

**THEORY OF MIND: A COMPARISON OF CHILDREN WITH
AUTISM SPECTRUM DISORDERS AND TYPICALLY
DEVELOPING BANGLA SPEAKING CHILDREN.**

By

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A research presented to the
Bangladesh Health Professions Institute (The academic institute of CRP)
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APPROVAL

We the under signed certify that we have carefully read and recommended to the Faculty of Medicine, University of Dhaka, for the acceptance of this dissertation entitled-“**Theory of mind: A comparison of children with Autism Spectrum Disorders and Typically developing Bangla Speaking children**”

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Declaration

I am Mst Farjana Akter, declare that the work presented here is my own. All sources used have been cited correctly. Any mistakes or inaccuracies are my own. I also want to make sure that any single discussion of the study will not be harmful to participants.

Signature & Date

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Dedication

TO MY BELOVED PARENTS

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List of Acronyms

Abbreviation	Elaboration
ASD	Autism Spectrum Disorder
BHPI	Bangladesh Health Professions Institute
CRP	Centre for the Rehabilitation of the Paralyzed
TD	Typical developing
ToM	Theory of mind

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EXECUTIVE SUMMARY

“Theory of mind (ToM) is the ability to recognize other people’s mental states and to understand that people’s behavior is influenced by their emotions, beliefs and desires”. Children with autism spectrum disorders (ASD) have severe problem in theory of mind ability; for this reason they face social, communicative and imaginative problem. Previous studies have found that Autism Spectrum Disorder’s children have severe deficit in Theory of Mind development. Using False belief Battery, the aims of this study were to find out developmental of ToM in typically developing Bangla speaking children and ASD children aged 4-8 years. This is a cross sectional study where 80 samples were purposively assigned. Those samples were divided in typical and ASD group and 40 samples was each group. Bangla translated false belief battery script was used for data collection. The result showed that children with ASD performed consistently more poorly on the ToM tasks than typically developing children. Furthermore, ToM ability in the current typically developing sample was not similar with universal development. Bangladeshi children development slows than children from other countries on the ToM, which may be due to cultural factors. Understanding of false belief (Theory of Mind) difference between typical and ASD children were significant and there is no significant difference in development of Theory of mind between girls and boys.

Keywords: autism spectrum disorder, false belief understanding, theory of mind

1.1 Introduction

Theory of Mind is part of the social cognitive setting in psychology. The term 'Theory of Mind' or shortly 'ToM' was first used by Premack & Woodruff (1978) who were studying whether chimpanzees have mind-reading skills or not. ToM gained publicity among other researchers who soon began to study human children in order to learn how this ability is acquired. Baron-Cohen, Leslie, & Frith (1985), demand ToM refers to the ability to recognize other people's mental states, and the realization that other people can —want, feel and believe things. Theory of mind begins to emerge at a young age and continue the whole life.

Wimmer and Perner (1983) cited in Finish, Zhang, Li & Long (2013) claimed false belief understanding – the understanding that others can hold beliefs that contradict the actual state of the world – is often tested with the unexpected-transfer task. According to Amsterlaw & Wellman (2006), children begin to pass this false belief task between the ages of 3 to 5 years, with most young 3 year olds failing the task, and most 5 year olds passing the task. Drover (2014) revealed children who pass the standard false belief task are said to have a representational theory of mind, which is based on individual experience and consists of the understanding that one's mental state can be discordant with another's or with a known reality. The ability to explicitly reason about another's false belief requires a representational understanding, which is why investigator focuses on belief understanding as an index of a mature theory of mind.

According to Wing and Gould's (1979), "Autism is characterized by triad of impairments: impairment in communication, imagination, and socialization". Tager-Flusberg (2007), found his study Individuals with Autism spectrum disorder's children show delays and deficits in developing ToM. A lack of theory of mind (ToM; that is, the ability to recognize the mental states of others) has been proposed to explain these deficits in autism (Brüne & Brüne-Cohrs, 2006).

Viller's (2014) revealed on his study Children's language acquisition is crucially connected to their development of a theory of mind (ToM). Communication depends on the infant's interest in and engagement with other social beings with minds, and it is through these interactions that children begin to learn words and meanings. the parallel development in metalinguistic skills, that children become capable of really understanding, and using, nonliteral language, such as jokes, metaphors, irony, sarcasm, and lies. A mature ToM thus feeds into these later pragmatic language developments.

Additionally following speech-language pathologists (SLPs) perform assessments and provide treatment for language, cognitive and communication disorders that result from the theory of mind difficulties and following ASD, Down syndrome, Hearing impairment, Cerebral Palsy. On the other hand, though the theory of mind is very important for language and communication development, but there is no sufficient study has been conducted on theory of mind in Bangladesh, as a result there is a lack of data in this area. As Speech & Language therapy's (SLTs) clinical services have been introduced in CRP since 2010 and speech therapy service is concerned with children language and cognitive development , so for the promotion of the service relevant data in this field is required (Speech & Language Therapy, 2010).

1.2 Literature Review

Autism is defined in the text revision of the fourth edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV-TR; American Psychiatric Association, 2000) “as a developmental disorder whose onset must be prior to 3 years of age and which is characterized by deficits in social interactions, impaired verbal and non-verbal communication, and repetitive, restricted or stereotyped behavior interests and activities” (Ellis, 1990). Autism spectrum disorders divided into high-functioning and low functioning groups. There are 75 percent Low-functioning autism children of total ASD population, and their IQ below 70. High-functioning autism children individuals have an IQ higher than 70 (American Psychiatric Association, 2000).

Baron-Cohen, Leslie & Frith (1985) suggested that “Theory of mind (ToM) is the ability to recognize other people’s mental states, and the realization that other people can want, feel and believe things”. Hughes & Leekam (2004) admitted in their study Internally, Theory-of-Mind involves a person’s ability to form and use mental representations in order to create and sustain a sense of oneself and one’s world and externally, Theory of Mind proved a person’s through their social activities and everyday social connection. Most of the study about theory of Mind declared that impairment in representational mental states in oneself and others is a major factor for Theory of mind deficits (Loth, Gómez & Happé, 2008). Liu, Wellman, Tardif & Sabbagh (2008) confined that false belief tasks is the means of testing mental representation as well as theory of mind.

More researchers and theorists claimed that representational theory of mind is the foundation for social cognitive functioning like as learning and teaching, pretending making and keeping friends and social learning. (Tomasello, 2009).

The understanding of false beliefs is commonly used for theory of mind test. False belief acknowledgement a person's mental representation of the world and the real state of the world and capable a person to understand that mental states can disguise reality. To understand false belief need to test three task; location change task, content change task and appearance reality task. In location Change task there were two characters, Sally and Anne. There were two baskets (red & blue) Sally put her ball into red basket, and then

she left. When she left the room, Anne transferred the ball into blue basket and she also left. When Sally comes back, where does Sally think the ball is? By this question check the children's belief. Then asked a reality controlled question. Where is the ball really? (Reality control question). In Content Change task shown a biscuit box which contains chocolate and ask a question to know person's own belief. What is inside box? Then find out the person's other belief. In Appearance-Reality used an Apple shape candle to reveal the person's appearance and reality distinction. They are called first-order tests because they only involve inferring one person's mental state.

Astington, Margaret & Edward (2010) in their study on development of theory of mind discovered that ToM develops from a very young age from 14 to 24 months of age. Between 3 and 5 years old, children begin to understand others' false beliefs, appearance-reality differences, and their own previous false beliefs. ToM is continued to develop throughout the lifespan.

In order to compare ToM development across cultures, most studies have looked at the age of 5. Children from different countries pass first-order false belief tests (e.g. Callaghan et al., 2005; Naito & Koyama, 2006; Yazdi, German, Defeyter, & Siegal, 2006). Wellman (2001) revealed on his study that performance on false belief tests differs between countries, age of onset is universally between 3 and 5 years, and that the developmental trajectory is similar across cultures. A Japanese study conducted by Naito & Koyama (2006) explored Japanese children have shown a delay in false belief development which developed in 6-7-year old. In another study, Chasiotis (2006) found that 3-5-year-old children from Germany and Costa Rica performed similarly to American children on first-order false belief tests, but Cameroonian children of similar age showed delayed development of belief attribution. These researchers concluded that contextual variables such as socioeconomic status, number of siblings and parenting style influence the development of ToM abilities.

Individuals with ASD show delays and deficits in developing ToM (Baron-Cohen et al., 1985). Charman et al. (2000) revealed that children with ASD do not appear to understand the distinction between appearance and reality and are not good at recognizing mental state words such as —think and —know. They also do not engage in

pretend play or imitation, and do not follow the gaze of a speaker; they do not understand complex causes of behavior like beliefs (Baron-Cohen & Swettenham, 1997). Most of the ASD children shows deficit in social, cognitive and imagination which refers as theory of mind deficits. (Baron-Cohen & Swettenham, 1997).

According to Kimhi (2014) difficulty to understand theory of mind affect daily social and academic life in individuals with ASD/HF-ASD. Even though social-communication impairments cannot be explained exclusively on the basis of ToM impairments, ToM is a crucial factor in the socio cognitive development of children.

In Bangladesh Nasreen (2017) found Bangladeshi ASD children socialization which was the initial development of theory of mind. Some literature discussed about theory of mind and its development. Others claimed ToM in ASD, like that lots of study discussed about different angle of ToM. . But no study compared ToM development with different age category of children (typical children and children with ASD). In this study investigator tried showed this variation.

1.3 Significance of the study

Theory of mind (ToM) development among every children (typical & ASD) are very important for language and communication. Most of the autism children have ToM impairments. For understanding theory of mind it is important to understand false belief which represent a person's mental state and understand own and other belief. Children social development depends on their false belief understanding .Problem in false belief understanding affect person's social functioning, engage in conversation, build friendship moreover all social aspects can be hampered for this (Astington, 2003). So, children needs to better understanding of false belief for their social development. However understanding own and other belief is important for children language and social development. Autism Spectrum Disorder's children may have deficiency in Theory of Mind development for which their social development is insufficient. (Mazz et al, 2017). To their better development it is important to provide intervention at an early stage that will chance for improvement is best when start early.

SLT's can give better intervention to manage autism child to improve their theory of mind as well as their language ,communication, socialization to improve their quality of life (Monir,1996).SLTs provide intervention children with Autism SLTs have a big role to work ASD children theory of mind.

This study also aims to help the teachers, psychologists, doctors and relevant professional who are concerned in the field of health, sociology, education and organizations in Bangladesh' So that they can take required steps to lessen the ToM impairment. This study will help to refer the client to the appropriate person. This study will also be helpful to raise awareness among the client, family members and society about importance of speech and language therapy service for autism children.

1.4 Research Question

What is the theory of mind in typically developing Bangla speaking children and children with Autism spectrum Disorder's?

1.5 Objectives

1.5.1 General objective

The main objective is to explore the level of Theory of Mind development in typically developing Bangla speaking and children with Autism.

1.5.2 Specific Objectives

- To explore the age wise gender in typical developing and children with Autism.
- To explore the theory of Mind in typically developing children and children with Autism Spectrum Disorder's.
- To association of theory of mind between type of children (typical & autism spectrum disorder's) and gender.

1.6 Operational definition

1.6.1 Autism Spectrum Disorder (ASD)

Autism Spectrum Disorder (ASD) is a lifelong neuro-developmental disorder. In this study investigator ASD mean as high functioning ASD who were participate in the study. ASD is characterized by social difficulties associated with problem in communication, behavior and sensory. In the DSM-IV, autistic disorder is defined by three distinct domains: “Impairment in social interaction skills, impairment in communication, restrictive or repetitive behavior or interests”.

1.6.2 Theory of mind

“Theory of mind is the ability to understand another person’s beliefs, feelings and thoughts“.

(Premack & Woodruff, 1978)

1.6.3 False belief

In this study false belief is commonly as tools for test the theory of mind. It represents a person’s mental state. It helps to understand that mental state can disguise with reality. False belief is an indicator to understand other person beliefs.

2.1 Study design

The focus of the study was to explore the level of Theory of mind Development in typically developing and children with Autism of Bangla speaking children. Considering the aim and objectives of the project the investigator decide to use the quantitative research method (cross-sectional type of descriptive survey design and Focus group discussion).

2.2 Study Site

This study was conducted in 3 special schools and 2 kindergarten school in Dhaka division.

2.3 Sample selection

2.3.1 Study Population

Typical developing children and children with autism spectrum disorder (high functioning) who were attended special school and typically developing school going (4-8y) children in Dhaka division were select to conduct the study.

2.3.2 Sample Size

A group of subjects that will select from the population, who will be used in pieces of research is called sample (Hicks, 2000). Larger sample is the representative of the population in a survey study, but in many situations, it is not possible for the researcher both for practical and financial reasons (Hicks, 2000). The investigator was use a sampling equation (Autism children) to determine the sample size. The equation was according to sample size –

We know that-

The equation for collecting sample size is given below- =

$$n = \frac{z^2 \times p(1 - p)}{d^2}$$
$$\frac{1.96^2 \times 0.07 \times (1 - 0.07)}{(.05^2)}$$
$$= 100$$

Where,

Percentage of population, P= 0.07

Prevalence, q= 1-0.07 = 0.93

Confidence level, Z= 1.96 at 95% (Standard value)

Degree of accuracy, d =.05, Required sample size n=?

Investigator was selected 100 samples (50 children with autism and 50 typically developing children) due to time limitation.

2.3.3 Sampling Procedure

In this study the sample was selected through purposive sampling procedure to accomplish the aim and objective. The purposive sampling was used as its comparatively easy, cost effective and quickest sampling method (Bailey, 1997). Investigator was very concern to avoid the sample selection bias through ensuring predefined inclusion and exclusion criteria. A purposive non probability sampling method was used to select participants for this study. According to Depoy & Gitlin (2000) —In purposive sampling criteria sample selection procedure is based on predefined criteria which represent insight of a larger group.

2.3.4 Inclusion criteria

- Typical and ASD children attending in special school.
- 4-8 years old typically developing & ASD children.
- High functioning autism child, IQ>70.

2.3.5 Exclusion criteria

- More than 8 years old typically developing & ASD children.
- Low functioning autism child.
- If any participant was not motivated to join the task and child was not show the target response for 15 minutes then he/she was excluded.

2.4 Data collection

2.4.1 Data Collection Tool

A structured close ended questionnaire was used as a data collection tool. Data was collected through False Belief Battery. Children completed four standard false belief tasks that assessed the understanding that belief can differ from reality, which are each described in the following paragraphs (see appendix A for complete scripts). The interview was conducted in Bangla to make it easier for all participants to understand

2.4.2 Data collection procedure

At first investigator was went to the participant's school and investigator was took permission from principal of the school and informed him/her about aim objectives of the study. Investigator win take permission from the parents of that their children are going to participant in this research. This was brought no harm to them. Investigator was identified high functioning autism child by observation screening and with the help of in charge therapist of the school. Investigator was went a kindergarten school to collect data from typically developing children. Then researcher was collected the name of child, age, date of birth, parents name, their education, level, occupation, number of sib lings, any disability in the family or not. Before conducting the assessment investigator was tried to build rapport with the child and then ensure that the room environment is well organized (limited noise, sitting position, enough lighting). Data was collected through interview.

Content Change task: Children were shown a biscuit box and were asked —What do you think is inside? Most children replied —biscuit, but were shown that there were actually chocolate inside the box. A question was asked: —Your friend has never seen inside this box before, what does she/he think is inside: biscuit or chocolate? The last question was a control question: —What's really inside, biscuit or chocolate?

Location Change task: Children were introduced to two characters, Sally and Anne. There were two baskets in the scene Sally put her ball into red basket, and then she left. While she was away, Anne transferred the ball into blue basket and she also left. When Sally returned to the scene, experimenter asked following Question. —Where does sally

think the ball is? (Belief test question), and —Where is the ball really? (Reality control question). The correct pattern of responses was: red basket, and blue basket, respectively.

Appearance-Reality: Children were shown a candle that look like an apple (Apple shape candle). Children were then asked —What does this look like a candle or an apple? And what is it really? A candle or an apple. The correct pattern of responses was apple, and candle.

2.5 Data analysis

Investigator used descriptive statistics for data analysis. Because descriptive statistics are commonly used to make sense of survey data (Hicks,2000). Bailey (1997) suggested that descriptive statistics are those that describe, organize, and summarize data. It includes such things as frequencies, percentages, description of central tendency and descriptions of relative position. Investigator used bar chart, line chart to show the result and used table to show association.

2.6 Ethical Considerations

Voluntary participation from the participant's was considered. Participants were provided with a written consent form. The Investigator was collect written permission to conduct the research from the participants. Participators were informed verbally about the aims and objectives of the study and investigators role as well. Participants also assured that the study would have no harm to the participants physically or mentally because it was a survey study and was not involve any experiments. Confidentiality was maintained by the investigator by keeping the name, address and personal information of the client confidential and as data was not shared with others except the supervisor of the investigator. Participants were also being informed that they had full rights to withdraw themselves or refuse to answer any question any time during the study.

2.7 Rigor

This study was conducted in a systematic way. All the steps of research were followed by the investigator sequentially. During data collection and analysis the investigator avoided the whole process by own perspectives, values, and biases. The investigator never

influenced the participants by her own perspective during data collection. A trustful relationship with participants was always maintained and the documents were kept confidential and there were no biases during data analysis.

The main objective of this study was to find out the Theory of Mind (False belief understanding) of 4 to 8 years old children with Autism and typically developing Bangla speaking children. 80 samples were selected for this study where separately 40 Children with Autism and 40 typical developing Bangla speaking children were selected under age group of 4 to 8years old divided into 4 age category for both (Autism and Typical) groups. Data was analyzed by descriptive statistical technique.

3.1: Age wise gender of Typically Developing (TD) Bangla speaking children and children with Autism.

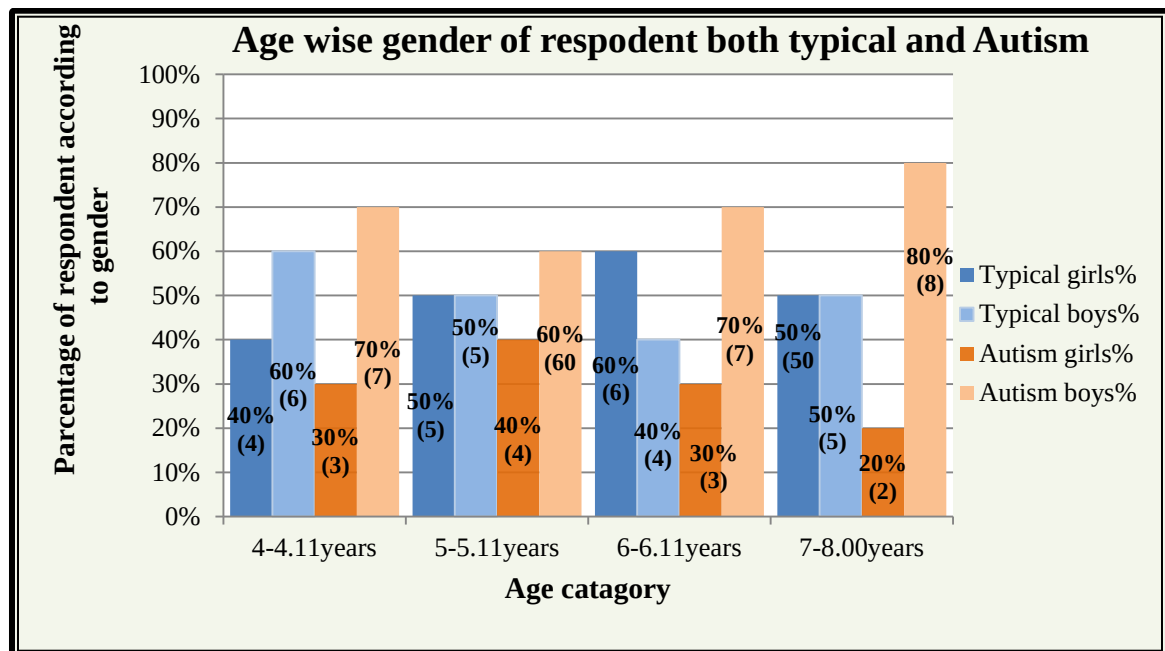


Fig 1: Gender of typical developing Bangla speaking children and children with Autism according to age category

The column chart shows the gender of typical children (TD) and Autism Spectrum Disorder (ASD) children according to age category. The vertical axis represents the percentage of gender (girls & boys) and the horizontal axis show the age category. At the age range 4-4.11y the number of TD boys (6) is more than girl and at same age group ASD boys (7) is more than ASD girls. At the 2nd age category the number of TD girls(5) and boys (5) are same but at the same age category ASD boys (6) are more than ASD girls. 6-6.11y have higher number of TD girls (6) and ASD girls (5) and boys (5) are same number. At the last age category there are same number of TD girls (5) and boys (5) and ASD girls (4) are less than ASD boys (6)

3.2 Typical developing children false belief test (Theory of Mind) Result.

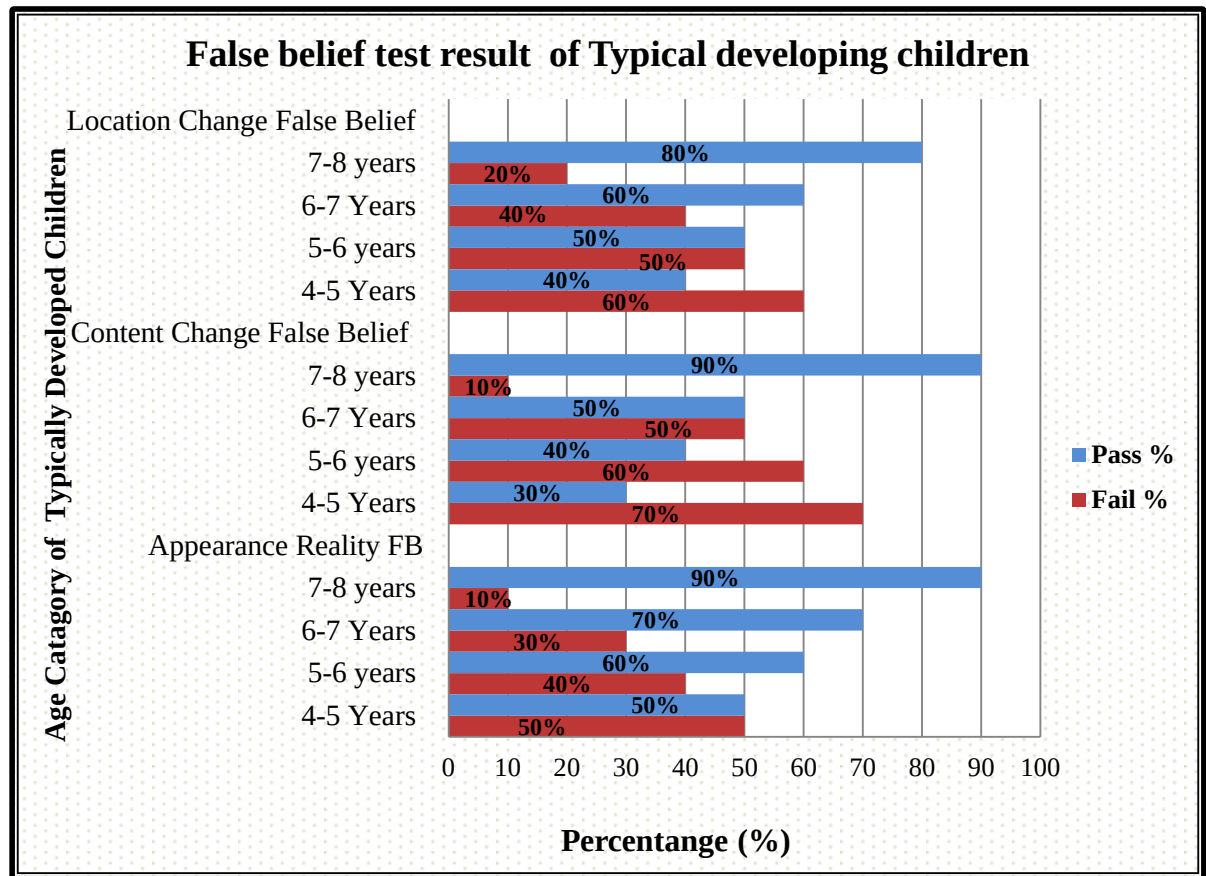


Fig 2: False belief test result of typical developing Bangla speaking children

The graph represents the Theory of mind (false belief) result of typical children according to task and age. The vertical axis shows the tasks according to age category and the horizontal axis represent the percentage of TD children ToM performance. The blue color means the percentage of pass and the red color means percentage of fail in the test. The graph shows the result of three ToM task (location change false belief task, content change false belief task and appearance reality task) In the graph we see in every task 4-5years old children performance is poor. Gradually the performance level increase with age. So it is clear that Tom development increase with age. We also see that false belief almost developed at 7-8.00 years old in typical developing Bangla speaking children.

3.3 Successful performance of typical developing children in false belief test according to tasks.

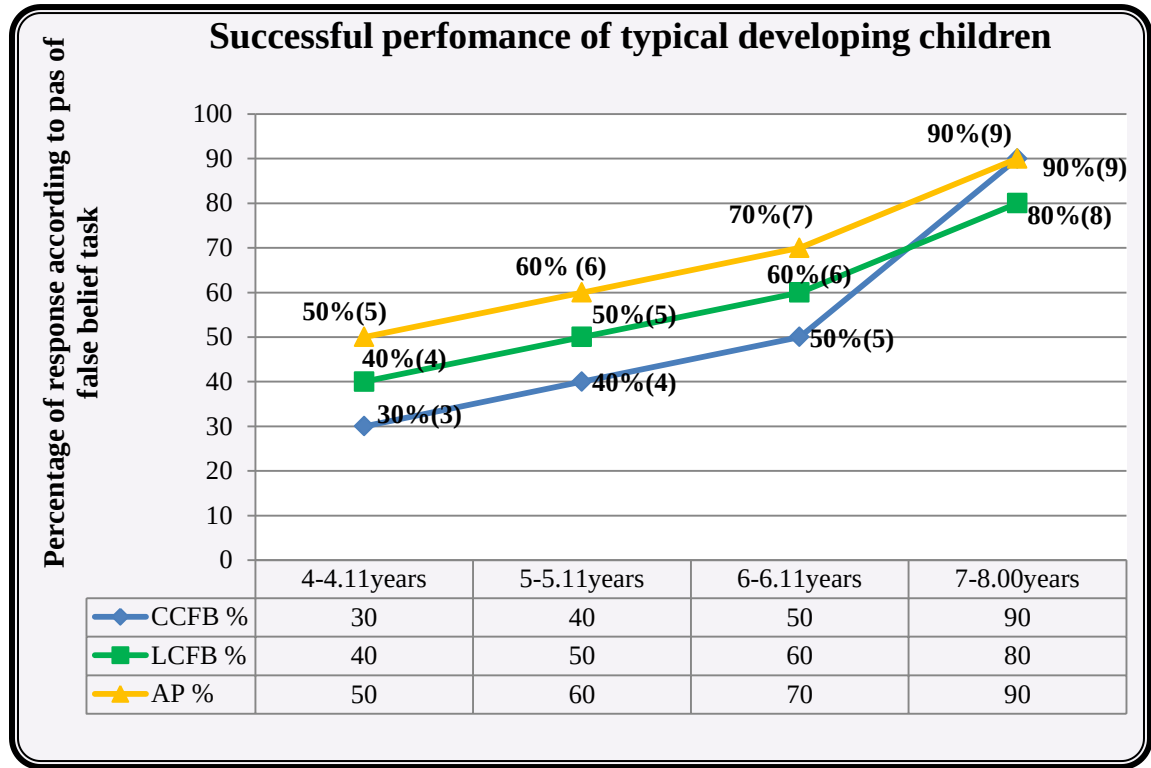


Fig 3: Successful performance of typical developing children in false belief test

This data showed that 4 age group of typical developing Bangla speaking children false belief test performance. At 4-4.11 year's old 30% typical children pass the content change task, 40% pass location change task and 50% pass appearance reality task. At 5-5.11 year's old 40% typical children pass the task, 50% pass location change task and 60% pass appearance reality task. 6-6.11 year's old children performance level-50% typical children pass the task, 60% pass location change task and 70% pass appearance reality task. 7-8.00 year's old children performance level-90% typical children pass the task, 80% pass location change task and 90% pass appearance reality task. The performance level increase with age in typical children.

3.4 Autism children false belief test (Theory of mind) Result.

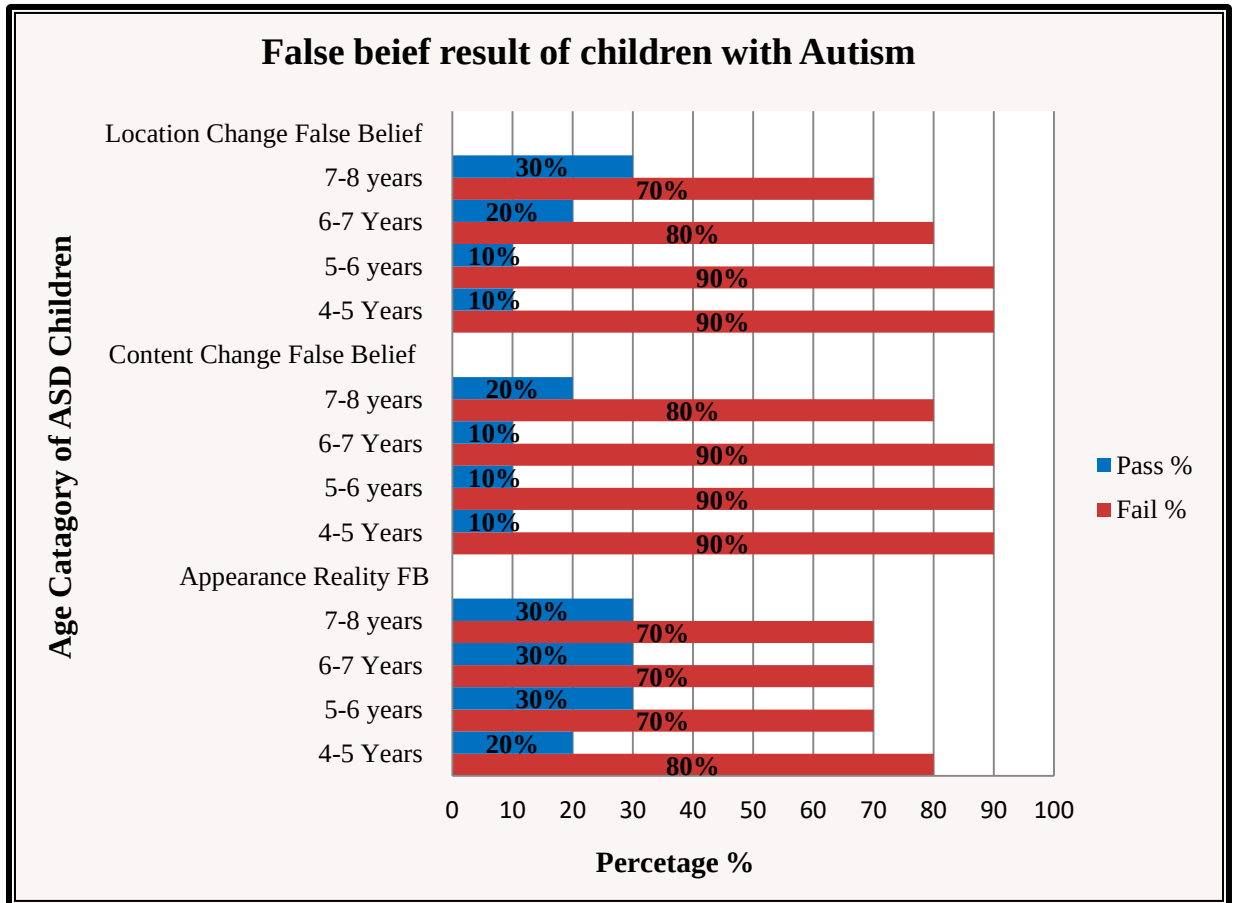


Figure 4: ToM performance of children with Autism according to age

The graph represents the Theory of mind (false belief) result of Autism Spectrum disorders children according to task and age. The vertical axis shows the tasks according to age category and the horizontal axis represent the percentage of ASD children ToM performance. The green color means the percentage of pass and the red color means percentage of fail in the test. The graph shows the result of three ToM task (location change false belief task, content change false belief task and appearance reality task) in the graph we see in every task all age category ASD children performance is poor. The ToM performances do not increase significantly with age. So it is alarming to note that ASD children have severe impairment in ToM.

3.5: Successful performance of ASD children in false belief test according to task.

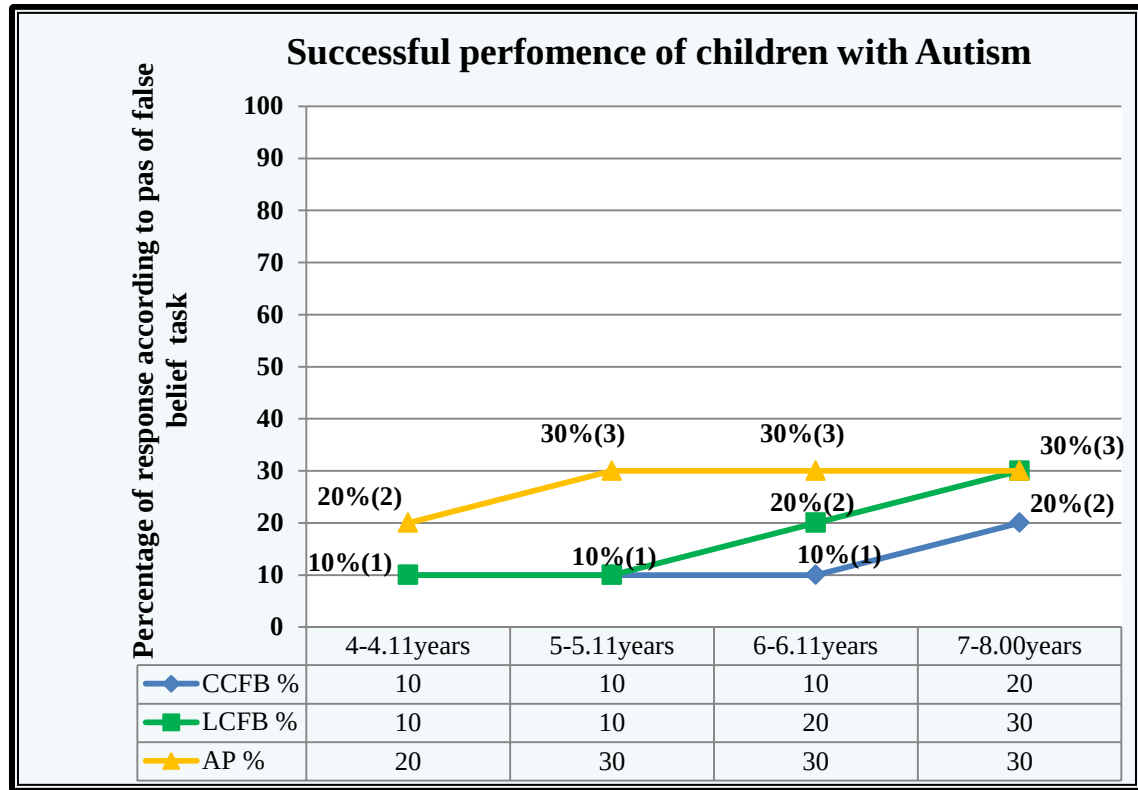


Fig 5: Successful performance of ASD children in false belief test

This data showed that 4 age group of ASD children false belief test performance. At 4-4.11 year's old 10% ASD children pass the content change task, 10% pass location change task and 20% pass appearance reality task. At 5-5.11 year's old 10% ASD children pass the task, 10% pass location change task and 30% pass appearance reality task. 6-6.11 year's old children performance level-10% ASD children pass the task, 20% pass location change task and 30% pass appearance reality task. 7-8.00 year's old children performance level-20% ASD children pass the task, 30% pass location change task and 30% pass appearance reality task. The performance level increase with age in typical children.

3.6 Comparison of Content change false belief task result of children between Autism and typically developing Bangla speaking children.

Investigator found the content change false belief of Children with Autism and typically developing Bangla speaking children

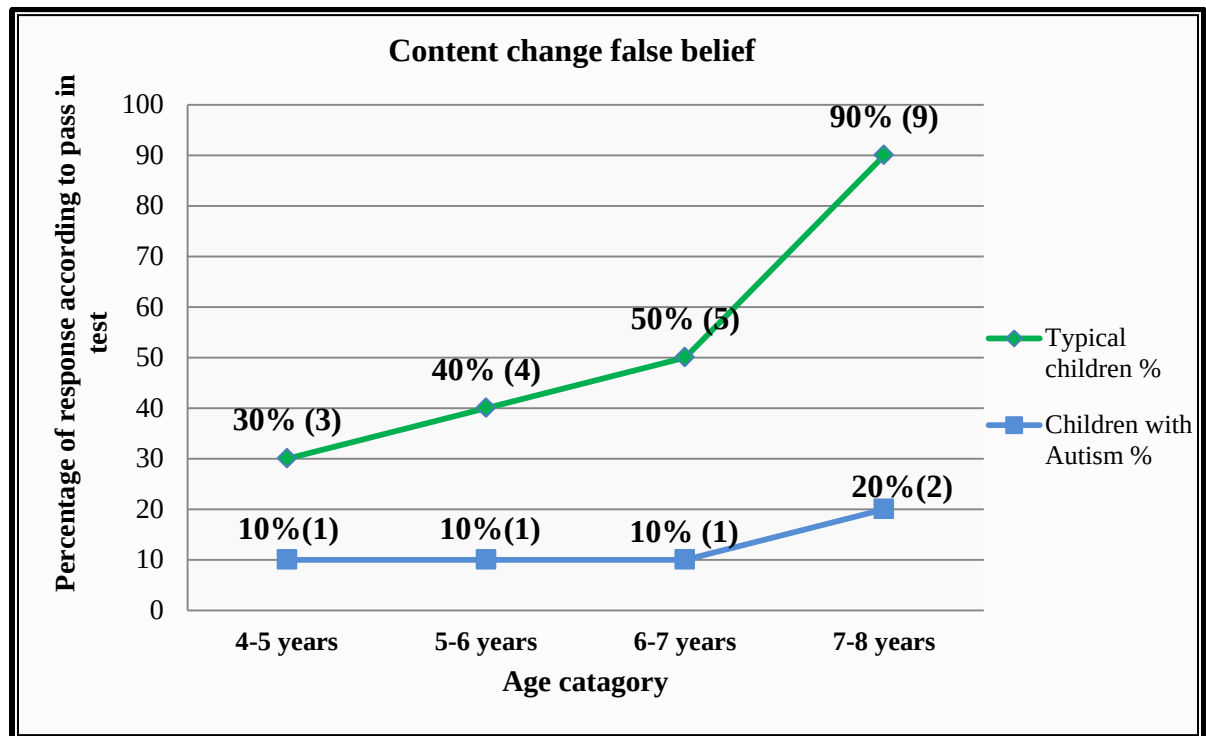


Fig 6: Content change false belief

This data showed the 4 age group of children with Autism and typical developing Bangla speaking children content change false belief performance. In vertically the graph represent the percentage of response according to pass in content change false belief task and horizontally shows the age category. At 4-4.11 year's old 30% typical children pass the task and same age group 10% Autism children pass the task. At 5-5.11 year's old typical children performance (40%) increase but the ASD children performance was not increase significantly. Gradually TD children performance increase but ASD children performance was very poor than TD children. 7-8.00 years 90% Td children pass the content change task where only 20% ASD children pass the task. So we can see that there are big differences between TD and ASD children in development of content change false belief (ToM).

3.7 Comparison of Location change false belief task result between children with Autism and typically developing Bangla speaking children

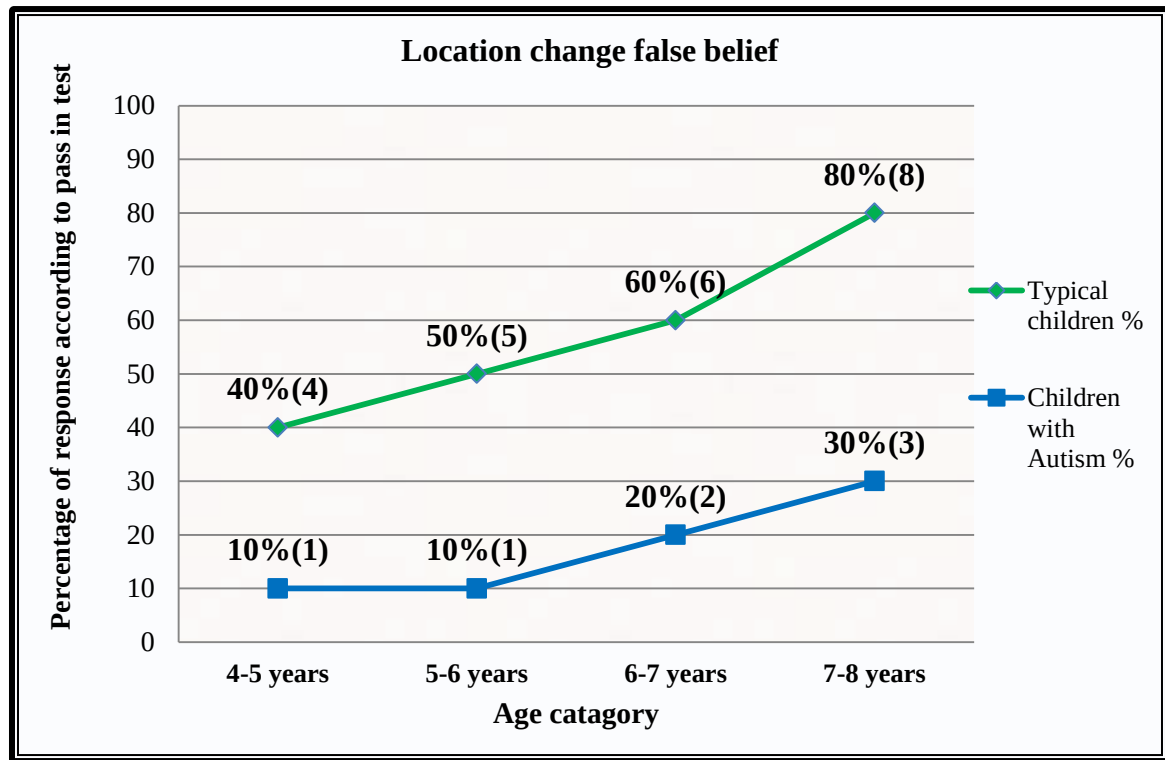


Fig 7: Location change false belief

The graph represents the location change false belief task result of children with Autism and typically developing Bangla speaking children. In vertically the graph represent the percentage of response according to pass in location change false belief task and horizontally shows the age category. 4-4.11 year's old 40% typical children pass the task and same age group 10% Autism children pass the task. In 2nd age category TD children performance increase 10% where ASD children performance remain same as before age category. In the graph we notice that the developmental gap increase with age. TD children have a sequence of development but ASD children have no developmental sequence.

3.8 Comparison of Appearance reality task result of children with Autism and typically developing Bangla speaking children

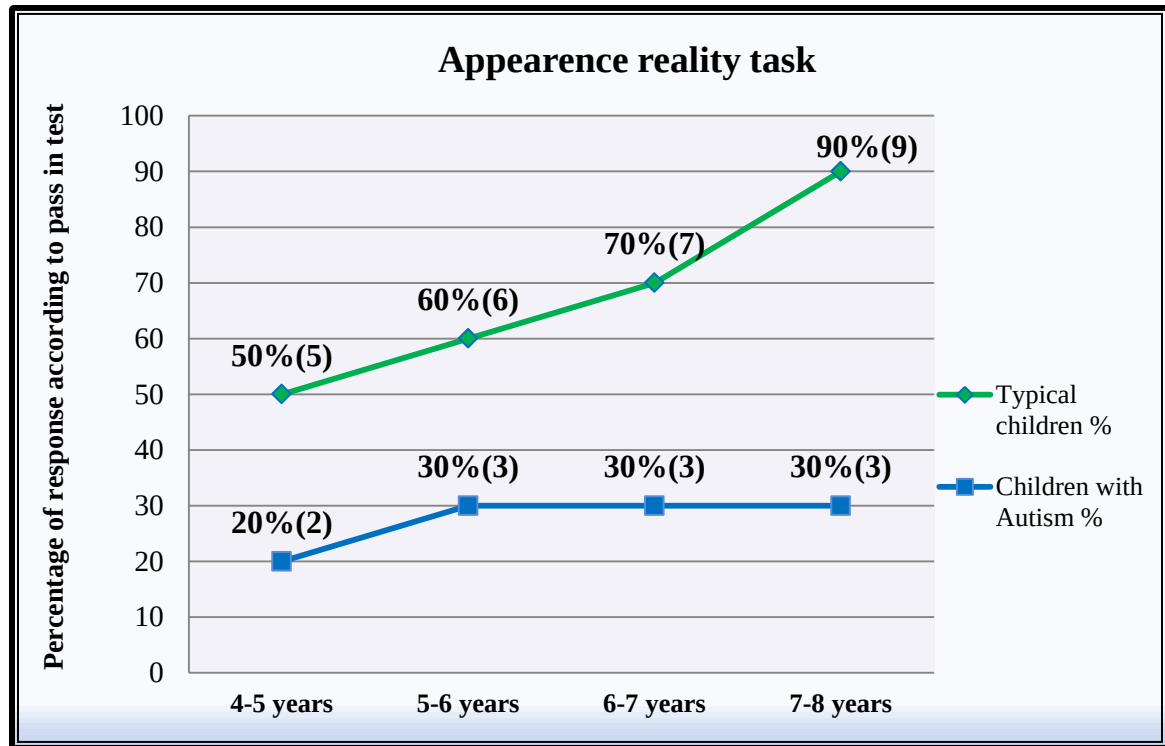


Fig 8: Appearance reality task

This line chart showed the 4 age group of children with Autism and typical developing Bangla speaking children's content change false belief performance. In vertically the graph represent the percentage of response according to pass in content change false belief task and horizontally shows the age category. 4-4.11 year's old 50% typical children pass the task and same age group 20% Autism children pass the task. In the graph we notice that 5-8.00 years old TD children development increase gradually but ASD children development remain same. The performance level increase with age in typical children. Autism children performance level was poor than typical children.

3.9 Association between type of children and false belief understanding (Theory of mind)

Table 1: Association of level of performance between typical and Autism Spectrum Disorders children.

Task name	Type of children	Pass	Fail	χ^2	Sig Value
Content change false belief	ASD	4	36	12.228	.000
	TD	18	22		
Location change false belief	ASD	8	32	6.765	.009
	TD	19	21		
Appearance Reality	ASD	11	19	11.31	.001
	TD	26	14		

Table 1: Association between TD and ASD

The table showed the association of level of performance between typical and Autism Spectrum Disorders children. Results of chi-square test presented in table 1 indicate that understanding of false belief (Theory of Mind) difference between typical and ASD children were significant. For every task $p > .005$. We know that if the chi value will be $p > .05$ they will be significant difference.

3.10 Association between gender and false belief understanding (Theory of mind)

Table 2: Association between gender and Content change false belief

Task name	Gender	Pass	Fail	χ^2	Sig
Content change false belief	Girl	12	24	1.117	.291
	Boy	10	34		
Location change false belief	Girl	15	21	1.835	.176
	Boy	12	32		
Appearance Reality	Girl	19	17	1.122	.289
	Boy	18	26		

Table 2: Association between gender and false belief

The table represents the result of association of false belief development with gender (girl & boy). Results of chi-square test presented in table 1 indicate that gender is not associated with false belief. In every task $\chi^2(1) =$, $p > .05$. The development of false belief understanding (Theory of Mind) between girl and boys is not significantly difference.

The obtained data has been analyzed from large number of participant which was divided into two groups they were typically developing (TD) Bangla speaking children and Autism Spectrum Disorders (ASD) children .Within the particular group forty children were typically developing and forty were children with ASD.

In this study the investigator took the subjects of typical development and the children with ASD of 10 each age category where the minimum age was 4 as Bibby & McDonald (2005) have revealed ToM usually appear at the age of four. Moreover another study of Japanese scientist Naito & Koyama (2006) recommends that the ToM may be delayed up to six to seven year of age as per their findings to typically developed children.

According to findings in typical children the girls and boys ratio was almost same where's ASD boys was higher than ASD girls as per figure 1 which support Lawson (2017) study where he found that more male living with Autism than female and only 1 female to every 3 or 4 males has received a diagnosis of autism.

The study result demonstrates that in case of typical children, false belief understanding (Theory of mind) developed at 7-8 years old following figure 2, on the other hand Astington, Margaret, & Edward (2010) found in there study on “theory of mind development” that 4 - 5years old children know that people may think different things and understand the false belief but in Bangladesh at 4-5 years old less than 50% typical children understand false belief. However other studies explored that in Italy and Britain (Lecce & Hughes, 2010), Hong Kong and mainland China (Liu, Wellman, Tardif, & Sabbagh, 2008) Japan and Korea (Oh & Lewis, 2008), children show differences up to two years in the acquisition of false belief understanding and these researchers claimed that in those counties ToM (false belief understanding) is delay than universal age. As Bangladeshi children developed false belief at 7-8 years old and Bangladeshi children show 2- 3 years difference than universal age so Bangladeshi children also are delayed in ToM onset. Chasiotis, Kiessling & Campos (2006) found their study that low socio-economic status or parenting style influence ToM (false belief understanding)

development. It can be consistent for Bangladeshi children. Need to further study to know the factors of delay ToM development in Bangladesh context.

Investigator revealed typical children successful performance in false belief test according to task in figure 3 where showed that typical children perform better in appearance reality task than other tasks (content change and location change false belief task). In this task investigator used apple shape candle image where both object was familiar with children that's why frequency effect can be responsible for the result. In content and location change tasks children needed to follow 2-3 steps instruction for that reason may be most of TD children fail those tasks in early age. The fact is common for all age group children.

In this study most of the ASD children fail in false belief task by way of figure 4. In Bangladesh most of the ASD children going to special school but they did not learn about theory of mind for that reason they could not understand false belief, other belief. Baron cohen (1985) who studied several study on theory of mind, he found on his study "Autism children have theory of mind or not" that Individuals with ASD show slower and different developmental pattern than typical children. So if speech and language therapists and special school teacher's used different strategy it can be useful for children with ASD. Although most ASD individuals fail false belief tasks such as the Sally-Anne test, content change, appearance reality task a significant minority of autistic individuals (around 10 to 30 percent) do pass false belief tests. Happe & Frith (1996) mentioned in their study that, these individuals are usually older and have a higher understanding than autistic individuals who fail false belief tasks this specific deficit in autistic children.

The study revealed ASD children successful percentage was poor as per figure 5. The graph shows that in appearance reality task ASD children perform better than other task (location and content change). In location change task 4-5.11 years 10% children pass and 6-7 years old 20% and 7-8 years 30% children pass. In appearance reality task 4-4.11 year's old 20% ASD children pass and 5-8 years old in every age category children pass level was same that was 30%. In this task investigator use an apple shape candle picture which was familiar with ASD children. Familiarity can be a cause behind perform better in this task. Investigator took the participant from different Autism special school and in those schools their teacher's use these pictures with them for teaching and it can be a

reason for this task. Nowadays most of the parents know about Speech and language therapy and the receive therapy. Speech therapists also use familiar picture in therapy session and this also can be effect on the task result. In content and location change tasks 4-5 years old 10% children pass and with increase age their performance was not remarkable. According to Firth (2001) false belief tasks are deceptively simple, but they can tap many different abilities and can be solved in many different ways he also said that there are many reasons for failure and the Sally-Anne and related test requires working memory to inhibit reality-oriented responses. Those tasks carry 3-4 step instruction but Autism children don not follow long instruction that's why the failed those tasks.

The result of content change false belief showed that there has a big difference between typical and ASD children performance. In this task there was two things one, own belief and two, others belief. The own belief question investigator showed a biscuit packet and asked what has inner the packet all typical children gave correct answer. Previous study have reported that normal child understand their own belief better than another belief (Williams, 2010). The investigator notices that with increase of age typical children understanding of other belief develop as own belief. Gopnik & Slaughter (1991) found that children understand another belief as much as their own but this finding is not appropriate for ASD children. Their understanding of other belief is severally impaired.

In location change false belief task 7-8 years typical children response was good (80% pass the task). Typical children understanding of false belief developed with age on the other side ASD children location change false belief understanding was very poor because in 4-4.11 years old 10% and 7-8 years old 30% ASD children pass the task and among 4-8 years their development was not appear able. In this task investigator used 3 steps commend which were difficulties to follow for ASD children. According to de Villiers (2007) theory of mind (false belief understanding) are correlated with language acquisition. In Bangladesh Autism School teachers do not concern with theory of mind. We cannot directly say that ASD children do not develop theory of mind because Ghim, Lee & Park (2010) found that autistic child could learn to understand mind, even though they have a specific deficit in theory of mind. Teaching the principles underlying the false belief seems to be effective, especially to autistic children. So ASD can develop

their ToM understanding if they get training and get the opportunity to learn ToM development activity.

In appearance reality task have a difference of performance level between typical and ASD children following graph 8. Green & Flavell (1986) cited by Deak, Ray & Brennenman (2003) found that children from 4 years old normally are able to distinguish between appearance and reality; they can talk about objects which have misleading appearances but in this study 4 years 50% typical children was able to distinguish appearance and reality it can be cultural effect or family effect. On the other side in this age 20% ASD children was pass in the task. Baron-Cohen. (1989) found that ASD children do not capture the object's dual identity in their spontaneous descriptions. It is an additional clue that in autism there is a deficit in the development of a theory of mind. Investigator compared every task between typical and Autism Spectrum Disorder's children according to age category. In every task ASD children performance were poor than TD children. TD children performance increase with age but ASD children was not increase significantly. Ghim, Lee, & Park (2010) found their study that autistic children could be taught to pass the false belief tasks and generalize their learning to other false belief tasks right after the teaching and two weeks later. So as a Speech and language therapists we should use ToM improvement activity with ASD children and need to special train up special school teacher about theory of mind.

In this study found that level of ToM performance was highly associated ($p < .05$) with type of children (typical developing children and children with Autism Spectrum Disorders). In every age category typical children performance was better than ASD children. Although Bangladeshi typical children ToM development is delay than other countries but they ToM development increase with age on the other hand ASD children development do not increase measurably with age. This finding in ToM is consistent with the results of previous studies on ToM in ASD. In the study of Baron-Cohen et al., (1985) cited by Steele et al., (2003) found that ASD children have severe impairment in theory of mind and have a significant difference with typical children in ToM development. So it is appearable that typical children ToM development is significantly better than children with ASD.

In this study showed the association between gender and false belief development which was statistically not significant (gender ratio is $p > .05$). Mathieson and Banerjee, (2011) cited by Devine and Hughes, (2012) found there study there is no direct relationship between gender and false belief development. Ibanez et al. (2013) found a total different scenario of where he claimed in his study that girls understanding of ToM are better than boys. In this study investigator found that girls ToM task performance was better than boys but not significant.

ToM seems to have a universal age of onset and developmental trajectory in typically developing children where Bangladeshi typical children shows delay development than universal age. However, contextual factors such as socioeconomic status may also influence the age at which ToM abilities develop. In comparison with typically developing children, children with ASD show severe delays in ToM development and deviance in the developmental trajectory of ToM. However, previous research and this study on ToM have mostly focused on ability to pass false belief tasks. Very few studies have looked at ToM using a range of developmentally sequenced tests. To get a more accurate picture of ToM it is essential to have a broad range of ToM tasks, some easier and some harder than the false belief task.

5.1 Limitations

There were some limitations during conducting the study. These are:

1. In this study sample was taken more from urban area. But culture & socio economic status can verify the results. So if the sample were from both rural and urban area the result could give a broad understanding of theory of mind.
2. Theory of mind has total 11 task due to time consuming the investigator could not modify all sets.
3. Due to time consuming the investigator selected 4-8 year old age group children

5.2 Recommendation

- The study was done within a short period of time and only 2 group of children (typical & ASD) were selected to conduct the whole study. Further study can be conducted with more groups of children (Mental retardation, Down syndrome)
- This study found that false belief understanding (ToM) is delay in Bangladesh with comparing other countries. So it can be explored the factors of delay ToM development.
- Theory of mind is closely related to language development so I recommended the special school teacher to work with ToM development activity.
- I recommended every speech and language therapist to work with ToM development in ASD and cognitive impairment children.

নাসরিন,সালমা (২০১৭)। বাংলাভাষী অটিস্টিক শিশুর সামাজিক সংজ্ঞাপন ও প্রতীকী হস্তভঙ্গী শনাক্তকরণ দক্ষতা।

বাংলাদেশ এশিয়াটিক সোসাইটি পত্রিকা, পঁয়তিশতম খন্ড।

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Annexure-1 (A)

False Belief Battery Scripts and Scoring

Name:

Date:

Serial number	Question	Probable Answers	Answer
1.1	Type of children	1.Autism 2.Typical developing children	
1.2	Age	----- month	
1.3	Gender	1.Boy 2.Girl	
2.Content change false belief (In every question 1 for correct answer & 2 for incorrect answer)			
2.1	Look what I have here: What do you think is in this box? Biscuits or other:_____	1.Biscuits 2.Chocolate	
2.2	Go ahead and look inside. (open box) Hey! Those are Chocolates! I wonder what Chocolates are doing in biscuits box. (close box) Here your She has never looked inside this box before. What does he think is inside, Biscuits or Chocolates?	1.Biscuits 2.Chocolate	
2.3	What is really inside?	1.Biscuits 2.Chocolate	
Total result of content change false belief task(Need to give correct ans. In every question for pass the task).		1.Pass 2.Fail	

3.Location change task There will be two baskets in the scene Sally put her ball into red basket, and then she left. While she was away, Anne transferred the ball into blue basket and she also left. When Sally returned to the scene, experimenter asked Thought Question			
3.1	Where will Sally look for her ball?	Red basket (1) Blue basket (2)	
3.2	Where is the ball?	Blue basket (1) Red basket (2)	
Total result of content change false belief task(Need to give correct ans. In every question for pass the task).		1.Pass 2.Fail	
4.Appearance Reality Task			
4.1	Look what I have here. What does this look like? Apple other _____	1.Apple 2.candle	
4.2	What is this really and truly, an Apple or a candle?	1.Candle 2.Apple	
Total result of content change false belief task(Need to give correct ans. In every question for pass the task).		1.Pass 2.Fail	

Annexure-1 (B)
False Belief Battery Scripts and Scoring

ক্রমিক নং	প্রশ্ন	সম্ভাব্য উত্তরসমূহ	উত্তর
১.১	বাচ্চার সমস্যার ধরণ	১। অটিজম ২। স্বাভাবিকভাবে বিকশিত শিশু	
১.২	বয়স	বছর _____	
১.৩	লিঙ্গ	১। ছেলে ২। মেয়ে	
২. Content change false belief			
২.১	দেখো আমার কাছে কি আছে। (একটি বিস্কুটের প্যাকেট দেখিয়ে) তোমার কি মনে হয় এই বক্সে কি আছে? বিস্কুট না অন্য কিছু।	উত্তর সঠিক হলে ১ ভুল হলে ২ হবে। বিস্কুট (১) চকলেট (২)	
২.২	চল বক্সটি খুলি। ওয়াও এগুলো তো চকলেট! বিস্কুট এর বক্সে চকলেট কি করছে। (এবার বক্সটি বন্ধ করা হবে) তোমার বন্ধু কখনো দেখেনি। সে কি মনে করবে বক্সে কি আছে? বিস্কুট/চকলেট	বিস্কুট (১) চকলেট (২)	
২.৩	বক্সে আসলেই কি আছে?	চকলেট (১) বিস্কুট (২)	
Content change false belief এর সার্বিক ফলাফল (পাসের জন্য ৩টি প্রশ্নেরই সঠিক উত্তর দিতে হবে)		১। পাস ২। ফেল	

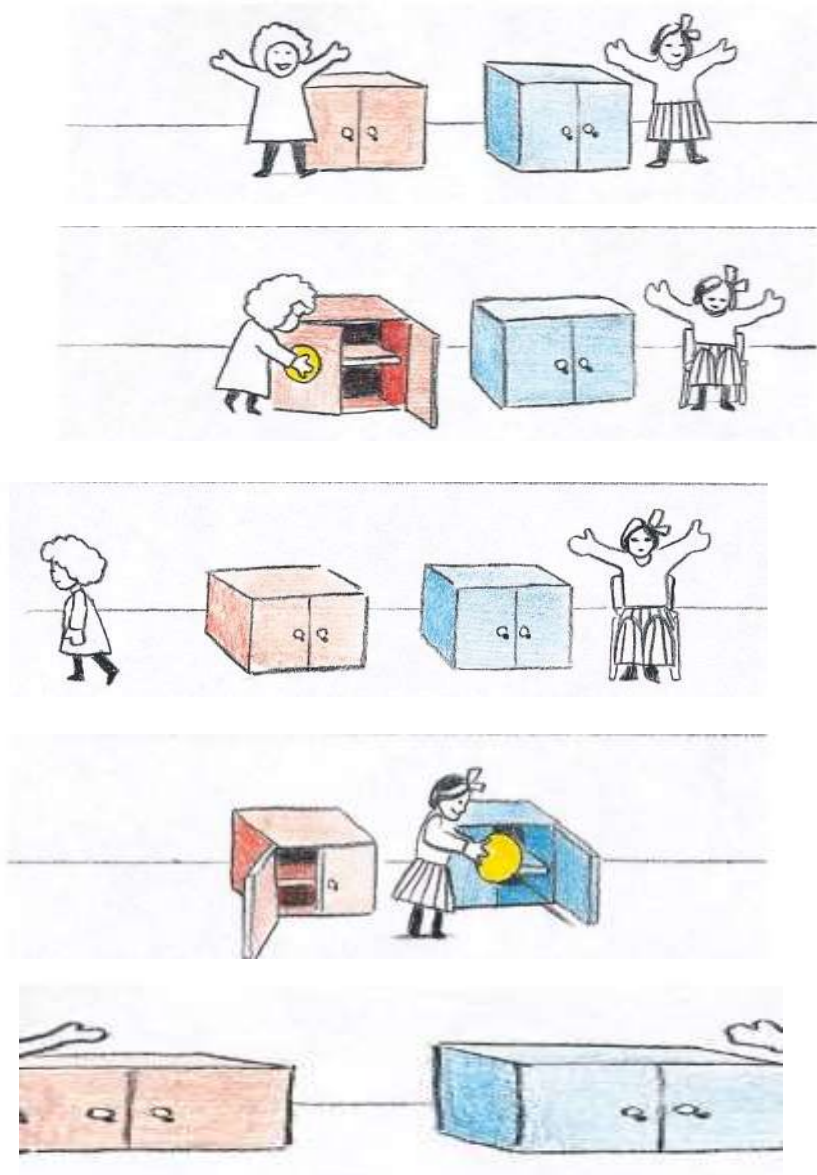
৩। Location change false belief <u>সেলি-এনি কাজ</u> এখানে দুটি ঝুড়ি থাকবে। সেলি তার বলটি লাল ঝুড়িতে রাখে এবং চলে যায়। তারপর এনি বল তার নীল ঝুড়িতে রাখে এবং সেও চলে যায়। যখন সেলি ফিরে আসে পর্যবেক্ষক প্রশ্ন করবে:-			
৩.১	সেলি কোথায় তার বলটি খুঁজবে ?	লাল ঝুড়ি (১) নীল ঝুড়ি (২)	
৩.২	বলটি কোথায় আছে ?	নীল ঝুড়ি (১) লাল ঝুড়ি (২)	
Content change false belief এর সার্বিক ফলাফল (পাসের জন্য ২টি প্রশ্নেরই সঠিক উত্তর দিতে হবে)		১। পাস ২। ফেল	
৪। Appearance-Reality Task			
৪.১	দেখো আমার কাছে এটা কি? (একটি আপেলের মত মোমবাতির ছবি দেখিয়ে) বলতো এটা দেখতে কিসের মতো ?	আপেল (১) মোমবাতি (২)	
৪.২	এটা আসলে কি ?	মোমবাতি (১) আপেল (২)	
Appearance-Reality Task এর সার্বিক ফলাফল (পাসের জন্য ২টি প্রশ্নেরই সঠিক উত্তর দিতে হবে)		১। পাস ২। ফেল	

গবেষকের স্বাক্ষর

সাক্ষীর স্বাক্ষর

Annexure -2 (Picture of Tools)

Location Change False Belief



Content Change False Belief

Investigator would use real object for this task

Appearance-Reality Task



Annexure -3 (a)

Consent form

The investigator is Mst. Farjana Akter a 4th year student of B. Sc. in Speech and Language Therapy in Bangladesh Health Profession Institute (BHPI). This study is part of course curriculum. In this study participate has clearly been informed the purpose of the study as to find out the “Theory of Mind: A comparison of typical developing Bangla speaking children and children with Autism spectrum disorders”. In this study I am.....

a participant or sample and I have been clearly informed about the purpose of the study. I am willingly participating in this study. I will have the right to withdraw from this study at any stage and I am not bounded to answer to anyone to get me out of the study at any time. This study will not cause any benefit or impact on participate work at present and future.

I have been also inform that, investigator will keep all information confidential and personal identity such as participates name & address will not be published anywhere of the study. The research will be available to answer any study related question to participate. I have been informed about the above- mentioned information and I agree to participate willingly giving my consent.

Signature of the study Participate: Date:

Signature of the Researcher: Date:

Annexure-3 (b)

সম্মতি পত্র

এই গবেষণা স্পীচ এন্ড ল্যাঙ্গুয়েজ থেরাপি বিভাগের অধ্যয়নের একটি অংশ এবং গবেষকের নাম মোসাঃ ফারজানা আক্তার। তিনি বাংলাদেশ হেলথ প্রফেশনস ইন্সটিটিউটের বি এস সি ইন স্পীচ এন্ড ল্যাঙ্গুয়েজ থেরাপি বিভাগের ৪ থ বর্ষের অধ্যয়নরত একজন ছাত্রী এবং তার গবেষণার বিষয় “Theory of Mind: A comparison of typical developing Bangla speaking children and children with Autism spectrum disorders”

এই গবেষণায় আমি -----

একজন অংশগ্রহণকারী এবং আমি এই গবেষণার উদ্দেশ্য পরিষ্কার ভাবে জানতে পেরেছি। আমি যে কোন সময় এবং গবেষণার যে কোন পর্যায়ে আমার অংশ গ্রহণ প্রত্যাহার করতে পারি এই জন্য আমি কারো কাছে জবাব দিহি করতে বাধ্য নি। এই গবেষণায় অংশ গ্রহণ করলে তা আমার ও অংশ গ্রহণ কারীদের বর্তমান ও ভবিষ্যতে কোন প্রকার প্রভাব ফেলবে না।

সাক্ষাতের সকল তথ্য যেগুলো গবেষণার কাজে ব্যবহৃত হবে, তা সম্পূর্ণ গোপন থাকবে। শুধু গবেষকের তথ্য সমূহ প্রবেশাধিকার পাবে। কোনো প্রকার নাম প্রকাশ হবে না।

আমি গবেষণার পদ্ধতি এবং জটিলতা অথবা সাফলের ব্যাপারে বা গবেষণার তত্ত্বাবধায়কের সহিত আলোচনা করতে পারব

আমি উপরোক্ত সকল তথ্য গুলো সস্ত্ররকে জানি এবং এই গবেষণায় অংশ গ্রহণে সম্মতি জ্ঞাপন করছি।

অংশ গ্রহণকারীর স্বাক্ষর ----- তারিখঃ

গবেষকের স্বাক্ষর ----- তারিখঃ

Appendix 4

Permission Letter



বাংলাদেশ হেল্থ প্রফেশন্স ইনস্টিটিউট (বিএইচপিআই)
BANGLADESH HEALTH PROFESSIONS INSTITUTE (BHPI)
(The Academic Institute of CRP)

CRP-Chapain, Savar, Dhaka, Tel: 7745464-5, 7741404, Fax: 7745069
BHPI-Mirpur Campus, Plot-A/5, Block-A, Section-14, Mirpur, Dhaka-1206. Tel: 8020178, 8053662-3, Fax: 8053661

সিআরপি-বিএইচপিআই/১০/১৮/৬৯

তারিখ : ২৮.১০.২০১৮

প্রতি
চেয়ারপারসন
অটিজম ওয়েলফেয়ার ফাউন্ডেশন
কেরানী গঞ্জ, ঢাকা-১৩১০।

বিষয় : রিসার্চ প্রজেক্ট এর জন্য আপনার প্রতিষ্ঠান সফর ও তথ্য সংগ্রহ প্রসঙ্গে।

জনাব,
আপনার সদয় অবগতির জন্য জানাচ্ছি যে, পঞ্চাশতাব্দীদের পুনর্বাসন কেন্দ্রে-সিআরপি'র শিক্ষা প্রতিষ্ঠান বাংলাদেশ হেল্থ প্রফেশন্স ইনস্টিটিউট (বিএইচপিআই) ঢাকা বিশ্ববিদ্যালয় অনুমোদিত বিএসসি ইন স্পীচ এন্ড ল্যাঙ্গুয়েজ থেরাপি কোর্স পরিচালনা করে আসছে।

উক্ত কোর্সের ছাত্রছাত্রীদের কোর্স কারিকুলামের অংশ হিসাবে বিভিন্ন বিষয়ের উপর রিসার্চ ও কোর্সওয়ার্ক করা বাধ্যতামূলক।

বিএইচপিআই'র ৪র্থ বর্ষ বিএসসি ইন স্পীচ এন্ড ল্যাঙ্গুয়েজ থেরাপি কোর্সের ছাত্রী মোসাঃ ফারজানা আক্তার তার রিসার্চ সংক্রান্ত কাজের তথ্য সংগ্রহের জন্য আগামী ২৬.১০.২০১৮ তারিখ থেকে ৩১.১২.২০১৮ তারিখ পর্যন্ত আপনার প্রতিষ্ঠানে সফর করতে আগ্রহী।

তার রিসার্চের বিষয় হলো- “Theory of mind: A Comparision of children with Autism and Typical developing Bangla speaking children.”

তাই তাকে আপনার প্রতিষ্ঠান সফর এবং প্রয়োজনীয় তথ্য প্রদান সহ সার্বিক সহযোগিতা প্রদানের জন্য অনুরোধ করছি।

ধন্যবাদান্তে

Sawal
28.10.18

মোঃ সাজ্জাদ হোসেন
বিভাগীয় প্রধান
এসএলটি, বিএইচপিআই।



Roual Hefins
31/10/18



বাংলাদেশ হেল্থ প্রফেশন ইনস্টিটিউট (বিএইচপিআই)
BANGLADESH HEALTH PROFESSIONS INSTITUTE (BHPI)
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সিআরপি-বিএইচপিআই/১০/১৮/৬৯

তারিখ : ২১.১০.২০১৮

প্রতি

পরিচালক

সোসাইটি ফর দ্যা ওয়েলফেয়ার অব অটিস্টিক চিলড্রেন (এসডব্লিউএসি)

শ্যামলী, ঢাকা।

বিষয় : রিসার্চ প্রজেক্ট এর জন্য আপনার প্রতিষ্ঠান সফর ও তথ্য সংগ্রহ প্রসঙ্গে।

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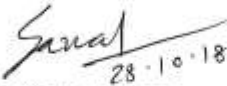
উক্ত কোর্সের ছাত্রছাত্রীদের কোর্স কারিকুলামের অংশ হিসাবে বিভিন্ন বিষয়ের উপর রিসার্চ ও কোর্সওয়ার্ক করা বাধ্যতামূলক।

বিএইচপিআই-র ৪র্থ বর্ষ বিএসসি ইন স্পীচ এন্ড ল্যাঙ্গুয়েজ থেরাপি কোর্সের ছাত্রী মোসাঃ ফারজানা আক্তার তার রিসার্চ সংক্রান্ত কাজের তথ্য সংগ্রহের জন্য আগামী ২৬.১০.২০১৮ তারিখ থেকে ৩১.১২.২০১৮ তারিখ পর্যন্ত আপনার প্রতিষ্ঠানে সফর করতে আগ্রহী।

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ধন্যবাদান্তে

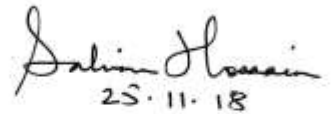

28.10.18

মোঃ সাজ্জাদ হোসেন

বিভাগীয় প্রধান

এসএলটি, বিএইচপিআই।




25.11.18