

# Quantitative- Qualitative Analysis the Theory of Mind in Patients with Psychotic Disorder

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**Abstract:** *The theory of mind deficit, as the ability to attribute mental states to others, could explain some of the symptoms of patients with psychotic disorder. The poor estimate of the mental states of other people could explain paranoid thinking, some variations in speech, peculiarities in behavior and other symptoms found in patients with this diagnosis. The aim of the research is to describe the theory of mind in psychiatric patients, as schizophrenia can be seen as a disorder of mental states. The research sample consisted of 30 patients diagnosed with schizophrenia or schizoaffective disorder. Data are obtained via questionnaire method and evaluated quantitatively and qualitatively. For research, we have used non-standardized mind-based verbal tasks. Based on frequency tables, psychiatric patients most failed in the theory of mind in dimensions - metaphors (60%) and mental states (50%). The other variables scored better while 30% of probands failed in the theory of mind of the 1st order, 26.7% of probands failed in the theory of second order, 16.7% in emotional states and 23.3% of all psychiatric patients in physical properties. Subsequently, we focused on the qualitative evaluation of individual areas. We found out, that patients scored the worst in the theory of mind tasks that refer to the mental states of others.*

**Keywords:** *The theory of mind; schizophrenia or schizoaffective disorder; qualitative evaluation of individual areas.*

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## 1. Introduction

The ability to properly understand the intentions of other individuals is extremely important for a successful interaction. The ability to ascribe mental states to oneself and others is called the theory of mind. Mental states are of an intentional character and they include desires, convictions, goals, emotions and intentions. These mental states are not observable however they are the cause of individual's action. The understanding of individual's desires and convictions allows us to understand and foresee the behaviour of others. Currently around 1.1% of populations suffers from a psychotic disease. The disease has a serious impact on the quality of general wellbeing of diseased persons as well as others around them. Manifestations of schizophrenia are of various kinds and they are difficult to grasp.

### *1.1 Theory of mind*

We need several scientific disciplines in order to understand and explain the complicated construction as theory of mind (Koukolík, 2006). Theory of mind is not only about understanding of convictions but as well as about understanding of other mental states and emotions. For understanding of the theory of mind issue they are at least of same importance as convictions (School & Leslie, 1999; Baron – Cohen, 2009).

#### **Mental states**

Mental state is considered a construction that is present in the behaviour of a child and which is later verbalized by children. We distinguish two mental states according to representative process. Presentation mental state is on the level of sub-semantic importance and it is not represented by signs. The second one is a representative mental state and it is constructed by a conceptualization of the first mental state. Representative mental state can be separated from other mental content and thus it becomes an own object of reflexion (Sedláková, 2004; Dlhošová, 2013). In the theory of mind we work with 2 semantic different mental states, and that are the convictions and desires. In the first case these are our own convictions, presumptions, beliefs, and postulates. The second one expresses our wishes, desires, hankerings and demands (Sedláková, 2004).

#### **Mental representations**

These are the inner representations of outer world or mental states and their modelling is happening on the basis of semantic representation (Palmer, 1978). The individual has the capacity to create representations of outer, but as well as his own inner course of events, mental life of other people and interpersonal relations. Some authors (Baron – Cohen, 1999;

Bánovský, 2013; Bora, 2009). call the mental representations of second degree as meta-presentation or secondary representation, or we can find the concept of M-representation or mind-reading.

## **1.2 Schizophrenia**

Schizophrenia can be defined as a serious mental disease that disrupts the ability to act and behave in accordance with the environment. It changes the relation to outer matters and relations to people (Libiger & Hoschl, 2002).

Schizophrenia symptoms are so manifold that we consider its types to be rather syndromes, i.e. a group of symptoms than a clearly bounded diagnostic units (Motlová & Španiel, 2017). The disease is of a chronic character and it permanently damages individual's personality, as well as it disqualifies hi from the work and social scope (Andreasen & Carpenter, 1993). Schizophrenia is associated with dopamine which belongs to bio active amins with exciting and remunerating effect. Its main function is the regulation of motoric activity levels and rewarding system in the brain (Dobeš, 2005).

### **Description on types of schizophrenia**

With the regard to various and manifold clinic pictures of acute diseases the schizophrenia is divided into types (Heretik, 2007). Creation of one type is thus dependent on the structure with which the patient is able of conceptualizing the basic pathologic changes (Mahnkopf & Rahn, 2000). Paranoid schizophrenia is the most common type of schizophrenia (F20.0). The patient hears voices that comment his behaviour, they are often of an imperative or threatening character. Unpleasant ethmoidal and bodily hallucinations, e.g. feelings of burning or radiation, are often found. The individuals with paranoid schizophrenia defend themselves better towards psychotic depersonalisation or disunity than the forms of catatone or hebephrene schizophrenia (Libiger & Hoschl, 2002). Negative symptomatology and disorganisation are usually present however not dominant (Heretik, 2007). There is not enough symptoms present in undifferentiated schizophrenia (F20.3) (Pečeňák, 2014). Residual schizophrenia is mainly characterized by the fact that after the acute symptoms of the disease are gone, negative symptomatology is dominant long-term (Heretik, 2007). Schizoaffective psychosis describes mainly a psychotic disease with the mix of schizophrenic affective symptoms (Smolík, 1996)

### ***1.3 Theory of mind in schizophrenics***

Firth (Frith, 1996) ascribes the disorders of formal thinking to the inability to consider the state of knowledge of other individuals. The presence of delusion is connected to the dysfunction which disables the representation of thoughts, convictions and intentions of other individuals. Certain signs and symptoms can be the result of the theory of mind deficit (Corcoran & Frith, 2003). As negative signs he designates the result of early and vast failure of the ability to represent the intentions. This hypothesis explains the impoverishment of actions, social retreat and flat emotivity. The inability to assess the mental state of others, usage of neologisms and excessive usage of personal pronouns leads to gradual exclusion from the society (School & Leslie, 1999). On the basis of this knowledge the essence of paranoid delude can be explained (Frith, 1996). Individual in acute state of disease is not able to estimate the intentions of other people. On that basis he presumes that others are trying to hide their intentions in front of him and he considers their intentions to be negative towards himself (Corrigan & Penn, 2001).

#### **Disruption of theory of mind as a sign of schizophrenia**

The ability of mentalisation develops normally in schizophrenia and only during its outbreak its damage occurs and at the same time we presume that in remission this ability is again in its normal state (Frith, 1996). The ability of mentalisation is disrupted in the patients in remission (Sprong et al., 2018; Bora et al, 2009; Herold et al., 2002). Among the tasks of the theory of mind of the first and second grade no significant difference was found and he interprets the results by the explanation that the disruption of theory of mind does not need to be limited only to the acute phase of the disease. The deficit of the theory of mind as a feature of schizophrenia is demonstrated by Inoue and the team by their research (Inoue, et al., 2006). This opinion is confirmed by researches focused on the fact that the individuals with high genetic risk of development of schizophrenia have lower ability of theory of mind (Wykes et al., 2001; Irani et al., 2006; Marjoram et al., 2006).

#### **Theory of mind in schizoaffective disorder**

In research of the theory of mind is the schizoaffective disorder usually perceived as one form of schizophrenia. When various forms of schizophrenia were compared it was found that the biggest deficit of theory of mind is shown in disorganized type of schizophrenia (Greig et al., 2004). Theory of mind is more connected, despite their expectation, with negative symptomatics (Abdel-Hamid et al., 2009). According to Frith's model

(Frith,1996) some psychotic symptoms of schizophrenia are present as a result of disruption of theory of mind. In regard to the fact that similar symptoms are found in schizoaffective disorder as well, the disruption of theory of mind should be similar.

### ***1.4 Research problem***

If the theory mind is present – one of the most important tools of social cognition (Corrigan & Penn, 2001). Schizophrenia can be perceived as a disorder of representation of mental states and the disrupted ability of mentalization is considered its central feature. (Corrigan & Penn, 2001). The findings of the previous research studies show that most of the patients with this diagnosis are not able to create mental representations (Corrigan & Penn, 2001; Corcoran & Frith, 2003; Greig et al., 2004; Abdel-Hamid et al., 2009; Corrigan & Penn, 2001; Hajdúk, 2012). Last but not least, the performance in the tasks of theory of mind in psychotic patients and qualitative analysis of results with the help of subjective responses of the respondents. The main goal of research is description of theory of mind in psychotic patients with schizophrenia diagnosis and schizoactive disorder (between F.20 and F.25).

Partial goals of the research are:

To find out the performance in individual tasks in the theory of mind

Qualitative analysis of quantitative results

**Research question:** In which tasks of the theory of mind most of the psychotic patients fail?

## **2. Method**

The data is obtained by questionnaire method and they are processed quantitatively and qualitatively. Verbal tasks focused on theory of mind were translated from English and we checked their validity through bilingual verification. The questionnaire was given to respondents in print form and it was without time limit.

### ***2.1 Research complex***

For the purpose of our research one research complex was set – patients with psychotic disease. The sample was obtained by an aimed selection. The selection of participants in the groups was executed with the aim to equalize the group on basis of gender and age (Table 1 and Table 2). In total 30 psychiatric patients hospitalized in psychiatric clinic FN Trenčín

or administered in psychiatric department in the Trnava hospital took part. The condition was the presence of F.20 schizophrenia diagnosis or F.25 schizoaffective disorder according to MKCH-10 diagnostic criteria. The collection of the data happened from December 2018 till March 2019 after the agreement with the local psychologists and doctors. Remission and chronicity of the disease was set on basis of report of the doctor in charge and psychologist according to research criteria used in clinical praxis as a routine.

They calculated variation coefficients for metric variables and an index of qualitative variation for variables of nominal character (chart 3 and 4). From the point of view of metric variables, all except dimension ToM MS showed the coefficient of variety to be lower as 50% which means that the sample for these variables is relatively homogenous. From the point of view of the index of qualitative variety all values were relatively high except the diagnosis variable where the allocation of groups was quite uneven. Other variables seem to be quite even from the point of view of allocation.

**Table 1.** Research complex

<b>Research complex</b>	
<b>Diagnosis</b>	<b>N</b>
F 20.0 Paranoid schizophrenia	12
F 20.3 Non-differentiated schizophrenia	5
F 20.5 Residual schizophrenia	8
F 25.0 Schizoaffective disorder - manic type	1
F 25.1 Schizoaffective disorder - depressive type	1
F 25.2 Schizoaffective disorder - mixed type	3
<b>Together</b>	30
<b>Gender</b>	<b>N</b>
men	19
women	11
<b>Together</b>	30

**Table 2.** Frequency chart

Frequency chart	N	Stated in %
Remission	10	33.3%
Manifestation	20	66.7%
Together	30	100.0%
Hospitalized	12	40%
Ambulant	18	60%
Together	30	100%

Table 3. Variety coefficient

Calculation of variety coefficients	
ToM 1	26,92%
ToM 2	38,24%
ToM MS	67,08%
ToM ES	31,97%
ToM fyz	36,64%
ToM meta	47,71%
Vek	25,21%

**Table 4.** Variety coefficient

Index of quantitative variety	
<b>Gender</b>	99%
<b>Education</b>	80,64%
<b>Dg.</b>	55,64%
<b>Disease phase</b>	78,28%
<b>Hospitalization vs. ambulant care</b>	96%

### ***2.3. Materials and equipment***

Verbal tasks focus on theory of mind are not a standardized method, it consisted of 11 short stories, names of participants were assimilated to the local situation. The translation of verbal tasks from English language and their validity we found out through bilingual check and Cronbach's alpha which was 0.89. The scores were converted according to the example of the authors of the stories. The focus and evaluation are to be found in the chart 5 and 6.

Definition of used verbal tasks		
1st story	ToM 1	Two stories focused on the detection of presence of theory of mind of the first grade through false convictions. Respondent thus had to realize that the protagonist has a conviction that does not correspond to the reality that we learn from the story.
2nd story		
3 <sup>rd</sup> story	ToM 2	Two stories focused on the detection of presence of theory of mind of the second grade through false convictions.
4th story		
5th story	ToM MS	Two stories focused on the detection of presence of theory of mind of the second grade through interpretation of acting



6th story		of the protagonist by pointing at his mental states. That is the revelation of interpretation of acting of the protagonist by pointing at his mental states. The estimation of facts related to mental state of other people is concerned.
7th story	ToM ES	Two stories focused on the detection of presence of theory of mind of the second grade through interpretation of acting of the protagonist by pointing at his mental states in relation to emotions. The estimation of facts related to emotions of other people is concerned.
8th story		
9th story	ToM fyz	One checking story focus on estimation of the facts on basis of physical assumptions. This task is constructed in a similar way as the previous tasks, the respondent, however, needs to think only about physical qualities and not directly about mental states.
10th story	ToM meta	Two stories were focused on metaphors. The respondent had to interpret a metaphoric declaration of the protagonist. In order to guess the real meaning of the protagonists' words he needs to have a theory of mind and think about his mental states.
11th story		

Scores in verbal tasks referring to mental state and intention		
ToM MS	5th story	2 points for pointing at the fact that Peter knows that Šimon lies to him. 1 point for pointing at the facts (it is a place where the racket can be found or at the fact that Šimon is a big liar) or for pointing at the fact that Šimon hid the racket without a reference to a lie. 0 points for a wrong answer.
	6th story	2 points for pointing at the fact that the other army will not trust him and they will go to look at the other place or any other reference for a double bluff, 1 point for pointing at the result (to save the tanks, to lead them astray from the track), 0

		points for a wrong answer.
ToM ES	7th story	2 points for pointing at the fact that he tries to evoke compassion by lying, 1 point for his state (he is greedy) or result (to get more hot dogs), 0 points for a wrong answer.
	8th story	2 points for pointing at convincing, manipulation of emotions, endeavour to evoke sympathy or feelings of guilt, 1 point for referring to the result (to sell more cats) or simple motivation (to make Julia sad). 0 points for a wrong answer.
ToM fyz	9th story	2 points for pointing at the same conditions of the weather and relative disadvantage of the air force in the fog. 1 point for pointing at one of these conditions. 0 points for a wrong answer.

### 3. Results

In the chart 7 we can see the results of non-varied descriptive analysis. We are stating the values of rates of central tendency such as average value, middle value and the most repeated value, furthermore the standard deviation and minimum and maximum quantities. The span, the difference between minimum and maximum value, inter-quartal span that represents the difference between 1<sup>st</sup> and 3<sup>rd</sup> quartile, thus 25<sup>th</sup> and 75<sup>th</sup> percentile.

**Table 7.** Results of uni-varied descriptive analysis

	ToM1	ToM2	ToM MS	ToM ES	ToM Fyz	ToM Meta
<b>Average</b>	2,27	2,13	2,40	2,13	2,23	1,53
<b>Median</b>	3	2	1,50	2	2	1,48
<b>Modus</b>	3	3	1	2	3	1

<b>Standard discrepancy</b>	0,907	0,819	1,61	0,68	0,82	0,73
<b>Minimum</b>	1	1	1	1	1	1
<b>Maximum</b>	3	3	5	3	3	3
<b>Span</b>	2	2	4	2	2	2
<b>Inter-quartile span</b>	2	2	3	1	1	1
<b>1. quartil</b>	1	1	1	2	2	1
<b>3. quartil</b>	3	3	4	3	3	2

**RQ:** In which tasks of the theory of mind most of the psychotic patients fail?

**Table 8.** Frequency chart

<b>Frequency chart stated in %</b>			
	<b>Failed</b>	<b>Neither failed not succeeded</b>	<b>Not failed</b>
<b>ToM 1</b>	30%	13,3%	56,7%
<b>ToM 2</b>	26,7%	33,3%	40%
<b>ToM ES</b>	16,7%	53,3%	30%
<b>ToM fyz</b>	23,3%	30%	46,7%
<b>ToM meta</b>	60%	26,7%	13,3%

**Table 9.** Frequency chart

Frequency chart stated in %					
	Completely failed	Failed	Neither failed not succeeded	Not failed	Completely not failed
<b>ToM MS</b>	50%	6,7%	13,3%	13,3%	16,7%

The next step in our statistics report is the research of the level of failure in various dimensions of mind. From frequency charts we can see (chart 8 and 9) that the psychiatric patients failed the most in these theories of mind – metaphors (60%) and mental states (50%). In other variables they scored better, when in the theory of mind of the first grade 30% of respondents failed, in theory of mind of second grade 26.7% respondents failed, furthermore in emotional states only 16.7% and in physical qualities 23.3% of all psychiatric patients failed.

### Qualitative analysis of quantitative results

The stories and correct answers to the questions and control questions		
<b>ToM 1</b>	<b>1st story</b>	Sára and Anička play together with a ball in the room. Sara puts the ball into the toy basket and goes to the kitchen. Subsequently Anička places the ball from the basket to the closet.
	question	Where will Sara look for the ball when she returns from the kitchen?
	correct answer	In the toy basket
	CQ	Where the Sara putt he ball initially?
	correct answer	Into the toy basket.
	<b>2nd story</b>	Jozef leaves a cigarette package with five cigarettes on the table and he leaves, Meanwhile Peter comes and he takes one cigarette from the package and he leaves without letting Jozef know.

question	When Jozef returns, how many cigarettes he will think he has in the package?
correct answer	5
CQ	How many cigarettes are there actually?
correct answer	4

Illustration of responses in ToM 1 according to the diagnosis						
			Dg.			
			F 20.0	F 20.3	F 20.5	F 25.1
ToM 1	1.	In the room		I don't know		
		She will ask Anička where she put it	/	Probably in the kitchen	In the closet	/
	KO	In the kitchen	/	In the room	/	/
	2.	It depends whether he counted them	/	0	/	/
	KO	/	/	I don't know, he lies	There is four cigarettes	/

When we processed the responses of the respondents, we corrected grammatical mistakes, we kept the dialect and expressive words to keep the authenticity of the responses of the psychiatric patients.

In first two questions most of the respondents scored well (chart 10 and 11) – among the responses there were correct responses as well. In the chart we describe the frequency of the most repeated response. In the

responses to the first story focused on the theory of mind of the first grade the absence of a particular place was often present – in the kitchen, in the room, perhaps in the kitchen. We have noted the responses – I don't know - or no response. Responding to the second question, the most used responses were – I don't know exactly, it depends if he counted it. In KO we noted a response that was correct however stylistically it was written incorrectly - There is four cigarettes.

**The stories and correct answers to the questions and control questions**

<b>ToM 2</b>	<b>3rd story</b>	Jozef and Mária are in the park together. The ice-cream vendor came. Jozef would like to buy ice-cream a lot but he has no money on him. The ice-cream vendor tells him he will be in the park whole day. Jozef lives near to the park therefore he goes home to get money. However, the ice-cream vendor leaves meanwhile. Maria asks him where he goes. The ice-cream vendor explains that it is Sunday and he will sell more ice-cream in front of the church thus he goes there. Maria, however has to go home for lunch. Jozef comes back to the park with the money. On the way he meets the ice-cream vendor and he buys ice-cream.
	question	According to Maria, where will Jozef go to buy the ice-cream?
	correct answer	To the park
	CQ	b) Does Maria know that Jozef met the ice-cream vendor?
	correct answer	No (she would know it only in that case if she later met Jozef with ice-cream).
	<b>4th story</b>	A thief robbed a bank, and he runs to hide from police. He meets his brother. He asks him not to tell the police that he is hiding in the church. The police is searching for the thief everywhere except the church and city park. The police meets the thief's brother and they ask him where they should search for the thief. They expect that he will lie and wherever he says they will go to search elsewhere. However, the thief's brother is very wise and he wants to save his brother. He knows the police will not trust him.

question	What will the thief's brother say, where should the police look for his brother? In the church or in the city park?
correct answer	In the church.
CQ	Where is actually the thief hiding?
correct answer	In the church.

Illustration of responses in ToM 2 according to the diagnosis						
		Dg.				
		F 20.0	F 20.3	F 20.5	F 25.1	F 25.2
ToM 2	3.	In front of the church				
		On the way from the park	Nowhere	On the way	To the ice-cream-vendor	To the shop where they sell it
	CQ	/	/	Yes	/	Where would she know it from?
	4.	In the park Whatever He will not reveal his brother	Whatever he wants	/	/	The thief is not allowed to the church, thus probably in the park
	CQ	How should I know?	At home	/	In the city park	Even he does not know where he hid himself

The third story led respondents responded correctly (chart 12 and 13). As the story was longer and it described the sequence of events and

circumstances the respondents had a problem with perception of the situation. To give an example there were responses that even had a logical connection “To the shop where it is sold,” or “To the ice-cream vendor”, however they were a wrong response to the question. In KO they usually replied I don’t know but there was also a statement “Where would she know it from”, which points at the correct response – no. In the 4th story fewer respondents replied correctly as well. We noted responses such as: “The thief will not be allowed to go to the church, so maybe in the park,” what indirectly points at the moral rule that the respondent presumably has assimilated, it may point at the fact the thief is a sinful person. We also observed presence of the place we have not mentioned in the 3rd story, but it was mentioned in the previous story. There were also responses whatever he wants or whatever. In KO there are also responses mentioning places from the previous story – in the city park or responses that points to the places that were not even mentioned in the story – at home. One respondent states an absurd answer “That even he doesn’t know where he hid himself”.

Frequency of most used answers in the research sample		
<b>ToM MS</b>	<b>5th story</b>	Šimon is a big liar. He never tells truth and his brother Peter knows it. Yesterday Šimon stole Peter’s tennis racket. Peter is very angry and he asks Šimon, “Where did you hide my racket?” Šimon replies that he hid the racket under the bed.
	question	Why will Peter look into the cupboard?
	correct answer	He doesn’t believe his brother because he has the experience that he is lying.
	CQ	What did Šimon steal from Peter?
	correct answer	Tennis racket.
	<b>6th story</b>	During the war, the red army imprisons a member of a blue army. They want him to tell them where the tanks of his army are hidden. They know they are either at the sea or in the mountains. They also know that the prisoner will want to save his army and thus he will be lying. The prisoner is very wise and brave, and he will not allow that



		the enemies find their tanks. Actually the tanks are in the mountains. When the red army asks him he says, "They are in the mountains"
question		Why did the prisoner say it?
correct answer		He knows they think he will be lying.
CQ		Where are the tanks hidden actually?
correct answer		In the mountains

Illustration of responses in ToM MS according to the diagnosis						
						Dg.
						F 25.2
		F 20.0	F 20.3	F 20.5	F 25.1	
<b>ToM MS</b>	5.	To see if the tennis racquet is not there	/	I don't know	I don't know	Whether he didn't eat the bread he hid there before
	CQ	/	/	Bed	/	The bread
	6.	Because they will not believe him  They are in the mountains	I don't know	They found their tanks	Because he is very wise	Because they would be seen by the see, there are no trees, therefore they went to the mountains
	CQ	I don't know	I don't know	/	/	The forest, because they are better masked there

In the 5th story the respondents either have not responded at all or often the answer I don't know was present (chart 14 and 15). We also noted

an absurd answer “Whether he didn’t eat the bread that he put there before” however we do not mention food in any of the stories. In KO they mostly responded correctly even in such cases when they didn’t state any answer to the first question and the respondent with the previously mentioned answer connected to his response – the bread. In the 6th story the respondents usually answered correctly however only on the level of 1 point. The respondents pointed at the salvation of the army or the fact that he will not be believed but never there was a double bluff. In KO the most used answers were probably I don’t know.

<b>The stories and correct answers to the questions and control questions</b>		
<b>ToM ES</b>	<b>7th story</b>	Boris is always hungry. Today his favourite food, hot dogs with beans, are served for lunch. He is very greedy, and he would like to have more hot dogs than others. And that is even despite the fact that when he comes home his mother cooks Good meal for him. There is one rule for everyone - it is allowed to eat only two hot dogs for lunch. When it is Boris’ turn he says: “Could I have 4 hot dogs? Because there will be no dinner at home...”
	question	Why did Boris say it?
	correct answer	It is his way how to evoke compassion and reach his goal
	CQ	Will Boris have dinner at home?
	correct answer	Yes.
	<b>8th story</b>	Julka wants to buy a kitten. She knows that Mrs. Kováčová has many kittens she does not want. Mrs. Kováčová loves cats very much but she cannot afford to take care for all of them. While visiting her, Julka finds out that Mrs. Kováčová has only tomcat kittens. Julka is now hesitant whether she wants any kitten from Mrs. Kováčová because originally, she wanted a female kitten. And Mrs. Kováčová has only the male kittens. But Mrs. Kováčová tells her: “If you won’t buy any kitten, I will have to drown them.”

question	Why did Mrs. Kováčová say it?
correct answer	She wanted to evoke sorrow in Julka in order to make her to take one kitten.
CQ	Is she really planning to drown the kitten?
correct answer	No.

Illustration of responses in ToM ES according to the diagnosis						
		Dg.				
		F 20.0	F 20.3	F 20.5	F 25.1	F 25.2
ToM ES	7.	/	/	He is greedy, gluttonous	Because he will not have dinner at home	Favourite food hot dogs
	CQ	/	Perhaps yes, I Will have dinner	/	/	No, his mother is annoyed cooking for him all the time
	8.	Because she is a swine She wants a cat You will not buy	I don't know	I don't know	Because she loves cats	Because she does not really love them

	CQ	Yes I don't think so	Yes	/	Yes	Maybe yes, better than placing them in shelter house
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In the 7th story the respondents pointed at greed and favourite food (chart 16 and 17). In case they responded correctly they scored only on the 1b level. In KO we noted subjective and judgmental responses “Probably yes, I will have dinner” or “No, mom doesn’t like cooking for him all the time”. In the responses to the 8th story some expressive responses were present, we state them as the respondent stated it in order to maintain the authenticity of the responses “Because, she is a swine”. It deals with some subjective statement of character of Mrs. Kováčová, however we have not inquired about it in the question. We have noted one-word answer as well “You won’t buy it”. In KO we have not noted any extraordinary answers.

		<b>The stories and correct answers to the questions and control questions</b>	
<b>ToM fyz</b>	<b>9th story</b>	Two enemy armies fight each other for a long time. The fight is leading nowhere. The forces are even. The blue army has better foot-soldiers and thus is better in fight on the ground whereas the yellow army has better aerial army. The last day of fight a dense fog comes to the ground and it floats over the heads of the soldiers all the time. Eventually the blue army wins.	
	question	Why did the blue army win?	
	correct answer	The blue army has better foot-soldiers and because there was fog, the yellow army could not see anything from the planes.	
	CQ	Which army has better areal forces?	
	correct answer	Yellow army.	

Illustration of responses in ToM fyz according to the diagnosis						
		Dg.				
		F 20.0	F 20.3	F 20.5	F 25.1	F 25.2
ToM fyz	9.	Big fog Because it is better	I don't know	The planes do not fly in the fog	/	They did not see anything from the planes. But how could the blue ones aim at them when they saw nothing through the fog?
	CQ	Blue Red	I don't know	Blue	/	/

In the 9th story we notice quite logical answers of the respondents (chart 18 and 19) but they are pointing only towards 1 aspect, thus if they scored then only on the level of 1b. In KO there appeared an answer red although in the story we do not mentioned the presence of red army at all.

The stories and correct answers to the questions and control questions		
ToM meta	10th story	Katka and Ema are playing together in their house Ema picks up a banana from a basket which is full of fruits and places it to hear ear and says: "Katka, look, the banana is a phone."
	question	Why did Ema say that?
	correct answer	She made a comparison. That is a usual phenomenon in play.
	CQ	Is what Ema said truth?
	correct answer	Only on basis of similarity and comparison, she meant it metaphorically.

	11th story	Iva is going to visit David for the first time. She is looking forward to see his dog because David spoke a lot about it. Iva likes dogs a lot. When David opens the door, a huge dog jumps out to greet Iva. David's dog is big. It is almost as big as Iva. Iva reacts: "David, you have no dog. You have an elephant!"
	question	Why did she say it?
	correct answer	It's a comparison. She compared the size of a dog to an elephant. Elephant is a big animal.
	CQ	Is what Iva said truth?
	correct answer	It's not truth. It's a comparison.

Illustration of responses in ToM according to the diagnosis						
		Dg.				
		F 20.0	F 20.3	F 20.5	F 25.1	F 25.2
ToM meta	10.	Of humour	I don't know	I don't know She wanted	Because the banana is a phone	Perhaps she wanted to call someone
	CQ	/	/	I don't know	Yes	Yes, I have seen one like that, for kids
	11.	Because she has a dog  Because she does not understand. Perhaps she is in love	Because she is stupid	Because it came to her mind  She wanted an elephant	Because she lied	To please him

	CQ	No, she isn't, she could have said it differently  Because she does not understand that it is a dog	Because she is stupid	Yes	Yes	No, a dog is not an elephant
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In the 10th and 11th story there are many conclusions without metaphoric grasp, the respondent simply makes individual answers (chart 20 and 21). For a better understanding, we state some of the noted answers: "Perhaps she wanted to call to someone", "Because the banana is the phone". Again, a one-word answer is present, similarly as in the 7th story, now as "Humour". In KO of 10th story, we have not noted any extraordinary answers. In the 11th story there were answers of judgmental character again "Because she is stupid" or "Because she doesn't understand maybe she is in love." In KO the answer Because she is stupid was repeated but it was by the same respondent. We as well noticed answers of the same type "Because she doesn't understand it is a dog" or "No, the dog is not an elephant". IN both stories however in KO some correct answers were present where the respondent pointed at the game or comparison.

#### 4. Discussion

##### 4.1 Interpretation of the results

In our research in researching the level of failure in individual dimensions in theories of mind the patients the most often failed in the tasks that were focused on metaphors and mental states where the ToM MS were cognitively the most difficult, where the psychotic patients had the worst scores. Presuming that the theory of mind is really connected with cognitive functions, this fact could be related to the better score in cognitive tests in patients during remission, that is stated by some authors (Kolibáš, 1996; Corrigan & Penn, 2001)

In the following part of the discussion, we will focus on the interpretation of qualitative part of the research and we will describe the content of individual responses of the patients with schizophrenia or schizoaffective disorder more closely. In the experimental sample the

disrupted ability of communication was manifested by not adhering to the conversation maxims (Grice, 1975). In rare cases the psychotic patients disrupted the quantity but the fact that they disrupted quality almost became a rule. The length of the response can probably be influenced by diverted thinking what is in accordance with the very definition of diverted thinking (Kolibáš, 1996). The patient often went astray towards the topics that were not relevant. We have also noted the diversion towards the topic that were not mentioned in the stories at all or they described the information that was used in the previous stories. Among the answers we found such that were often only a repeating of the story. Big part of the psychotic patients didn't use the contextual information enough what is in the accordance with the conclusions of the experts (Kolibáš, 1996; Hajdúk, 2012). Furthermore, we are pointing at the answer that was correct however the very formulation was incorrect – There is four cigarettes. Impoverishment in the quantity or the content of the verbal expression is one of the symptoms of schizophrenia (Bora et al., 2009). We have noted some impoverished answers as well – “You won't buy” when the patients had an obvious problem with expression or word creation. As the story Nr. 3 with the ice-cream vendor was longer and it described the sequence of events and circumstances, the respondents had a problem with perception of the situation as the patient had to read the story, remember it, connect the circumstances and solve it subsequently. That is the process of analysis and subsequent synthesis of thinking what is extremely difficult for the patient with psychotic disease as he has lower level or analytical and anticipating thinking (Morice & Delahunty, 1996). We have noted answers that had logical connection “To the shop where it is sold”, but they were not the correct answers to the questions.

In this case the patients described some steady pattern which they have assimilated shopping = shop. We have noted answers like: “A thief will not be allowed to the church thus probably in the park” too, which indirectly points at the moral rule that the respondent has probably assimilated, it can point at the fact that a thief is a sinful person, however the response didn't point at the thinking of the protagonist and his endeavour to help his brother. We have repeatedly noted that the patient speaks of himself in the answers: “Probably yes, I will have dinner”.

Excessive use of the personal pronouns is one of the deficits of mentalization as well (Rochester & Martin, 1979). The result of early and vast failure of the ability to represent intentions as negative signs (Corcoran & Frith, 2003).). In the story 4 where we are inquiring where the thief hid himself the patient concludes the following: “Even he does not know where



he hid himself.” We have noted an absurd response as no food was mentioned in that story and it was not mentioned in previous stories as well. In this case the respondent mentioned bread in checking question as well. Here we can think of the presence of positive symptomatics – deluding ideas – sudden idea that gave the birth to the delude (Kolibáš, 1996). The presence of the deludes is related to the disfunction which obstructs the representation of the thoughts, convictions and intentions of other individuals (Frith, 1996). Patients with the presence of paranoid deludes had specific problems with mentalization (Frith & Corcoran, 1996). In the 7th story the respondents pointed at greed and favourite meal, not at the compassions with the protagonist. He individuals who fulfilled the criteria for schizophrenia had much worse score in tasks that required interpretation of social intentions of indirect speech than the group created by healthy individuals (Corcoran et al., 1995; Kerr et al., 2003) In the latter stories focused on metaphors many conclusions without metaphoric grip are found, the respondent simply gives individual answers. In the tasks focused on the theory of mind the patient with psychotic disease needs to understand the abstraction by his own abstraction as we have mentioned in the discussion few times. As his thinking is distorted to certain extend in the result it is completely understandable as they present and explain their answers.

#### ***4.2 Limits***

After the execution of the research, we noted several limits. The first one is a very small research sample. Working with the whole group is extremely difficult mainly from the point of view of pharmaceutical treatment, to great extend it determines their will to cooperate.

When the research is executed it is extremely important to check the influence of various variables. For example, their current health state we could assess only according to our competence. The very tasks of the theory of mind focused on the false convictions were one of the limiting factors. The tasks of false convictions of second grade cannot discriminate among healthy individuals very well. Another possible limit can be the assessment of the answers by one person on basis of criteria that was set beforehand. In the future research we suggest the answers to be assessed by more persons, thus higher objectivity can be maintained.

#### ***4.3 Future intentions and application in the praxis***

For future research there is an interesting question – whether the patients with psychotic disease fail only in solving of the tasks in the research or if the deficit of the theory of mind can be seen in everyday life as

well. If we focused on research of the theory of mind in the patients with psychiatric diagnosis in the future, it would be interesting to compare its presence among various diagnoses. The research studies [18, 39] point at distorted ability to apply the theory of mind with the patients with bipolar disorder as well and the findings how the presumption of some common mechanism between bipolar disorder and schizophrenia.

The disease changes the brain and its structure in some dynamics. Long-term pharmacological intervention is needed, but at the same time we suggest introducing psychoeducational intervention in praxis as well. Cooperation with the doctor or psychologist is important as a management of one's own disease in long term. Existing programs are focused on social cognition with the help of training of understanding emotions, the patients train various social situation as well, for example with the help of analysis of the situations that happened in movies (Kayser et al., 2006; Inoue, Yamada, Kanba, 2006). The results of the analysis of situations showed the improvement of the performance of the theory of mind in comparison with the group that was being cured by psycho-pharmaceutics, sometimes with supportive psychotherapy Kayser et al., 2006; Inoue, Yamada, Kanba, 2006; Inoue et al., 2006). From the mentioned findings we can say that the ability to apply the theory of mind is trainable and it is extremely important that the cognitive training is introduced into the rehabilitation of patients with psychotic disease. Patients with psychotic disease meet many obstacles but they make much efforts to understand their disease. Mental disease is often stigmatized as it is a sensitive topic, mainly on the side of the patient.

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