the disorder and applying appropriate cognitive – behavioral treatments to improve some of the symptoms of schizophrenia.

Introduction

One of the dilemmas and problems in today's society is mental illnesses which have always existed in human society. According to the Diagnostic and Statistical Manual (DSM-V) mental disorders are syndromes with main features as follows:

Impaired cognitive, emotional and behavioral control in a way that is clinically significant and reflect inappropriate psychological, biological and developmental processes that are behind mental function (Ganji, 2013). Schizophrenia is a variable but disruptive clinical pathological syndrome that engages cognition, emotion, perception and other aspects of behavior. The instrument of these manifestations varies in different patients and has different durations, but the effects of the illness are always severe and long. Schizophrenia as a psychotic disorder is often associated with cognitive damage such as Concrete Thinking Disorder, Impaired Information Processing, Impaired Social and Occupational Interactions, Impaired Social Cognition, Impaired Social and Occupational Functions and low accountability (Tsang, 2002).

Schizophrenia is characterized by two categories of positive and negative symptoms. Positive symptoms are those introduced with their presence and include mental disorders, deliriums and hallucinations. Schizophrenic patients have many problems in logic arrangement of their thoughts and making logical and reasonable conclusions. Their opinions and beliefs are at odds with reality and perceive incentives that do not exist. Unlike positive symptoms, negative symptoms of schizophrenia are characterized by the absence of normal behaviors:

Shallow emotional response, lack of speech, lack of initiative and persistence, the inability to gain pleasure and social withdrawal (Carlson, 2007)

Neuro-psychological models show that some of the clinical symptoms of schizophrenia can indicate a particular disorder in a patient's mental status. This pathological change of self-consciousness may occur as impairment in the ability to represent mental state of the patients/others, and this ability is known as "Theory of Mind".

In addition, patients with schizophrenia are unable to identify and evaluate themselves using their own mind. This assessment ability that distinguishes perceptions of its origin from perceptions with external origin can be adopted as diagnostic criteria for visualizing natural understanding. If this evaluation function is impaired, the perceptions with internal origin are experienced as external perceptions (Gambini, et al 2004)

The term "Theory of Mind" or "Mentalizing" was first used to explain the human's ability to predict his behavior and that of others. This ability allows us to represent beliefs, attitudes and goals of others in our mind and properly respond to them (Baron-Cohen, 1995). In other words, all people have beliefs and attitudes that can be correct or incorrect. Beliefs and attitudes of others are not necessarily similar to ours. Awareness to our mental functions and that of others helps explain and predict the behavior of others. Recent researches have conceptualized Theory of Mind consisting of two basic components:

1. Cognitive component
2. Emotional component

(Shamay - Tsoory, Harari, Aharon-Peretz et al., 2009)

Cognitive theory of mind that refers to the ability to infer and predict beliefs, intentions, thoughts, beliefs of others and emotional component refers to the ability to infer emotional and affective states and feelings of others

Flaws in the theory of mind in psychosis can also make symptoms for a person. For example, if the patient is unable to understand beliefs as reflections of reality, the distinction between the subjective and the objective affairs will be difficult for him and this can contribute to the development of delirium. Also, if the patient is unable to perceive unique views of others, he cannot allocate a room in his mind for their views and cannot understand the listener's confusion which is in turn a sign for thought disorder in patients. Moreover, if patient cannot monitor his targeted behavior, he will suppose that he has not created them and the delusion of alien control occurs (Langdon & Coltheart 1999). Thought insertion and delusion of control may indicate the inability to express action plan. Delution of Reference and Persecution may indicate forms in reflecting mental state of others (Gambini et al., 2004). The initial researches showed that most schizophrenic patients had a poor performance than healthy subjects and non-schizophrenic patients in passing Theory of Mind test. And this disorder has been more significant in active period of the disease. **(**Bourai 2003; Shankel et al, 2005; Brunet et al 2003; Hiro et al 2008; Bourai et al, 2009; Mentag et al, 2011; Gertie and Freeman, 1999; Drury et al, 1998; Nejati Safa et al, 2004**;** Zera'atkar et al, 2013**;** Raiiat Moeini et al 2014) Patients with negative symptoms have had the most malfunctions in the Theory of Mind task performance (Shamay - Tsoory et al., 2007; Ali Loo 2011) and patients with paranoid symptoms did poorly on the Theory of Mind task performance (Mack et al., 2004). In a study by Drury et al. (1998), patients with Delusion of Persecution had a weaker performance on the Theory of Mind tasks than non-delusional patients (Beth et al, 2010; Zeraatkar, 2013). Impaired cognitive function is considered as a central characteristic for schizophrenia, and it seems all the patients are affected to it in varying degrees and poor health outcomes and repeated recurrence in this group of patients is caused by this impairment. These cognitive deficits are arisen in areas such as memory, problem-solving, selective attention, judgment, maintenance and administrative practices (Ramfar et al., 2006).

Memory failure plays a key role in pathological schizophrenia models. (Hamesli, 1994) There are different types of memory according to Mayne and Bonanno (2001). The most important categorization, divides memory into three forms of short-term memory, long-term memory and the hidden memory. However, each one has biologically allocated a special position to it and maintained special information. Human's memory is prone to systematic errors many of which are made and formed on the basis of actual experiences. In recent years, this susceptibility has been discussed in researches entitled False Memory. False memory refers to reminiscent of what is never experienced or distortions of them (Nemets et al., 2002). People sometimes remember events that have never happened and even note the details carefully (Leding, 2009). The memory is affected by social influence and the recounted details by memory of others are replaced by information of an individual's memory who has listened them (Miserbag, 2009).

Memory can be affected by irrelevant environmental information and even take the words of others (Bremner, 2000). This type of False Memory is more common in adults. Some therapists believe that scary and sad memories are suppressed and placed in the subconscious parts of the mind, but they are later restored.

This type of information may have changed and even replaced or added by new information.

False Memory is mostly observed in significant scary and sad memories (Nash, 2009).

First, Bartlett (1932) carried out a systematic research on this and found that people suffer from distortion or memory error. Before that, psychologists such as Bine, Stern & Manstenberg performed researches in this area and pointed out the Memory Distortion phenomenon (Cici & bruck, 1993). The common goal of many researchers is to understand how these errors have been created (Anorth and Brewer, 2010; Beth, Lawez and McKenna, 2010; Etgar, Kandel, Escobaria and

Mercè Bech, 2010). Although many studies have investigated the false negative errors such as forgetting in patients with schizophrenia, the researchers' investigation showed that a False Memory has not been researched such as the false positive errors with Theory of Mind in schizophreniac patients. That is why the question arises whether there is a difference between the Theory of Mind and False Memory in people with schizophrenia and healthy people.

Research Hypotheses

1- Cognitive theory of mind ability in schizophrenic patients is lower than in healthy individuals.
2- Emotional Theory of Mind ability in schizophrenic patients is lower than in healthy individuals.
3- Patients with schizophrenia have more false-positive memory errors compared with healthy individuals

Research Method

Methodology

This is a causal-comparative (ex post facto) research.
Population: population of the present study includes all patients with schizophrenia hospitalized in the first four months of 2015 to Health and Welfare Centers in Ardabil.

Sample size and sampling method

Among patients with schizophrenia admitted to the Welfare Centers, 30 patients were selected as convenience sampling.

Tools for data collection

To study the research hypotheses and False Memory, both components of theory of mind (cognitive and emotional components) were compared in patients with schizophrenia. To assess the cognitive component of Theory of Mind, the Comic Strips Test, and to assess the emotional component of Theory of Mind, Adults' Eye Movement test which is a Face Manifestations Assessment Tool were used. Besides, Diss - Rüdiger – McDermott test has been used for the evaluation of False Memory in people with schizophrenia and healthy individuals.

***Comic Strips Test for Examination* of Evaluating Cognitive Component *of* Theory of Mind**

Comic Strips were first built by Sarfati et al in 1997. Comic Strips Test comprises six images the first of which (left image) shows someone doing something. The subject is asked to select the image that is logically complemented of the first 3 images (left side) after observing them. The correct answer is considered a sign for the recognition of the fictional character's intention**.** Then the participants are asked to explain what the fictional character has done in the images.

In these cases, Score 3 is given to choosing the correct answer and the correct explanation for the fictional character (which is a sign of Theory of Mind ability), Score 2 is given to the correct answer of 1 of 2 questions (which is a sign of relative subjective opinion) and Score 1 is given to incorrect answer to both questions (which is a sign of lack of Theory of Mind). Comic Strip Tests contain 10 stories. About the validity of the test (internal consistency), Morris et al (1999), quoted by Qumrani et al (1979), reported the validity and reliability of the test as 0.85 and 089 respectively. Qumrani et al (2006) investigated the validity and reliability of the translation and adaptation of Theory of Mind tasks in Iran and the validity of the test varied between 0.71 to 0.94 and the test validity was obtained as 0.81 (Quoted from Qumrani and Alborzi (2006).

Mind-reading Test through Eyes to Assess the Emotional Component of Theory of Mind

To measure the emotional component of Theory of Mind, a revised **"**Reading the Mind in the Eyes' **test"** was implemented (Baron - Cohen et al., 2001) This test shows particular damages of Theory of Mind in patients with autism spectrum disorder and schizophrenia. The revised form of this test (the 36-point form) contains images of the eyes (from the eyebrows to the middle of the bridge of the nose) belonged to actors/actresses. Four descriptions on mental state are provided with each item (a target mode and three diversionary modes with the same emotional value). Just with using visual information, the respondents will be asked to select the word that best describes thought or feeling of the eyes owner. This test has no time limit, and participants can pause on each image to find out the correct answer and then go to the next question. If faced ambiguous meaning of the words, the meaning can be asked from the examiner or they can refer to the glossary of the test. Each correct answer is awarded Score 1 and the scores range from 0 to 36. A score ranging from 22 to 30 indicates low Theory of Mind and the score higher than 30, indicates high Theory of Mind. The validity of this test in

Bafaneh's study (2011) was 0.72 on Theory of Mind deficit and its Face Validity carried out under the supervision of several psychologists, has been reported high. Validity and internal consistency (Cronbach's Alpha Coefficient) of this test has been reported as 0.73 in Mahmoud Ali Loo et al (2011).

False Memory Test Assignment

This assignment can be implemented in visual, auditory, and written form. Researchers can create changes according to the groups under study and the purpose of study, and the existing situation. This test does not depend on a specific culture and can be applied in all cultures due to its semantic structure and is a good instrument to assess False Memory (Rüdiger, Mead and Bergman, 2001) The validity and reliability of this test have been approved in the general and student population of Iran (Abdullahi, 2001). The primary version of this assignment was first presented in 1998 by Rüdiger and McDermott by applying the items used by Dis entitled (DRM). In this model, with the use of multiple word lists of the associated and relevant words, the memory errors are discussed in recall and recognition assignment. In this model, the subject is exposed to a list of words with semantic dependence (such as doctor, clinic, hospital, pharmacy, sphygmomanometer) all of which were relevant with the main bait not mentioned in the list (e.g., here the word doctor is the main bait) After reading the words, the subject will be asked to recall these words after a certain time. The recognition phase includes a list of the presented words, not-presented keywords and the additional words that the participant must determine which word is one of the provided words and which one is not. This plan has provided an easy and reliable method for studying false memory recall and recognition in the associating processes. According to Wade et al (2007), about 40% of the studies conducted on False Memory have used DRM Paradigm. This confirms the validity of this tool and introduces it as a powerful tool. Additionally, Stadler, Rüdiger and McDermott (1999), calculated the validity of Recall and Recognition test using Split-Half Method. These researchers reported Split-Half method correlation coefficient as 0.80 and 0.85 for Recall and Recognition tests respectively. Since DRM is a method for assessing False Memory, researchers prepare different versions of it according to their research needs. In this study, semantic network determination list was used for the selected Persian words and designing a False Memory Test corresponding with it (Nejati 2014) to study False Memory in the Persian language speakers. Four lists were selected from among the main lists. In the Recall phase, these words were presented with an interval of 2 seconds except keywords (bait). In Recognition Test, a list was selected with 18 words from the presented list and 18 words from not-presented list. Recognition test was presented to subjects after 30 to 45 minutes. For scoring each set of lists, the correct and false answers were first identified in both sections of Recall and Recognition. The final score of the false recall was calculated from dividing total recalled keywords by the number of lists. Getti et al introduced another indicator of False Recall entitled relative False Recall. Besides, Carneiro et al (2007) have emphasized using it in developmental studies of false memories. This indicator is determined concerning the recall level of any subject. In fact, the number of recalled words is divided for each participant. The prior score of False Recall is calculated compared to total presented words and not the total recalled words.

Correct recognition scores were calculated from dividing the total number of correctly recalled words by the total presented words in the collection of lists. False recognition scores were obtained from dividing the total number of recognized keywords by the number of lists and the correctly recalled words score were obtained from dividing the total correctly recognized words by the total number of presented words available in the lists.

Research Method

In order to implement the research, licenses and the introduction of a field practice were first taken from the Research Deputy of Ardabil University for the Welfare Office of Ardabil. Then the initial coordination was carried out with the considered Health Centers and after selecting patients with schizophrenia in an accessible way, research purposes were described for them and written informed consents were taken from them to participate in research. The subjects participated in the study in an atmosphere devoid of tension and ensured to full respect of the principle of secrecy and confidentiality. The subjects had enough time to respond the questionnaire items and the ambiguous points (if any) were explained for the patients. Moreover, they could cut their cooperation with the examiner if desired. Furthermore, healthy individuals were randomly selected from among those matched with patients group in terms of age, gender and educational status and responded to cognitive and emotional Theory of Mind questionnaires and False Memory test. It should be noted that most of the questionnaires were completed in participants' quite favorable and enthusiastic cooperation and the collected questionnaires were compared and analyzed through SPSS 20 software.

J) Method of Data Analysis: The collected data were analyzed in two ways of descriptive and inferential statistics. The hypotheses of this study were analyzed by Multivariate Analysis of Variance (MANOVA)

Findings

Research Hypotheses

In the following, descriptive parameters associated with the variables under study are shown in Table (1).

Table 1. Mean and Standard Deviation of the variables under study in two groups of patients with schizophrenia and healthy individuals

Groups	Patients with Schizophrenia		Healthy Individuals	
The dependent variable	Mean	Standard Deviation	Mean	Standard Deviation
Cognitive theory of mind	15.43	2.77	21.66	2.42
Emotional theory of mind	13.37	3.74	20.97	4.19
False Recall	0.077	0.06	0.041	0.035
Correct Recall	0.33	0.12	0.62	0.13
False Recognition	0.32	0.16	0.15	0.046
Correct Recognition	0.66	0.14	0.84	0.054

As observed in Table (1), the mean cognitive Theory of Mind is 21.66 in healthy subjects and 15.43 in schizophrenic patients. The mean emotional Theory of Mind in healthy subjects is 20.97 and in schizophrenic patients is 13.37. In other words, the average Theory of Mind abilities in schizophrenic patients are less than healthy individuals. The mean false-recall in healthy subjects is 0.041 and in schizophrenic patients is 0.077. And the average correctly recall in healthy subjects is 0.62 and in patients with schizophrenia is 0.33. In other words, the mean false-recall in patients with schizophrenia and the average correctly recall in healthy subjects, are greater than other groups. The average false recognition in healthy subjects is 0.15 and in patients with schizophrenia is 0.32. The average correct recognition in healthy subjects is 0.84 and in patients with schizophrenia is 0.32. The average correct recognition in healthy subjects is 084 and in patients with schizophrenia is 0.66. It means that mean schizophrenic patients is more than healthy individuals in false recognition property and less than them in correct recognition. To test the hypotheses of research, MANOVA was used. To use this test, assumptions should be established. One of these assumptions is the equality of the groups' variance, and the other is the equality of the variance-covariance matrix and the results of these tests are presented in Tables (2) & (3).

Table 2. Levene's Test results for variables of cognitive theory of mind, emotional Theory of Mind and False Memory

Groups	F	Degrees of Freedom 1	Degrees of Freedom 2	The level of significance
Cognitive theory of mind	1.21	1	58	0.27
Emotional theory of mind	0.879	1	58	0.35
False Recall	1.78	1	58	0.12
Correct Recall	0.169	1	58	0.683
False Recognition	2.45	1	58	0.09
Correct Recognition	38.917	1	58	0.0000

Levene's test results in Table (2) show that the variances are equal.

Table 3**:** Box's M test for variables of cognitive Theory of Mind, emotional Theory of Mind, and False Memory

Box Value	F	Degrees of Freedom 1	Degrees of Freedom 2	The level of significance
93.85	2.39	21	12372.787	0.09

By reviewing Box's M test, it was found that the homogeneity of variance – covariance matrix has been observed (F=2.39, P<0.05), which suggests that the observed covariance matrices of the dependent variables are equal for independent variable levels. Therefore, using MANOVA to test the following hypotheses is permitted.

1. Cognitive Theory of Mind ability of schizophrenic patients is lower than that of healthy individuals.
2. Emotional Theory of Mind ability in schizophrenic patients is lower than healthy individuals.
3. Patients with schizophrenia have more false-positive memory errors

Table4. The results of MANOVA for research variables

	Tests	Value	F	The level of Significance	Eta squared measures
Group	Pillai's Trace	0.682	18.913	0.000	0.682
	Wilk's lambda	0.318	18.913	0.000	0.682
	Hotelling effect	2.141	18.913	0.000	0.682
	Largest root of the error	2.141	18.913	0.000	0.682

As observed in Table (4), MANOVA for two groups of schizophrenic patients and healthy subjects show significant differences in the scores of cognitive Theory of Mind, emotional Theory of Mind and False Memory. In other words, between the two groups of patients with schizophrenia and healthy subjects significant differences are found at least in one of the dependent variables. Eta squared measures (which in fact is the square of the correlation coefficient among the dependent variables and the group membership) shows that the difference between the two groups is totally significant with respect to the dependent variables and the difference is 68.5%. It means that 68.5% of variance is related to the difference between the two groups in the interplay of the dependent variables. In the following, MANOVA results are presented in Table (5).

Table 5. MANOVA results on the research variables

Index Variable	Sum of squares	Degree of Freedom	The mean squares	F Value	The level of significance
Cognitive Theory of Mind	582.81	1	582.81	85.78	0.000
Emotional Theory of Mind	866.40	1	866.40	54.74	0.000
False Recall	0.019	1	0.019	7.56	0.008
Correct Recall	1.28	1	1.28	73.51	0.000
False Recognition	0.41	1	0.41	28.57	0.000
Correct Recognition	0.49	1	0.49	38.82	0.000

Considering the Multivariate Analysis of Variance in Table (5), according to the F =85.78 and also considering that a significance level of test error is less than 0.01 at the 0.99 level of significance. It can be concluded that cognitive Theory of Mind in schizophrenia patients and healthy subjects were significantly different. Referring to the average of the two groups of cognitive Theory of Mind presented in Table (1), it is clear that the cognitive Theory of Mind in two groups of patients with schizophrenia is lower than the healthy people. Thus the first hypothesis is confirmed and cognitive Theory of Mind abilities in schizophrenic patients is lower than healthy individuals. The findings in Table (5) show that the two groups of patients with schizophrenia and the healthy subjects are significantly different in emotional Theory of Mind (p<0.01, F=54.74). Referring to Table (1), and comparing the mean of the two groups in emotional Theory of Mind, it is found that the emotional Theory of Mind in schizophrenic patients group is less than that of healthy subjects. Accordingly, the second hypothesis is confirmed and emotional Theory of Mind abilities in schizophrenic patients is lower than healthy individuals. More analyses on findings in Table (4), indicate that the two groups of schizophrenic patients and healthy subjects in recall (p<0.01, F=7.56) and False Recognition (P<0.01, F=28.57) are significantly different. Referring to Table (1) indicates that schizophrenic patients enjoy more false recall and false recognition than healthy subjects. Also according

to the difference between the healthy group and the patient group in recall ($F=73.51$, $p<0.01$) and correct recognition ($F=38.82$, $p<0.01$), it can be concluded that schizophrenic patients enjoy less recall and recognition than healthy subjects. Accordingly, third hypothesis is also confirmed and there is a significant relationship between positive and false memory in schizophrenic patients and healthy subjects and schizophrenic patients have more false-positive memory errors than healthy subjects.

Discussion and conclusion

First hypothesis: cognitive theory of mind ability in schizophrenic patients is lower than healthy individuals. The results of multivariate analysis of variance showed that the two groups of healthy subjects and patients with schizophrenia are significantly different in cognitive Theory of Mind components so that schizophrenic patients are impaired in cognitive component of Theory of Mind. These findings are consistent with Kazemian (2015), Fritland (2015), Romeo (2014), Raiiat Moeeni (2014) and Zeraatkar's findings (2013) and inconsistent with Vasten's (2000) who showed in his research that the Theory of Mind is healthy in some schizophrenic patients because the ability of attributing mental states to others that reflects the Theory of Mind is a prerequisite for delusions of persecution is at least inconsistent in delusional disorders. In explaining these findings, it can be said that people receive and process a wide range of social and cognitive symptoms of mental representations in social interactions. Individuals' mental representations of intentions, desires, feelings and emotions of others play an important role in social functioning. For social creatures, the power to detect incentives, goals, desires, beliefs and feelings of others is a required skill for life, I.e., understanding others for better coordination with them. This degree of knowledge and awareness, in turn, allows people to predict the behavior of others. Social and cognitive neurologist scientists call this special and vital skill, the ability of the mind and know that the basis for the success in the relationships (Bartz and Hollander, 2007).

For example, if a patient with schizophrenia is faced with some problems in understanding his behavior as a result of his considered goals, and in inhibition of inadequate reactions, will incorrectly interpret his actions under the control of an alien and will experience imperative hallucinations.

If the patient confuses his mental representations with reality, he will achieve mistaken beliefs about the intentions of others leading to the formation of persecutory delusion (Wang et al., 2007). Cognitive Theory of Mind component, is the ability to receive and to interpret psychological status of others in order to predict their behavior, that is, cognitive Theory of Mind is very important in the ability of inferring beliefs of others and involvement of competitive social behaviors and Mind-Reading ability in order to facilitate social interactions help people manipulate others to reach their goals (Wellman et al., 2001; Yall and Brozy, 2007; Ritter, 2010).

Second Hypothesis: Emotional Theory of Mind ability in schizophrenic patients is lower than in healthy individuals. Besides, the results obtained from multivariate variance showed that the two groups of healthy subjects and schizophrenic patients are significantly different in the emotional component of Theory of Mind.

And the emotional Theory of Mind in patients with schizophrenia is significantly weaker than healthy people. These findings are consistent with findings of Ali Loo (2011) and Sadat Fathabadi (2012). There is a full similarity between the concept of emotional Theory of Mind with empathy (schema-Tsui et al., 2009). In other words, these patients have no empathy to the thoughts and opinions of others. Positive social relationships and having a healthy Theory of Mind require the capacity to understand emotions and people's sensory experiences. The mentioned experience and ability are very important in terms of epistemology because they provide a direct assessment from the behavior of others (Distri, 2004; Lavarens et al., 2004). Good social relationships require experience of emotions the same similar to excitements of another person. This experience provides the ability to direct assessment of the behavior of others, which is very essential in the emotional component of Theory of Mind. Therefore, as a general rule, we can say that the psychological status documents and being aware of the views of others is a necessary condition but not sufficient of empathy for empathy because a sufficient condition for empathy is the ability to assume oneself in the position of others and experiencing their emotions. Weaker performance in schizophrenic patients compared to healthy subjects is because these patients are faced with disorganized and disarrayed thinking. They have many weaknesses in refining and justifying their targeted thinking and behavior. Hardy_Bayl (2003). By doing extensive researches, they concluded that lack of Theory of Mind ability in patients with schizophrenia due to a lack of competence and general weakness in manufacturing executable programs is created in these patients' minds. Accordingly, perhaps a flaw in the Theory of Mind is the background for the severity of symptoms and signs of schizophrenia.

The third hypothesis: patients with schizophrenia have more false-positive memory errors than healthy subjects. Another finding of this study was that schizophrenic patients have more false-positive memory. These findings are

consistent with Paz Alonso et al., (2013); Parnoth Marino et al., (2010); Beth et al., (2010); Mamarla et al., (2010). These findings were inconsistent with Martinez et al findings (2004). To explain these findings, Associative-Activation Theory can be used. Associative-activation theory knows False Memory as a product of associative-activation processes that these associative relations play an important role among the materials of the list and the keyword in the False Memory error. This theory shows using scattered-patterns of activation that processing a word activates the corresponding word or, in other words, the corresponding concept in the mental lexicon and this activation continues in the process of presenting the list words some of which are not-presented materials but they have been activated due to their relations with materials presented in active database (Ho et al. 2009) Several theories have been proposed to explain the strong effects of False Memory. One of the possible explanations proposed by Rüdiger and McDermott (1995) is that the keywords are repeatedly activated by the presented list of the words and create implicit associations, therefore, or keywords come to mind whether consciously or unconsciously. This explanation is consistent with the Source Registration Framework Theory provided by Johnson et al. Source Registration Framework Theory says that, it is derived due to involving a decision-making process both by the stored information in the encryption and by the context in which this information is restored (Mac Cobb, 2002). Based on the obtained results, the following suggestions are offered:

Given that the present study was conducted in the geographical area of Ardabil, it is suggested a research to be carried out with widespread statistical population and samples to generalize the results with greater confidence.

In the future researches, the subject of schizophrenic pathology to be investigated in terms of cognitive, metacognitive and neurologic aspects with controlled illness period, drug control and the type of schizophrenia.

This research and its results only in schizophrenic patients have been conducted. Consequently its generalization to acute patients is difficult.

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