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Articles

The theory of mind among deaf children: a review of the Theoretical Foundations

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Abstract

The ability to understand that others have mental states such as thoughts, tendencies, and beliefs that can be different from one's own mental state or reality is called the "theory of mind". In this article, we will first try to explain the theoretical foundations of what is now known as the theory of mind, and then, by reviewing research published on the development of the theory of mind in deaf children, we seek to research the theory of mind about hearing impaired children. Some theorists believe that the growth of the theory of mind is dependent on linguistic experience, in contrast to theorists who believe that the growth of the theory of mind is related to an executive function. Some researches have shown that latent deafness has succeeded in achieving mental theory. On the other hand, studies have shown that there is no delay in the theory of the minds of deaf children.

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1. Introduction

The theory of mind is a term that refers to the ability to predict and describe behavior by referring to mental states (Rappachly, 2003; Simon, 2004). and, the coherent body of knowledge about the human mind that we normally obtain we use it to predict and describe our own behavior and others (Stington, 1996, Abbeduto et al., 2004). In the literature, synonyms such as subjectivism, mind-reading, public psychology (Baron-Cohen, 1999) and social perception (Franny Hoog, 2008) have been used instead of the term "theory of mind." The term "theory of mind" for the first time in 1978, by Primak and Vodovorov, the study of the behavior of chimpanzees has been proposed (Kal & Tomaslou, 2008).

The history of the study of the evolution of the skills of the theory of mind in children to the early work of Piaget on "child thinking" and "self-management" during the 1930s and research on "empathy" and "role-playing" in the 1960s-1970s (Amin Yazdi, 2004).

The main assumptions of this theory are: the mind exists, is connected with the outside world, is separate from the outside world, it can visualize objects or events correctly or incorrectly and actively engage in interpretation and interpretation one influences reality (Jokar, Samani, & Cheng steel, 2000).

At the moment, there are two perspectives on the evolution of the "theory of mind" (Amin Yazdi, 2004): The first view is that understanding the child's wrong belief is the acquisition of the "theory of mind", and is usually around four and five years of age, a qualitative change occurs in this ability (Gattir, 2005; Triion and Nader Gears Bews, 2008). At this point, the child realizes that other people can have beliefs that are false or contradictory with his belief (Sebola & Vishart, 2008).

This perspective views the development of the theory of mind continuously (Amin Yazdi, 2004) and the second view that children's understanding of mental states increases significantly from four to six years of age, but until the age of eight, the performance of the children is weak. This view points to the transformation of children's understanding of mental states into stages (Anthony et al., 2006) and the theory of mind as a multidimensional structure that has different levels (Morris et al., 1999).

On the other hand, according to (Sera et al., 2002; Gevers et al., 2006), the "theory of mind" damage may limit the ability of children to understand humor, as well as to describe the interest and awareness of talking with their peers. The lack of the theory of mind is associated with social problems because the theory of mind is considered to be vital to the social functioning of a child (Hughes et al., 1999; Ruffman et al., 1998).

Begeer, Malle, Keysar, and Nieuland (2010) measured the use theory of mind in social interactions in high-level autistic individuals and normal-growth individuals as control groups. The participants in this study were 68 (53 patients, 15 people), of which 34 had autism and 34 had normal growth.

Participants were evaluated by two assignments that required the use of mental skills in social interaction. The results of the study showed that people with autism were considerably weaker in using sentences and phrases than the control group.

Neal (1999) used a multiple-line research project for four children with autism in research entitled "Using the theory of mind to increase the social competence of children with autism." The results showed that after implementing the educational package, all children achieved the theory of mind and social interactions with peers and social play increased in them.

Qomrani and Alborzi (2006) in a research study on the evolution of the "Theory of Mind" in mild and moderate mentally retarded students aged 7 to 9; the evolution of the theory of mind in mentally retarded and normal students and their relationship with some they looked at demographic variables such as age, gender, and socioeconomic status. The results of this study showed that in both groups, mental retardation and normalization are the processes of evolution of the theory of mind with respect to the ascending age. The theory of children's minds is not related to gender. The study of demographic variables shows that:

- As much as the father's literacy rate increases, the function of the children (backward and normal) is improved in the theory of mind test.
- The difference between the children of different occupational classes is significant.

Fombonne (1999) investigated adaptive behavior and the theory of mind in children with autism. They used false beliefs to measure the theory of mind and used the Weinland adaptive behavior scales to measure adaptive behavior. The results showed that the adaptive behavior scores of children who were unable to complete the beliefs of false beliefs were higher than those who were unable to complete these tasks.

Mento et al., (2014) in research, with the clinical interpretation of instruments, which personality variables could be involved in hearing loss condition and Cochlear Implant (CI). This observational study highlights the psychological dynamics that should be taken into account by the operator's team, in order to improve the quality of life of these patients and increase their long-term therapeutic outcome.

Resches and Perez Pereira (2007) investigated 74 common children in research on communication abilities and the theory of mind in preschool children. They compared the subjects in terms of their age and their function in the theory of mind. Their results showed a significant difference in the communication abilities between subjects who achieved the theory of mind and those that had not been obtained. Also, the perception of belief was a strong predictor of the development of communicative competence.

Bosacki and Astington (1999) examined the relationship between social cognition (theory of mind) and social adequacy in adolescents. They chose 64 girls and 64 boys to do this. To collect data on social adequacy, for each person, two grades were ranked one by peers and the other by the teacher. They used the interview to measure the theory of mind. The results of this research showed a positive relationship between the theory of mind and social adequacy in both the boys and girls groups, however, when social adequacy was answered by peers. There was no significant relationship between the scores given by the teachers to social adequacy. There was also a gender difference in response to the tasks of the theory of mind; in that way, it was better than the sons.

Mento et al., (2016) assess whether temperament plays a role in the adaptation to CIs and if certain temperamental and character traits may be the risk or protective factors for surgery and rehabilitation outcomes. The Temperament and Character Inventory (TCI) was employed to obtain a psychological evaluation. The findings suggest a connection between the scores obtained on the TCI questionnaire and the patient's behavior toward the CI. The effects of the operation may be mediated by some temperamental and character traits. In the field of clinical psychology and hearing rehabilitation, a psychological evaluation may contribute a more profound understanding of the personality dynamics that influence the patient's reaction toward traumatic hearing loss, compliance, and CI surgery outcomes.

In the last three decades, many studies have been conducted in the field of theory. These studies seek to determine the relationship between the theory of mind and variables such as sex, cultural context, language, executive performance, social interactions, etc. In this research, we seek to investigate the theoretical foundations of the theory of mind among deaf children.

## **2. The theory of mind**

One of the important tasks of children is to promote their social understanding, the nature of their own mental lives and others. They need to learn that individuals have goals, intentions, and expectations; they must know that people know some things and do not know some things, and if they believe in something, it does not mean that others have the same belief. In short, they must know the workings of the human mind (Ziegler & Alibi, 2007).

Social recognition as the focus of all the child's skills needed to understand the tendencies, emotions, and feelings of other children and adults (Sebola & Vichart, 2008). Social recognition is one of the key abilities we need to succeed in social interactions in everyday life (Newen, Gly & Zink, 2008). The subject of social recognition is human and human affairs, and it means knowing people and their actions. Social cognition has three structures: person's perception, role acceptance skills, and theory of mind (Gradi's, 2002; Qamarani et al., 2006).

The theory of mind is the latest trend in research on the development of social cognition of children, which began in the 1980s and is currently the dominant area of research in this field (Flavel, 1998; Mohesni, 2004). The theory of mind is a term that refers to the ability to predict and describe behavior by referring to mental states (Doherty, 2009) and referred back to 1978. In this year, Primak and Vladimir presented the term "theory of mind" in an article entitled "Do chimps have a theory of mind" (Doherty, 2009). In the commentary of this paper, three philosophers suggested separately that a way to understand whether an animal has a conceptual

belief in believing is to put the animal in a simulated position (Bennett, 1987; Dent, 1987; Harman, 1978; Fallwell, 2000).

These beliefs were used by two Australian psychologists, Mae Pearnar and Weimar, in the early 1980s, and they used an unpredictable impact-induced method proposed by philosophers (Flavel, 2000). With the publication of the article by Pramak and Woodov, and by the paper by Weimer and Pearnar, a huge flood of research and theorizing on children's understanding of the mind began that the study was not limited to transformational psychologists, but also researchers from other disciplines, especially philosophy, comparative psychology, and cognitive science to research this was the case (Carpandal et al., 2008).

However, the term "theory of mind" was first introduced in 1978 by Primak and Woodoff in the study of the behavior of chimpanzees (Cal & Thomas, 2008). However, how children understand their mental states and others is not a new issue. Simmons (2004) has argued that the source of this question is when psychology returns as an independent income discipline, and points to Baldwin (1897), who states that "the transformation of the understanding of others in the course of the transformation of self-understanding, and the self-socialization of the child it develops when he discovers that others have a self-perceived self as "me." That this "me" has different experiences about the "child's self. "

The attention to this question is seen from the perspective of other psychologists such as Piaget and Vygotskij. In Piaget's view, schemas act as an overview framework for understanding the social behaviors of others (Simmons, 2004; Abdullah Zadeh Rafi, 2010). In the context of his understanding, Piaget stated that the social context influences self-understanding. In that way, cultural and social contexts influence the development of consciousness towards oneself. This is one of the few cases in which Piaget considered the role of social interaction in the evolution of cognition (Stacyyang, 2008).

In Vygotsky's view, children acquire cultural values, ways of thinking and social norms through interaction with people in their different family, educational, social and cultural settings (LotfAbadi, 2006). Though Baldwin and Vygotsky's attention is drawn to the evolution of the child's knowledge of the mind, their work was in theory, and these two theorists did not conduct research on the evolution of the child's knowledge (Abdullahzadeh Rafi, 2010).

According to Flaulle (1999), there are three main streams of research on the development of children's knowledge about the mind. The first flow, directly or indirectly, goes back to Piaget's research. Piaget believed that children initially knew that there were things as conceptual, perceptual, and emotional. However, naturally, they cannot know that they have such views or others act following these views or may report their views unknowingly when they are asked to report others' views. Even after children become aware of these perspectives and perceptions, they only gradually gain the ability to differentiate their views from others (Flavel, 1999).

The second stream, which began in the early 1970s, consists of a hypothesis about the growth of metacognition in children. Metacognition refers to knowledge about the nature of individuals as cognitive holders, about the nature of various cognitive assignments, and about the possible strategies that can be used to carry out various assignments. Metacognition also includes individual executive skills to regulate and control their cognitive activities (Flavel, 1999).

The third stream, which is the theory of mind, began in the 1980s and is now dominant in the whole. Indeed, it can be said that the latter category has almost the entire domain of cognitive development, since the published materials in the field of the theory of mind increase by hundreds, and there is no sign of a decrease in this trend (Flavel, 1999).

Effective factors in the propagation of the theory of mind

Mono (1996) believes that several scientific and research moves have been effective, directly and indirectly, in the popularity and expansion of well-known research into mind theory:

- The epistemological belief that the study of the mind, despite the tendency to materialize it, cannot be reduced to another level and cannot be reduced to the level of analysis. The contemporary philosophical movements, especially the philosophy of mind and the views of those of Pashre (1993) and Pinkas (1995), which are indirect references to psychologists. On the role of "mentality" and mental content in the general theory of "interpretation" and inevitability of the intentional level, they have influenced the growth of thinking and research on the theory of children in psychology.

- Another scientific trend that has been mentioned in the research is cognitive orientation and research on language and communication abilities on advanced monkeys. The article by Primaque and Woodrowt (1978), entitled "Do Subjects Have a Mental Theory?", Laid the foundations for this type of research, and further research, including the Thirty Part (1980) group's research on the expression of frustration in the gorilla's group, Have yielded interesting results in this regard.

- A collection of researches by scholars such as Shatz (1982), Bertrand and Biglie (1982), on language learning, in particular, the acquisition, understanding and proper use of words related to mental states, are among others the resources and research movements the phenomenon of mental theory has been affected. The last but most important factor directly affecting the theory of the mind is that Flavel et al.'s research focuses on the fact that he has followed his research on the observation.

Considering the limits of children's perception or perception of interpersonal perspectives, fall well and his colleagues sought to examine this ability in the context of the individual, that is when it is the individual who has different views on a subject (Flavel, 1992). Thus, Flavel distinguishes himself from the experimental design with reality, one of the three main methods in the popular research on the theory of the child about the mind, of direct involvement in the development of mental theory.

## **2.1 The dimensions of the theory of mind**

Some researchers have conceived the theory of mind as one-dimensional and equal to the perception of false belief, while others have considered it different levels (Abdollahzadeh Rafi, 2010). Here's how it goes.

After the conception of the theory of mind by Pramak and Woodov, philosophers (Bennett, 1987; Dent, 1987; Harman, 1978; Frelaul, 2000) assumed the perception of false beliefs as equivalent to the theory of mind. They stated that if a child could ignore his belief in the subject in order to judge and predict the behavior of another person on a particular topic, and to rely on the wrong belief of the other person on the subject, that is, he was able to himself the mental world assumes the opposite, so he has the theory of mind (Flavel, 2000).

The researchers, based on this suggestion, sought to build a tool for measuring the theory of mind (Prarner & Weimar, 1978; Fallwell, 2000), which is now known as the Sally and it's own. If a child was able to respond to similar homework assignments, such as unexpected transfer assignments and unexpected content (designed to examine the perception of a false belief), then he would have achieved the theory of mind. In this view, the theory of equivalent mind is assumed to be perceived as false (Sebola & Vichart, 2008).

Research has shown that children around the age of four and five are able to grasp the belief that they are mistaken (Gaiter, 2005; Thieron & Nader, Gers Boys, 2008). Therefore, in this view, the evolution of the theory of mind is continuous, and the difference in the children's belief in false beliefs before and after the age of three is due to functional factors such as conversational awareness and attention (Amin Yazdi, 2004).

But, on the other hand, another group of researchers considers the transformation of children's understanding of mental states step-by-step (Antonyth et al., 2006), and theory of mind as a multidimensional structure that has different levels (Flavel & Miller 1993; Mauritius et al., 1999). Flavel and Miller (1993) consider the evolution of mind theory in five stages.

Throughout the first phase, children choose the concept of mind. That's why they attribute their needs, emotions, and other mental states to others and use cognitive words such as knowing remembering and thinking. In the second stage, children realize that the mind is associated with the physical and material world. Specifically, they realize that a specific stimulus leads to a certain mental state, and this mental state leads to behavior that mental state can be inferred from the relationship between behavior and stimulus.

In the third stage, children recognize the minds differently from the physical and material world. For example, children at this stage understand that a person in an object, even when that object does not have physical presence, can think that in the fourth stage, children learn that the mind can represent objects and events correctly or incorrectly, therefore a representation with regard to the reality of an object or event (such as false beliefs) can be false. Also, by considering mental states, a behavior can be false (for example, when a person is sad, laughing).

Similarly, the beliefs or attitudes of two people can be different. In the fifth step of the last step, children understand that the mind plays a mediating role in interpreting reality. For example, children understand that previous experiences affect common mental states, which also affect emotions and social interpretations. According to Flavel et al. (1993), steps 1 to 3 can be considered as a preliminary mental theory.

Flavel et al. assume that these steps are created in a precise sequence. In Steps 3 and 4, the theory of real mind is created and probably slowly grows up to 6 years old. In Step 5, we have a refined mind theory that will be created later. Maurice et al. (1999) developed a test for mind theory based on this classification by Flavel et al. they call stages 1 and 2 the first-level mind theory (recognition of emotions and pretending); stages 3 and 4 are second-level theory (the perception of the original false belief), and stage 5 is called the third-level mind theory (the perception of secondary false belief).

Therefore, they considered three levels for the theory of mind that children with age would be able to reach higher levels. Research suggests that educated mentally retarded children go only to the second level of the theory of mind (AbdullahZadeh Rafi, 2010; Qamarani et al., 2005).

## **2.2 The evolution of children's mind theory**

Children develop in mind theory. Below is an outline of the evolutionary stages of the theory of mind associated with age.

The first stage, neonate: In the first stage, which lasts from birth to 18 months, the vision and purpose of seeking imitation (Gupnik & Maletzov, 1993) and the joint vision attention (Baron Kuhn, 1995) begin to grow.

Second stage: Emergence: In the second phase, which lasts from 18 months to age 3, the child begins to understand the wishes of others and pretends to play (Lesi, 1987).

The third stage, the emergence of understanding the knowledge and belief in a 3-year-old child: there are indications that a three-year-old child is learning a mental approach, that is, thinking about thinking or beliefs.

Step Four: Understanding a 4-year-old child from false beliefs: This is the stage in the emergence of the theory of mind. At this stage, the child begins to understand false representations or contradictory truths (Volman, 2002). Children at age 4 can explain the behavior of others based on their false beliefs and respond properly to false beliefs.

The fifth stage, the second-level viewpoints and the second: In the fifth step of the child, the perception of the second and third-rank viewpoints is achieved. Namely, the child realizes that people have beliefs that others have in their minds that they believe may be right or wrong (Ashington, Peltier & Homer, 2002).

### 2.3 Factors Influencing Children's Mind Theory

**Social fabric:** Recently, attention has been paid to the role that social interactions can play in the formation of the theory of mind. Simply put, how can the child be able to understand others should be taken into account in the experiences the child receives in his social context (Dan, 1992). False belief assignments may lessen the child's ability to understand the beliefs and intentions of others, and the child may perform better in normal conditions (Ashington, 2003). Controversial results have been reported in this regard, some of which have suggested lower age levels for the theory of mind compared to experimental studies.

Of course, this does not mean that these conflicting studies measure different phenomena, but may measure different aspects or stages of development of a different ability (Ashington & Alson, 1995). The texture of the story may play an important role in predicting the theory of mind (Ashington, 2003). A study on everyday conversations shows that children begin to talk about feelings and desires in the second year of life, and in the third year, they will talk about mental states, thoughts, and knowledge (Barthes & Wolman, 1995). The child's understanding of what is seen in ordinary conversations happens about a year before a child succeeds in false beliefs.

**Siblings:** Social interactions with parents, other adults, siblings, and peers have been shown to contribute to the development of cognitive development in childhood (Faranet & Rese, 2000). Biggest brothers and sisters, often like parents, change their behavior so that they respond to the needs of the child, in fact, provide the support that children need to learn, and the mind theory is important (Yang Blade & Don, 1982). Interacting with brothers and sisters provides a rich source of information about mental retardation, especially in the form of a joint game, for the child (Bar & Hayen, 2003). Also, Young Blade and Doan (1995) found that mothers and sisters-brothers talk to the child in a variety of ways about emotion.

Mothers focus on child emotions, while siblings-brothers focus on feelings, common feelings during play or harassment. In sum, it can be said that the game of pretending, solving the problem with the help of others and discussing emotions and positive relationships during the first three years of life, significantly increases the performance of siblings in false beliefs.

-Theories in relation to the theory of mind

-Various ideas have been made on what contributes to the transformation of children's understanding of minds and mental states (or, in other words, the development of the theory of mind). Below are some of the most important of these ideas that have shaped the direction of research.

-Modular theory

Some scholars such as Schal and Loessy (1999) consider a separate area for brain theory in the brain, as well as other cognitive abilities, each with specific areas in the brain, and a particular category of information being processed there. It seems that the mechanism of the theory of mind also processes only social information. According to modular theory, the growth of the theory of mind is essentially dependent on the neurological oscillation of its related structures. Experience, in turn, triggers the mechanism of the theory of mind but does not interfere with its initial appearance.

*Theory* -The term theory was used by the philosopher Adam Morton (1980) to refer to the belief that "normal psychology of normal consciousness is similar to a theory in nature." From the perspective of psychologists, the theory of theory, cognitive transformation, is the process of shaping and evolving theories of children from the world, themselves and others. In the theory-theory approach, it is believed that the understanding of mental states occurs through a quasi-theory (Carpaland & Lewis, 2004).

The child, or, in other words, the mind reader, will use mental states as theoretical structures to predict and describe behavior (Tiras et al., 2006). According to this view, children and adults have similar folk psychology. For example, if three or four years old children are faced with simple behaviors (Hannan seeks to find his book below the table) and ask them why Hannan does this?

They respond in the same way as adults to the desire (they want their book) and believe (thinks the book is under the table). Such an explanation of Hanna's behavior derives from the theory of the child's mind, in which the child describes his behavior by attributing mental states (tendency & belief) to Hanna (Amin Yazdi, 2004).

From the psychologists' point of view, a theory of theory, the perception of the child of mind, in different stages of transformation, has different qualities. In a study by Bartsch and Wellman (1995), children were used to examining the state of mind in conversations. Based on the results of children's studies of about two years of age, psychology tends to be. The second level of understanding the theory of mind appears at about three years old.

Bartsch and Wellman, this level is called psychosis-desire-belief. At this age, children begin to use cognitive words in their conversations (thinking, knowing, remembering, and believing). At about age four, children reach the very last level of the theory of mind and reach the believable psychology of desire. At this level of understanding of the psychological world, the child finds that mental states have an open-minded nature, and any psychological function (e.g., desire, belief, perception, intention) is formed by the mind that forms and can now be a consequence. Understand the false belief (Danesh, 2005).

*Modular Theory* -According to the covenant theory, the mind consists of separate systems (such as linguistic talent, visual system, face recognition), each of its systems had its own characteristics (Chomsky, 1988, Amin Yazdi, 2004). Contractor theorists believe that structural changes in the psychological organization are the result of neuropsychological development, and they are based on the theory of the mind (Essay, 2005). They believe that part of the brain is devoted to the processing of mind theory (Doherty, 2009).

The covenant approach is in contrast to the view that humans have a set of general ability arguments and are used in the face of any cognitive assignment, regardless of the specific content of each assignment (Amin Yazdi, 2004). In a view that considers the theory of mind as a pillar, it is believed that the theory of mind focuses certain stimuli of the environment as internal, and after processing, it is extracted from the perception of the mental states of others.

In this process, other information in the environment does not influence how the theory of mind is processed. Such constraints in the flow of information (packet information) lead to certain features: the modules are the domain of the particular, fast, unconscious, and compulsory, and the flow of the calculation is modest in little depth (Amin Yazdi, 2004).

*Simulation theory* -The theory of simulation, introduced in 1986 by the theory of mind, was proposed by philosophers Gordon and Hill (Doherty, 2009). According to the view of children's

simulation, through introspection, they develop their own understanding of mental states and use their imagination to argue for psychological subjects (Carpandale & Lewis, 2004). Contrary to the theory of theory, in simulation theory, it is believed that children do not need to grow the theory about the relationship between mental states and behavior.

In this approach, it is believed that children are introverted aware of their own mental states, and through this kind of rooting or simulation process, they can use this awareness to infer the mental state of others (Flavel, 1999; Mohseni, 2004), and there is no need for any inference, conceptual structures or theorizing to understand their mental state.

The child's perception of the mind is more of a phenomenal experience than an idea in which the child perceives his phenomenological experiences intuitively. In this approach, it is believed that the child, using the working pattern of his mind, predicts the mental states of others and, consequently, their behavior (Amin Yazdi, 2004).

According to this view, the children predict the actions of others as they imagine how they would act if they had the beliefs and desires of these people (Mashhadi, 2003). In this stream, the child first experiences the same mental states in real or imagined situations. In other words, the child becomes aware of his own tendencies, beliefs and feelings through his inner self and then, by placing another in his position, predicts that the other will be mentally and behaviorally (Amin Yazdi, 2004).

*Representation Theory* - This theory focuses on whether the theory of mind is a single ability or as part of a larger representation system. Perrner (2001) says that the theory of mind is not an independent cognitive-social ability, but rather as part of a complex representation system, which includes problem-solving abilities, executive function, language, and memory. In contrast, Lesley (1987) accepts the model of the theory of independent mind that has a particular domain and is inherently dependent on the rationality and is in line with the linguistic model. In addition, public abilities such as memory play an important role in the growth of the theory of mind. The loose requirement for the development of the theory of mind in a child is the achievement of the child in the 18th month of age. Fatalism is the embodiment of other states or embodiments of another embodiment.

*Public Psychology Theory* - Although the theory of mind has a social structure. But recently, the focus of research has shifted from the scope of cognitive processes to the study of the growth of the theory of mind in the social context of the child. Psychologists say that the growth of any theory cannot be independent of the social context from which it originated (Ashington & Olson, 1995).

### **2.3 The assessment of the theory of mind**

One of the scales for examining the theory of mind, which is often used, is the falsehood of the belief. On this scale, referring to the subjective representations of the person, there are proper predictions about his behavior. Despite the criticisms that have been made in using this tool, the meta-analysis recently performed by Wolman, Cross, and Watson (2001) has shown that this assignment is acceptable and well-standardized for psychometrics.

In this meta-analysis, the performance of thousands of children from seven different countries has been studied in the false belief task, which all shows the strong influence of age in this category. Because the majority of children at the age of three were unsuccessful in this assignment, they were successful at age four and a half. Additionally, the reliability of this assignment is acceptable, and according to the test-retest method, the probability of another

successor is 80%. (Volman et al., 2001). There has been much debate over the validity of the falsehood assignment.

While some believe that this assignment is not a valid scale for assessing the ability of the theory of mind (Leslie, 2000, Repaccioli and Slater, 2003), it seems that the given assignment has desirable structure validity. Moreover, as already mentioned, it has been shown that performance in false beliefs is correlated with predictable ways with some other cognitive structures, including creativity, behavioral variables, such as social skills, as well as some other variables, such as popularity in peer groups, according to these findings, false beliefs have concurrent validity and promise.

In addition to standard false beliefs and similar tools that measure the ability of preschool children to attribute various mental states (including aspirations, emotions, etc.), there is also a large literature that analyzes the use of the term mental state as the index of the theory of mind in children. However, so far, there have been few measurements to measure mind reading in older children. Probably the most well-known of these scales is the second-class false belief task (Sullivan & Metalburg, 1999), which involves predicting a person's behavior or mental state by the first role of a story.

The subject performs this task based on his thoughts about what the person concerned thinks. Children with normal growth do not have the ability to do so before age 7 or 8, so they should be considered an advanced test of the theory of mind. Although the theoretical levels of the mentioned mind are most used, other tools have been developed over the last 15 years, many of which come from autism literature. To examine the theory of mind in deaf children, it is also common practice but with an instruction that refers to the language. (Repaccioli & Slater, 2003).

## **2.4 The theory of mind in the slow step**

The theory of mind is studied in people with very low mental status. In the studies using these individuals, more of this group has been considered as a comparison group (Chirman & Campbell, 2002). However, research that has just begun in this area has been attempting to examine the theory of mind in various mentally retarded groups, such as down syndrome, Williams, X fragile, and Pride Wiley (Abdouto et al., 2004). The first research on mentally impaired people, from Baron-Cohen, Lesley and Fritz (1987).

They report that 85 percent of mentally retarded children respond to false belief assignments and that there is no difference in the performance of mentally retarded children. Then they concluded that mentally retarded children are not delayed in the theory of mind. This finding was not confirmed in subsequent studies (Mashhadi & Mohseni, 2006; Qamarani & Alborzi, 2005; Peret & Kultirt, 2008). It was found that mentally retarded children are delayed in theory of mind in comparison with ordinary children. Even some researchers have argued that these children can have a defective mind theory, and this defect can be a source of other problems for these children (Abdouto et al., 2004).

However, research has shown that mentally retarded people achieve the theory of mind; for example, in Abdouto et al. (2004), 65 percent of these people were able to respond correctly to false belief assignments. In Qamarani and Alborzi (2005) and AbdollahZadeh Rafi (2010), the theory of mind-minded students of mental retardation is measured by using an evolutionary test (which includes aspects of the belief beliefs that incorporate more levels of mind theory), It was found that these students achieved the theory of the first level mind (recognition of emotional feelings) and the second level (the original false belief).

However, research has shown that the performance of mentally retarded people is lower than that of ordinary children in the theory of mind. AbdollahZadeh Rafi and Nasatian (2009) stated

that the weakness of the mentally retarded children in the tasks of the theory of mind towards ordinary children may be due to the following:

A) The Positive Relationship of Cognitive Abilities: Like Language (Milligan, Stington and Deck, 2007; Abdouto, Short-Mirson, Doliish and Benson, 2004; Melinda Hall and Thagar-Flasburg, 2003), Verbal and Nonverbal Intelligence (Abdollahzadeh Rafi, 2010), executive performance that includes work memory, inhibition control, and management (Bowl, Phillips, and Conway, 2008; Fahi and Simmons, 2003; Halla, Hagg and Henderson, 2003; Kennin, 1998) with the theory of mind; the categories that mentally retarded children it's obviously difficult for them (Thieron & Nader-Gross Boys, 2008).

B) The positive relationship of social interactions with the theory of mind: The influence of social interactions on the development of the theory of the mind of ordinary children have been identified. Leobenti et al. (2008), for example, showed that parenting discussions with their child about mental states have a positive correlation with the development of the child's mind theory. In addition, the relationship between the theory of mind and the parent's parenting style (Harrison, 2006; Pearce & Founder, 2003), with the number of sisters and brothers (McAlister & Peterson, 2007; Futh & Hummels-Lonergan, 2003), have been identified. The role of social interactions in the cognitive development of children in Vygotsky's theory is very much emphasized. In connection with the social interactions of mentally retarded children, Sibulla and Vichart (2008) have said that most of the interactions are with family members and that interactions outside the family are limited to the situations that society provides for them, such as those in the school community.

C) Preconditions for the theory of mind: common attention, imitation and play, and imagination as the forerunners of the child's next mindset theory. Dan et al. (1996) showed that children who played with their peers were more likely to be false than most other children. Subjective mental retardation children are involved in latent imitation (Sebola & Vichart, 2008).

Though mentally retarded children have a weaker performance than ordinary children in mind theory, the trend of the theory of mind in these children as ordinary children with respect to age is increasing (Abdollahzadeh Rafi, 2010) and, variables such as age and father's education have a positive relationship with this development (Qamarani & Alborzi, 2005). In these children, the abilities of intelligence (Abdollahzadeh Rafi, 2010) and linguistic abilities (Abdooto et al., 2004) have a direct relationship with the evolution of the theory of mind as seen in normal children (Milligan, Stington & Deck, 2007).

## **2.4 The theory of mind in children is a learning disorder**

No research has ever been done in relation to the theory of the minds of children with learning disabilities. Most research has been done on the mentally retarded group. For example, Qamrani and Alborzi (2005) studied the theory of mind in students with mild and moderate mental retardation of 7 to 9 years old and concluded that normal and mentally retarded students have a significant difference in mind theory. So that ordinary students perform better than mentally retarded students.

In another research, Ghaffari et al. (2010) examined the development of the theory of mind in ordinary and aggressive students of guidance and comparison of the performance of girls and boys in the theory of mind.

## **2.5 The theory of mind in deaf children**

Here, we will try to study the theory of mind in deaf children, with the research that developed the theory of mind in deaf children from 1995 to 2002.

Given that the study of the theory of mind in children has begun since the 1980s, the number of published researches that have dealt with deaf children is very limited.

And so far, research on the theory of mind in deaf children has not been conducted in Iran.

For the first time, Patterson and Siegel (1995) reported that the majority of a group of Australian deaf children between the ages of 8 and 13 succeeded in the proper implementation of the theory of mind work that the children of the hearing impaired 4-5 years old correctly performed, In that respect, they have a similar function to children.

Their findings reinforced the assumption that the growth of the theory of mind is appropriate to social experiments, the majority of children in their sample were from families that were dominated by another deaf person or a person dominated by language, knowledge of the sign language in the hearing impaired family is common.

Given the importance of the theory of mind as a social tool, any damage to the development of the theory of mind creates an obstacle to interacting with others. According to Patterson and Siegel (1995), the social problems of a deaf child can be due to his disability in the theory of mind, in addition to being caused by communication problems associated with language and speech.

Another study by Dwilie et al. (1997) was performed using shifting assignment on 22 deaf hearing impaired hearing children who were trained orally, with an average age of 7 years and 6 months, and only 54 % of them responded correctly to their respective assignments.

Russell et al. (1998) also examined the development of the theory of mind in deaf children, they believe that both theoretical and Peterson and Siegel (1995) findings suggest that deaf children, especially those with hearing, have problems, in theory Have mind.

Additionally, the acceptance of the fact that the limitation of social experience in the first years of life that results from deafness causes a delay in the growth of the theory of mind seems logical, but they predict that it is possible that the function in the theory of mind improve with age and experience. As a deaf child enters school, he grows up in language and develops more social interaction opportunities with deaf peers and teachers, and the social environment can increase the theory of mind in the child.

The rate and speed of this growth should be determined by age. The subject of Peterson and Siegel (1995) is not known due to the limited age of children who have been examined.

Paterson Wiggle (1999) suggests that the similarity of the performance of deaf hearing-impaired children with the surviving children is related to the probability of these children's neuro-biological similarities, and notes that they are conducting research of the kind that they employ by using Brain imaging techniques.

Of the kind that Fletcher and colleagues (1995) need to get these similarities, and on the other hand, the reason for this problem is in the constraints on the conversation by which children have the opportunity to talk about mental states or know the information, it has the limitations that deaf children with both hearing-impaired parents and children remain confronted with.

Marc Chain Green, Hint Marsh and Walker (2000) research on the development of the theory of mind on 15 deaf Australian children with an average age of 13 years and 1 month who had hearing-impaired parents and who were trained in the deaf school with a general communication approach and Also, 15 hearing-impaired children with an average age of 13 years and 2 months. Unlike other researchers, they did not use common false beliefs such as shifting tests.

Instead, they asked each child to tell a story in relation to the subject they were determined to be, subjects were encouraged to tell the story. The words that express mental states were taken into consideration in the study of the child's ability to think in the theory of mind.

They say that the use of the storytelling method rather than the false belief task suggests that deaf children can attribute mental states to others as they themselves attribute, and even in that context a small (but statistically significant) group are ahead of their hearing children, 87% of deaf children and 80% of hearing children reach the theory of minds, according to the most common and original definitions, between the ages of 9 and 15.

The analysis of the frequency of children's referrals to false and correct beliefs did not indicate the difference between themselves and others as a result of the auditory agent, they say, although these results are certainly not strange for someone who deals with deaf children, But these data are contrary to the results of many studies that have been developed using false beliefs in the study of the theory of mind in deaf children (Marcac et al., 2000).

Wolfe, Vantage and Siegel (2002) selected 19 hearing impaired children from 4 to 8 years old, 32 hearing impaired seniors with a delay of 4 to 8 years, 20 hearing impaired 4-year-olds and 20 hearing-age children 3 years old using 4 mental images. Studying the false beliefs, they studied the growth of the theory of mind.

Deaf hearing impaired children had a lower age than deaf pointers, this difference was statistically significant ( $P < 0.05$ ). However, their performance in mind theory was better than delayed pointers than deaf ( $t_{49} = 5/84$ ,  $P < 0/001$ ).

The difference between the deaf pointing point and deaf pointing point was comparable with that of the 3rd and 4th-year-old children since the performance of 4-year-olds in the theory of mind was better than that of 3-year-old children ( $t_{38} = 3/88$ ,  $p < 0/001$ ).

### 3. Discussion and conclusion

In this study, after describing the theoretical foundations of the theory of mind, we sought to follow the theory of mind in deaf children. What was found was that ordinary children, at the age of four, were able to understand that others had mental states that could be different from one's own mental state or reality.

They understand that human behavior cannot be simply understood on the basis of situational characteristics. At this age, cognitive skill develops in children, whereby they understand that the understanding of behavior depends on the subjective representation of a position.

The child understands that the reception and understanding of phenomena and objects are separate, and this is dependent on previous knowledge and experience (Baron-Cohen & Leslie, 1985; Russell et al., 1998; Flavel, 1999).

Following some early reports on the delay in the theory of mind in deaf children (Maslell, Betger, & Weinberg 2001, Raimle, 2003) recently, several studies have examined the development of the theory of mind in deaf children,

Most scholars such as Patterson and Siegel (1995 and 1999), Russell et al. (1998), Dwilie et al. (1997) Wolf, Vantage and Siegel (2002) have shown the performance has been associated with delayed hearing loss hearing children in achieving the theory of mind. Marcarch et al. (2000) argue that deaf children, even those with hearing impairment, are able to attribute the mental states as they themselves attribute to the other, using a storytelling method rather than a false belief task.

The challenging thing about this is the difference between the tools they use to study the theory of the mind. Unlike other researchers who have always used false beliefs to examine the ability of other children's minds, they have used word-for-word analysis and used in the storytelling of deaf children.

On the other hand, Patterson and Siegel (1999) and Wolfe, Vantage and Siegel (2002) argue that deaf children with deaf parents, those who refer to the age at which hearing children learn spoken language from their parents, are delayed in the theory of mind does not show itself.

An important variable in any research in relation to deaf children is the hearing status of parents. Deaf children with deaf parents and deaf hearing children are different in many areas, such as linguistic experience and deafness.

Given that false beliefs, which are the most commonly used method for assessing the theory of mind, are largely dependent on language, it is a question of whether the language is merely a mediator and tool for assessing the child's ability in the theory of the mind, or that language is preceded by the growth of the theory of mind. For this reason, some researchers have identified the tool used to evaluate the theory of the mind as a cause of delay in deaf children.

Deaf children may have reached the theory of mind, but they do not have enough linguistic ability to understand stories such as their story and the year they used to study the theory of mind in a child. Then, the observed delay could be due to lack of language access and not a basic cognitive impairment (Shick, Villiers & Hofmister, 2002). Earlier research has shown that the scope of access to everyday conversations in the environment makes deaf people deprived of much of the information about the surrounding world.

But deaf people, by the way, get some of this information into relative social capability, and they can get a significant portion of the information that they do not get through hearing through the sight.

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