

**THEORY OF MIND – ABILITIES IN CHILDREN WITH LEARNING
DISABILITY – AN EXPLORATION**

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ALL INDIA INSTITUTE OF SPEECH AND HEARING

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MYSORE – 570 006

MAY 2013

DEDICATED TO
ALMIGHTY GOD
&
THE KIDS WITH
SPECIAL ABILITIES

CERTIFICATE

This is to certify that this independent project entitled “*Theory Of Mind Abilities In Children with Learning Disability – An Exploration*” is the bonafide work submitted in part fulfillment for the degree of Master of Science (Speech Language Pathology) and of the student (Registration No. 11SLP029). This has been carried out under the guidance of a faculty of this institute and has not been submitted earlier to any other University for the award of any other Diploma or Degree.

Mysore

June, 2013

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CERTIFICATE

This is to certify that the dissertation entitled “*Theory Of Mind Abilities In Children with Learning Disability – An Exploration*” has been prepared under my supervision and guidance. It is also certified that that this has not been submitted earlier in any other University for award of any Diploma or Degree.

Mysore
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DECLARATION

This is to certify that this Independent Project entitled “*Parent Education Program for Parents of Children with ASD: SLPs Perspective*” is the result of my own study under the guidance of **Dr. Shyamala K.C.**, Professor and Head of the Department, Department of Speech Language Pathology, All India Institute of Speech and Hearing, Mysore, and has not been submitted earlier in any other University for the award of any Diploma or Degree.

Mysore,

Register No. 11SLP029

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CHAPTER I

1. INTRODUCTION

Learning Disabilities in the most basic sense is a problem taking in, processing, understanding, or expressing thoughts and information, as reflected in difficulties with reading, calculating, spelling, writing, understanding or expressing language, coordination, self-control, and/or social skills development (Siegel, 2009). The pragmatics of language is the study of the rules that govern the use of language in social situation. Pragmatics is an important part of communication for every human being because it is this aspect that explains what we do with our language, how we modify what we say based on the context, what our intention is when we say something and likewise what opinion might the other person hold if this is what is said (Hegde, 1991). Children with Learning Disabilities are known to show difficulties with social skills (Siegel, 2009).

Theory of Mind (ToM) forms an important aspect of the pragmatics of language. Presence of ToM is required for the understanding of social situations and relationships. Theory of Mind (ToM) is the ability to attribute mental states (beliefs, intents, desires, pretending, knowledge, etc) to oneself and others, and also to understand that others have beliefs, desires and intentions that are different from one's own (Premack et al., 1978).The presence of ToM facilitates better human communication by allowing one to predict, understand and explain other people's behavior. Thus, an absence of ToM can lead to a communication breakdown.

Normal children develop the ToM by around 4-5 years of age (Reviews by Garfield et al. 2001; Peterson et al., 1995).

In last 20 years of Theory of Mind research, the foremost focus in an “atypical sample population” has been autism (Baron-Cohen, Tager-Flusberg, & Cohen, 1993). However a wide range of task performance scores are reported for ToM abilities among sample subjects with Learning Disabilities. Pass rates vary between 50% (Sodian & Frith, 1992) and 86% (Baron - Cohen et al., 1985), and later studies found lower pass rates of 40% - 50% (Benson, Abbeduto, Short, Bibler Nuccio, & Maas, 1993; Yirmiya, Solomonica, Shulman, & Pilowsky, 1996; Zelazo, Burack, Benedetto, & Frye, 1996).

16 adults were evaluated using a “first-order representation of false-belief task” (Sally-Ann experiment) for their ‘theory of mind’ abilities (which is the ability to correctly reason about another person’s mental state). Only 12.5% of the participants were found to perform this task accurately (Ashcroft, Jervis & Roberts, 1999). This provides grave doubts on the ability of theory of mind high scores in “children with Learning Disabilities”.

CHAPTER II

2. REVIEW OF LITERATURE

2.1 Overview

Theory of Mind (ToM) is the understanding of one's own and others' minds and an awareness of the relation between people's minds and the world (Lundy, 2002). The concept of ToM originated from a series of studies conducted by Premack and Woodruff with Chimpanzees in the late 1970's (Premack and Woodruff, 1975, 1978). It later was used to explain some of the deficits attributed to children with autism (Baron-Cohen, 1988; Frith 1989).

ToM is an ability to infer the full range of mental states (beliefs, desires, intentions, imagination, emotions, etc.) that cause action. A ToM can be considered a theory about the internal mental state of others that helps one interpret their external behavior. ToM, now has come to mean not only the ability to develop a theory about what someone knows, but also about their emotional state. It is recognition that people's beliefs may guide their behavior and that other people's beliefs may be different from one's own. A ToM allows us to make predictions about others' behaviors based on our assumptions, about their purposes, intentions and knowledge. Essentially it is a set of inferences about another person's motivations and knowledge that allows us to adjust our communication with them. It enables us to distinguish when someone is serious, joking,

and sarcastic and to determine what they mean from what they say. It enables us to negotiate the social aspects of communication. It is a set of inferences because the internal mental states of others are not directly observable or explicit (Myers, 1998). Understanding knowledge states is important to a ToM and to understanding the pragmatic aspects of communication. For example, it is important to distinguish between knowing and guessing (Myers, 1998). A ToM not only informs us about someone's motivations and affective states, but about their knowledge base as well.

In the affective realm, ToM helps guide one in determining how much to say. If one infers that a given topic will make someone uncomfortable, he/she adjusts by broaching it in a delicate manner. If one infers that a given topic is boring to the listener, he/she may acknowledge it and continue or move on to another topic. We read facial expressions, body language, and linguistic information to help us arrive at an understanding of the listener's perspective. (Myers, 1998)

It has been suggested that ToM is a meta-representational skill through which we are able to generate representations about representations. The specific mechanisms of ToM are not yet understood, but it is assumed that it requires a fairly sophisticated inferential capacity that aids us in filling the gap between what is meant from what is said (Myers, 1998).

We typically think of people in terms of their mental states—their beliefs, desires, hopes, goals, and emotions. In fact, even young children rapidly acquire basic abilities to see self and others as wanting, feeling, thinking beings (Flavell and Miller, 1998).

Examples of the relationship between mental state & understanding behavior include the following (Marschark, et al., 2000; Moeller, 2002; Reiffe&Terwogt, 2000):

- ✓ **Desire:** A child recognizes that Mom reaches into cookie jar since she wants a cookie
- ✓ **Emotion:** A child observes that another child is crying & says that the child feels sad.
- ✓ **Intention:** When an adult throws a ball toward a basket but misses, a child will pick up the ball and drop the ball in the basket because the child understands that the adult intended to have the ball go into the basket.
- ✓ **Belief:** A child sees that her parent's keys are on the kitchen table. However, the child recognizes that the parent is looking in her purse for her keys because she thinks (believes) they are there.

The impairment of theory of mind is defined as a trouble with “perspective selection”, referred to as “mind-blindness” interchangeably. ToM deficit Individuals have

- ✓ Trouble establishing intentions of others,
- ✓ Lack understanding of how their behavior influences others,
- ✓ Have a difficult time with social reciprocity (Bakers, 2003).

These complications do not help in appreciate humor, deception, confusion, the motives for social events & rituals. Most importantly, they impede mature interpersonal relationships. Consequently it is imperative to measure and interpret the task performance correctly, with subjects at risk of developing a weak ToM (children with autism who grow with persisting complications) or subjects with delayed acquisition of ToM (children with HI and occasionally young adults).

Most studies on ToM have been on children in the clinical population of Autism Spectrum Disorders (Baron-Cohen et al., 1985). Other clinical populations on which ToM has been researched include Down's syndrome (Baron-Cohen et al., 1985), intellectually handicapped children of mixed diagnosis (Baron-Cohen, 89; Prior et al., 1990; Reed & Peterson, 1990), emotionally disturbed children (Siddens et al., 1990), and children with severe Specific Language Impairment (Leslie and Firth, 1988; Perner et al., 1989). All children within these groups of communication disorder have shown normal or near normal performance on false belief tasks versus the children within the clinical group of ASD, who have consistently failed to pass false belief tasks (Baron-Cohen et al., 1985). Pertaining to the adult population, individuals with acquired damage to the right hemisphere have demonstrated ToM deficits (Brownwell et al., 1992; Siegel et al., 1996).

2.2 The precursors and Development of ToM

Understanding attention, understanding of others intentions, and imitative experience with other people, are hallmarks of a theory of mind which may be observed early in the development of what will later become a full-fledged theory of mind.

During 7-9 months, a social skill develops in the child's brain, which translates to "Understanding of attention in others". It is a "critical precursor" to the maturity and growth of the theory of mind (Baron-Cohen, 1991). It encompasses the interpretation that, sense by sight can be as selective as paying attention. The observer evaluates the observed object as "of interest," and this act of observation can prompt beliefs.

Attention can be focused and shared by the act of "pointing", a "joint attention" behavior which requires considering someone else's mental state. Predominantly so, if the subject sights the object too or finds it interesting. Academics have conjectured that the "inclination to spontaneously point" to an object of interest ("proto-declarative pointing") and to "appreciate the pointed interest of another being" could be the fundamental intention behind all human communication (Baron-Cohen, 1991). "Comprehension of other people's intentions" is another "critical precursor" to fathom social cognizance since "intentionality" is a underlying attribute of psychological states and events. The "intentional stance" has been well outlined by Dennett (1987) as other people's activities are goal-focused and rise from individual values and

aspirations. 2-3 years kids could actually distinguish between an experimenter intentionally or accidentally marking a sticker on a box (Call and Tomasello, 1998).

Meltzoff (1995), observed that 18 month old children could accomplish “target manipulations” which were unsuccessful by adult experimenters. He recommended that these infants could epitomize the “object-manipulating” behavior of adults as involving goals & intentions. Toddlers (2-3 years) believe that desires and wants, drive behavior and that beliefs correspond to reality. (Wellman, 1990)

Current research in developmental psychology helps us understand that the origin of a.) theory of mind faculty and b.) social-cognitive accomplishments like “perspective taking and empathy”, both are rooted in the ability of the infant to imitate others (Meltzoff, 2002).

According to Meltzoff, once the infant understands that others are ‘like me’ then this will allow the infant to bridge the gap among physical and physiological states that are present in others as well as those experienced by the self. For instance, an infant subject will learn that people turn towards objects of interest and their movement helps the infant to understand that if he/she turns to towards an object then it will indicate an interest in the object.

In comparative disciplines researchers have been skeptical about attributing advanced human social-cognitive skills such as mentalizing and empathizing to imitation alone. This is particularly in light of the argument that true imitation is not done by adults. A test of imitation by Horowitz (2003), explored to what extent do adults exactly imitate an experimenter demonstrating a novel task, and it was found that adults imitate far less precisely than children did. The precise psychological state that makes imitation possible is not yet defined and therefore cannot be used to explain mental states, its perception as well its development in humans

By 4-5 years, children recognize that behavior can be caused by beliefs or desires and that people will act on beliefs even if they are wrong (i.e., contradict reality). They act based on what is believed to be true rather than what is actually true. When a child takes part in a type of narrative discourse that is interpretative then his/her reasoning of the mind moves forward. Children gradually acquire the characteristics and norms of the culture or group in social contexts and thus learn to assign meaning to what people do, feel, and think. When children develop the skill of being able to narrate stories about what happened earlier to themselves or to others they are in turn growing the skill of bringing together the thoughts, feelings, and actions of themselves and others. Due to this reason conversational discourses that must take place in every family becomes imperative.

By about 4-5 years a typically developing child is equipped with all the essential skills needed for a sound ToM (Garfield et al., 2001). A major change that takes place during the period from 3 to 4 years is the understanding that things can be conceived of as being different than they really are. This enables children to come to grips with false belief (Wimmer & Perner, 1983) and related concepts like the distinction between appearance and reality (Flavell, Flavell, & Green, 1983). The earliest onset of this ability emerges around 3 years as a particular kind of understanding which we (Clements & Perner, 1994) have called "implicit understanding". This can be demonstrated in the original false belief paradigm, there is a sharp onset around 3 years (2 years and 10 months and 3 years and 2 months)

It was also found (Clements & Perner, 1997) that when children had to act, e.g., quickly move a welcoming mat into place, many moved that mat to location A provided they acted spontaneously and quickly. Those children who hesitated tended to move it to B. This provided one more reason to call this early knowledge implicit because it seems to dissociate from conscious, explicit knowledge in a similar way as implicit from explicit knowledge when visual illusions are involved (e.g., illusory motions of a dot, Bridgeman, Kirsh, & Sperling, 1981; Bridgeman, Peery, & Anand, 1997; Milner & Goodale, 1995; Wong & Mack, 1981; see Perner & Clements, in press, for analogy to our finding).

A similar finding that implicit knowledge (expressed in manual gestures) precedes explicit knowledge (expressed in answers to questions) has been reported by Church and Goldin-Meadow (1986) for Piagetian conservation tasks and for maths problems (Perry, Church, & Goldin-Meadow, 1988). This group of researchers, Goldin-Meadow, Alibali, and Church (1993), also made the interesting suggestion that the appearance of implicit knowledge marks the Zone of Proximal Development (Vygotsky, 1978) within which instructions and helpful scaffolding (Wood, Bruner, & Ross, 1976) become effective. This may explain some of the claims, that in natural interactions children show earlier competence than in the experimental test situations.

Deception in stories seems to be understood as—or slightly after—children master the false belief test (Wimmer & Perner, 1983; Sodian, 1991). Active deception (Sodian et al, 1991) even when emotionally extremely involved (Peskin, 1992) is not reliably and flexibly employed in novel situations until that age (mothers and nursery teachers think so too, Stouthamer-Loeber, 1986; see Perner, 1991, Figure 8.7). It is true that in standard situations children do behave deceptively by the age of three. For instance when accused of some wrong doing they seemingly deny having done it with a firm, "No" (Lewis, Stanger, & Sullivan, 1989). However, this kind of evidence is multiply ambiguous. As Stern and Stern (1909) observed we do not know whether these "No"s are genuine acts of deception or pleas for not being accused.

If successful, they may work deceptively (the adult is genuinely made to believe that the child did not do it) but without the child realising that that's how the trick works, i.e., by inducing a false belief in the accusing adult. From the child's point of view saying "no" simply had beneficial effects in the past.

This ambiguity of interpretation of real life acts of deception, is a source of festering controversy in the animal literature about primates being or not being able to understand false belief. Primatologists observing apes in the wild or the zoo (e.g., deWaal, 1982; Byrne, 1995) present ample anecdotes of seemingly convincing acts of deception. These acts look convincing as uses of a theory of mind because if we engaged in these acts we would understand the mental effects on the victim. However, experimental attempts of demonstrating flexible acts of deception that indicate an understanding of false belief (or even knowledge) consistently meet with failure (Woodruff & Premack, 1979; Povinelli & Eddy, 1996) not to speak direct attempts at testing false belief in chimps (Call & Tomasello, in press).

Children's understanding of false belief comes with an understanding that perceptual access (e.g., seeing what's in a box) is important for knowing between the ages 4 to 6 years. However, for them the importance of perceptual access seems to override other sources of knowledge like inference (Sodian & Wimmer, 1987).

As a consequence, they fail to see the point in memory cues (e.g., put a police car outside the house where the policeman is visiting in order to remember where he is; Sodian & Schneider, 1990) because such cues enable retrieval of knowledge without direct perception. At this age children also don't appreciate that different properties are gained through different sense modalities, e.g., that you need your eyes to learn what colour an object is, but your hands (to lift the object) in order to learn how heavy it is (O'Neill, Astington, & Flavell, 1992). This understanding develops between 4 and 6 years and might be the basis for genuine episodic memories.

It's not that theory of mind development stops at 6 but less research effort has been devoted to exploring the many important developments in later childhood. Children's ability to introspect—for us almost self-evident—aspects of their own thoughts develops surprisingly late (Flavell, Green, & Flavell, 1995). For instance (Flavell, Green and Flavell, 1998), a group of 5½ and 8½ year olds were to sit in the special Don't Think chair and they were instructed to not think for a while. After about 20 seconds they were allowed to move over to the normal chair and were asked: "While you were sitting over there in that Don't Think chair, you tried not to have any thoughts. What happened? Did you have no thoughts at all or did you have some thoughts anyway?" Very few 5-year olds (15%) but most 8 year olds (75%) and adults (100%) admitted to the inevitable of having had some thoughts.

Higher order false beliefs, e.g., what John mistakenly thinks that Mary thinks where the ice cream van is (Perner & Wimmer, 1985), are understood around 6 or 8 years. Although the complexity of the story has a much greater influence at this stage than for the acquisition of understanding first-order beliefs (Nunez, 1993; Sullivan, Zaitchik & Tager-Flusberg, 1994). A relevant implication is that children cannot really distinguish more complicated speech acts, like irony from lies. Lies as well as irony (and jokes) are false statements, and they are intended to be false by the speaker. The difference emerges at the second order level: the speaker does intend the listener to believe the lie, whereas a joke or irony is not intended to be believed (Leekam, 1991; Winner & Leekam, 1991).

Children this age also have problems with promises (Astington, 1990). Fortunately they do understand what's important, namely that promises need to be kept. Rather, their problem is that they see too much commitment. For instance, Mant & Perner (1988), told stories like the following. A boy tells his friend that he'll go swimming and she regrets not to be able to join because she has to help mother. He later decides to stay home. She finds out that mother doesn't need her and goes to the pool where she is lonely and disappointed. Up to the age of about 9 years children judged the boy as naughty for not having gone to the pool. It is as if stating what one wants to do constitutes a commitment to doing it. The difficulty is in seeing that there are exceptions.

There is an interesting age parallel to understanding exceptions to the reprehensibility of lying: white lies are not bad and even socially desirable (Walper & Valtin, 1992). Children's problems understanding the function of lies, promises and social commitment are also of interest in connection with children's competency as witnesses in court (Perner, 1997).

And there is much else left to be discovered about the mind for the older children. As Chandler (1988) pointed out, all the rapidly increasing evidence of understanding the mind in early childhood does not show that children conceive of the mind as truly constructive and that they fully realise the relativity of human knowledge. Much of this awareness develops later.

2.3 Theories of ToM

1. **Neurological theory:** This theory proposes that ToM depends on a specific brain mechanism that is present before birth, and must mature before ToM can develop (Fletcher et al., 1995).

2. **The second theory** proposes that false-belief understanding develops out of other capacities that mature earlier. For example, pretend play (Leslie, 1987) and shared attention (Baron-Cohen et al., 1996) may be skills that precede ToM abilities.

3. **Environmental influences /Exposure to early conversation:** The third theory postulates that the development of ToM is influenced by exposure to conversation about

mental states (Jenkins and Astington, 1996; Perner et al., 1994). According to this theory, communication difficulties that are often characteristic of many developmental disorders may prevent them from being able to successfully converse with others, therefore affecting their ToM abilities. In support of this theory, research has found a relationship between verbal ability and ToM in normally developing children (Jenkins and Astington, 1996).

2.4 Learning Disabilities and Theory of Mind

The main emphasis of the investigation on the theory of mind in atypical subject groups has been the dismal performance of Autism patients (Baron-Cohen, Tager-Flusberg, & Cohen, 1993, for a review). However, a wide variation has been with groups of subjects with a Learning Disabilities without autism (see Charman&Lynggaard, Happe, 1995, for reviews).

Pass rates have hovered 50% (Sodian&Frith, 1992) & 86% (Baron-Cohen et al., 1985), & recent studies has shown 40% and 50% (Benson, Abbeduto, Short, BiblerNuccio, & Maas, 1993; Yirmiya, Solomonica, Shulman, &Pilowsky, 1996; Zelazo, Burack, Benedetto, & Frye, 1996). The wide variation in pass rates among learning disability subjects may reflect a wide variety in “mentalizing ability”, or unreliable performance.

Theory of mind (ToM) relates to the ability to infer other people's mental states (such as their thoughts, beliefs, desires and intentions) and to use this information to make sense of, and predict, behaviour (Howlin et al., 1999). Thus, impairments in mentalizing ability have implications for both understanding social interactions and communicating personal needs. Utilizing tests of first and second-order theory of mind (Perner and Wimmer, 1985; Perner et al., 1987), research has consistently demonstrated that children with language impairment have a deficit in this area (Baron-Cohen et al., 1985; Baron-Cohen, 1989; Frith, 1989; Yirmiya et al., 1996).

2.5 Family size, Birth order and ToM:

Perner et al., (1994) presented a strong link between ToM performance with increased family size. It was established that children with siblings performed much better than a case with single child. Likewise, Jenkins and Astington (1996), found that a major predictor of "false belief understanding" and verbal ability rested on the size of the family, not the order of birth. Also research construed that, with physical age and verbal mental age accounted for, the birth order was not a large contributor.

However, a significant variance was found between birth order and Theory of Mind (Farhadian et al., 2010). Birth order contributes heavily towards ToM "comprehension". Ruffman et al. (1998) found having one or more older siblings, had a direct correlation with higher "false belief" scores, but not having younger siblings.

An investigation into the longitudinal relations between theory of mind (ToM) understanding and perceptions of self and social conversations in 17 school-aged children (12 girls, 5 boys, age 8-12 years) was conducted. ToM was assessed at Time 1 (T1; M age = 8 years 5 months, SD = 8.7 months), and perceptions of self and conversational experiences assessed two years later at Time 2 (T2; M age = 10 years 4 months, SD = 7.9 months).

Most importantly, longitudinal findings showed that children who scored relatively high on ToM at T1 reported relatively lower perceptions of self-worth and higher number of mental states verbs in their perceptions of peer and family conversations at T2. Significant negative longitudinal associations were found between children's number of siblings and their perceptions of self-worth (T1) and number of cognitive terms in their perceptions of peer and family conversations (T2).

Frequency analysis suggested that girls' perceptions of conversations referred to more social and psychological aspects of self and relationships, whereas boys focused mainly on physical activities. Most children were more likely to prefer listening to talking during social conversations. The majority of children reported feelings of mixed or ambiguous emotions during experiences of silence

2.6 Language and ToM:

When a person wants to engage in a conversation that involves mental states then it goes without saying that he must already possess some form of a language system. Discourse about mental state further strengthens the ability to acquire a good ToM. Yet it has not been definitely determined which component of language contributes to the development of theory of mind skills (Astington and Baird, 2005; de Villiers and de Villiers, 2000; Lohmann and Tomasello, 2003; Moore et al., 1990), there is little evidence that children acquire these skills in the absence of language.

Language proficiency at some level of sophistication seems to be necessary for the presence of ToM (Moeller and Schick, 2006). Properties specific to language are required for ToM development, over and above age-related experiences and neurological maturation (Rommel, et al., 2001). Added to this when a child has good language skills it allows a greater access to mental state talk, which in turn promotes ToM development (Rommel and Peters, 2009).

A very precisely stated paragraph cited in a paper published by Schick et al., (2007) points out the role of language in the growth and development of the Theory of Mind. If this develops with only normal cognitive maturity combined with perceptive observation of human behavior, then a child could cope up the ToM growth normally in a socially and cognitively nourished environment though there is a dearth of the language

component. However, studies show this as otherwise. Social observation and cognitive development does not suffice a complete development of ToM.

The significance of the child's language environment and with that its own language development is needed and is paramount. Nonetheless the precise mechanism or weight of the language component plays a role is still debated. Is language important due to the role it plays in tasks definition? Or because it eventually affects other cognitive processes? Or it's a means of acquiring more knowledge? Or Language a means to be superior or more direct medium of thought in the domain of Theory of Mind?

As quoted by Remmel and Peters (2009), Primarily changes in concepts present in the mind and the way these concepts relate to language experiences of the child pave the way to in children's ToM performance in preschool years. Language is important since it facilitates conceptual developments and modifies the performance demands of the tasks (Yazdi, et al., 2006) 1. In a typical case, habitual "language development" is an inextricable part of children growing up. Therefore determining the relationship between language development and ToM is difficult. Both these cognitive fields develop in tandem.

Other authors have studied the components of language, particularly syntax, and commented on its role in ToM performance. They have suggested that, it is acquisition of certain forms of syntax, particularly complement syntax, rather than common

conversational exposure to language and concepts about mental states and varied perspectives that determine ToM acquisition (de Villiers & de Villiers, 2000; de Villiers & Pyers, 2002; Schick et al, 2007). More recent studies have given further attention to the possible implication of language disorder in the development of ToM deficits, and have considered whether type of language disorder may be relevant. Pragmatic, semantic and syntactic aspects of language have all been considered to be related to theory of mind abilities, although possibly playing different roles (Astington and Jenkins, 1999).

Children with semantic-pragmatic language disorders have been found to perform as poorly as children with autism on tasks of false belief and deception (Shields et al., 1996), and a number of researchers have argued that this suggests that these disorders exist on the ‘borderlands’ of autism (Shields et al., 1996; Botting and Conti-Ramsden, 1999). Studies using children with phonologic-syntactic disorder have found less clear results, with these children performing better, but not always as well as age-matched controls without any developmental disability (Shields et al., 1996; Ziatas et al., 1998). One significant question with respect to these children has been whether any impairment in performance on ToM tasks reflects a real impairment in underlying ToM ability or rather results from difficulties in managing the linguistic complexity of these tasks.

Miller (2001) systematically varied level of linguistic demand in ToM tasks and found that children with SLI performed similarly to same-age peers when linguistic complexity was low, but similarly to younger children matched with them on language

comprehension ability when linguistic complexity was high, suggesting that linguistic ability rather than underlying ToM ability limits the performance of such children on standard ToM tasks. Johnston et al. (2001) found, however, that the use of cognitive state terms (know, pretend, think) in the conversational speech of children with syntactic impairments resembles that of younger language-age matched children, and is less than that of children matched on mental age, in terms of both the proportion of speech occupied by such terms and in the variety of terms used.

Johnston et al. (2001) argue that the absence of any advantage in this aspect of lexical usage for the children with SLI over language-age matched children suggests that the two groups do not differ in everyday use of ToM and hence that syntactic difficulties, by impairing children's abilities to verbally represent complex propositional structures, may inhibit the development of ToM abilities. Astington and Jenkins (1999) provided further support for the hypothesis that syntactic abilities may facilitate the development of ToM in a seven-month longitudinal study of normally developing three-year old children. With age and previous performance level controlled, performance on standardized tests of language ability predicted later performance on ToM tasks, but not vice-versa. Furthermore, syntactic ability was a more powerful predictor of later ToM ability than was semantic ability.

2.7 Mental State Language and ToM:

Within the domain of language, Mental State Language (MSL) seems to play a crucial factor in determining ToM acquisition. Researchers have found, that when mothers use mental state language from when the child is very young then it helped in developing the child's subsequent ToM skills, this finding was based on longitudinal studies (Jenkins, et al., 2003; Ruffman, et al., 2002). More frequent the mothers' use of mental state talk, more the use of such language by children (Furrow, et al., 1992; Hughes & Dunn, 1998). When a mother links an emotion or a mental state (e.g., "you think mommy's funny?") to the young infant then it promotes understanding of the child towards other people later on in life (Meins et al., 2003).

Siegal and Varley (2002) stress on the issue of critical period in ToM development. They say that just as children need exposure to language input within a critical period of language development, it seems children need critical exposure to discussions of mental states and evidence that the mental states of others can be different from their own to be able to pass the ToM tests. Agreement upon the age for critical period has not been found in literature though it may be said that, the critical period for ToM is tied into first language acquisition. Studies point to age 6 years as a cut-off period for determining a signer's ability to be judged native-like (Kegl, et al., 1999; Newport et al., 2001)

As and when a child's thinking skills develop, moms react with an increased amount of "mental state terms" and a decreased emphasis on "desire talk" (Bartsch & Wellman, 1995; Brown & Dunn, 1991). Archetypal parents of growing children increase the use of "cognitive talk" with age. This leads to an increased competence in language and thinking skills (Brown & Dunn, 1991; Furrow et al., 1992; Moore, et al., 1994).

Research suggests that "sibling play collaboration" is imperative for understanding empathy in other people's mind (Brown, et al., 1996). Harris (1992) reasoned that the mere allusion of psychological and emotional situations in family environment nurtures the child's Theory of Mind development. What makes it particularly resilient is the to and fro shuttling from one perspective to another. Welch-Ross (1997) recognized substantial correlation among "mother-talk" about the past and a child's Theory of mind maturity and development.

Since the early days of research on theory of mind, investigators have examined children's use of language for evidence of mental state understanding. Shatz et al. (1983) studied the emerging use of mental state terms by toddlers. They found that cognition terms such as *know*, *think*, *mean*, *forget*, and *guess* were first used by children between 2;4 and 2;8; however, examination of the contexts in which these words were used suggested that they did not have true mental state functions, but occurred in the routinized phrase "I don't know" or were used to manage discourse (e.g., "Know what?" to initiate conversation or take a conversational turn).

Terms expressing desire may be among the first to be used with a truly mentalistic function. Bretherton and Beeghly (1982) found that by 2;4, more than half of the children in their sample applied the desire terms *want* and *need* to both self and others, and Bartsch and Wellman (1995) observed genuine reference to desire soon after the second birthday. By comparison, Bartsch and Wellman (1995) found that *think* and *know* were not used as true mental state terms before 2;7.

True mental state functions for cognition words were not observed by Shatz et al. (1983) before 2;6. Both Shatz et al. and Bartsch and Wellman relied on analysis of surrounding context to identify genuinely mentalistic use of mental state terms. The most convincing mentalistic uses are contrastive uses. These uses contrast someone's mental state with reality, contrast one's mental state with one's own prior mental state, or contrast someone's mental state with someone else's mental state (Bartsch & Wellman, 1995; Shatz et al., 1983).

An example from Bartsch and Wellman (1995, p. 46), produced by a child at age 3;8, is "I thought I could rip the papers off, 'cept it doesn't have any paper." Evidence that mastery of mental state language is related to theory of mind comes from an experimental study by Moore, Pure, and Furrow (1990), which showed that 4-year-olds' understanding of the relative certainty implied by the verbs *think* and *know* was related to their false belief performance.

2.8 Assessment of ToM:

False-belief tasks:

One of the most important milestones in theory of mind development is gaining the ability to attribute *false belief*: that is, to recognize that others can have beliefs about the world that are diverging. To do this, it is suggested, one must understand how knowledge is formed, that people's beliefs are based on their knowledge, that mental states can differ from reality, and that people's behavior can be predicted by their mental states. Numerous versions of the false-belief task have been developed, based on the initial task done by Wimmer and Perner (1983) - unexpected transfer test.

This test often referred to as the Sally-Anne task. Two dolls are shown to the child, named: Sally, with a marble placed in a basket and Anne, with a box. Sally takes a walk, leaving the room, when Anne swaps the marble from the basket to her box before Sally returns. The child is quizzed where Sally will search for the marble. The child passes, if she answers "basket" and alternatively, fails if she responds "box", given that Sally did not witness the act.

To pass the task, the child must understand, another person's mental representation differs from theirs and hence, predict their behavior. These researched false-belief tasks prove consistently that, until the age of 4, most normally developing children fail this task.

Appearance-reality tasks:

There are drawbacks to the false-belief test also and hence other tests of theory of mind were developed. In order to check theory of mind ability in terms of ‘appearance-reality’ a task popularly called as the ‘Smarties’ task was developed. In this task the experimenter will require material such as a ‘Smarties’ chocolate box and some pencils. The chocolates are removed from the box and replaced with pencils before the test begins.

The test involves asking the child what he/she thinks or believes is in the ‘Smarties’ box. The normal and appropriate response of the child to this question would be ‘Smarties’. Then the box is opened and the child is shown that Smarties box actually in reality contains pencils though it appears that it must contain ‘smarties’ chocolates. Then the second step of the task involves asking the child what he/she thinks another child who has never seen inside the same ‘Smarties’ box will think is inside the box. The child passes the task if he/she says ‘Smarties’ and fails the task if he he/she says ‘pencils’. Passing this task requires the child to understand that another person need not necessarily have the same concept of reality as he/she does and therefore need not know everything that they themselves know of

An example of this is the “*Hiding and Finding Game*”. This is a task of nonverbal false belief developed originally by Call and Tomasello (1999). This was adapted by Figueras-Costa and Harris (2001). The task involves two experimenters: the primary experimenter who is labeled as the ‘hider’ and a second experimenter who is labeled as the ‘communicator’. The task consists of multiple trials in which the hider hides a penny in one of two identical boxes and then the child is asked to find the penny, with the help of the communicator.

Recent tests like the ‘Theory of Mind Scale’ (Wellman and Liu, 2004) are more comprehensive. This test is a five-item test which includes a false-belief task. It spans a larger range of ages and tasks. The five task items can be administered in 15 to 20 min, thus administration of the test is quicker (Wellman and Liu, 2004)

An observation that has been made is that in majority of the research on Theory of Mind and its assessment have used material such as still/static pictures or stories with puppets. This aspect has been criticized by Tompkins (1985) who is of the view that use of static pictures and stories involve making metalinguistic judgments about hypothetical situations. Thus these tasks do not correctly measure or tap the cognitive processes required to make accurate judgments using theory of mind abilities in actuality.

Weed et al (2010) evaluated theory of mind ability using animated films with moving geometric shapes. Eight films were used, in which four films had triangles represented as intentional agents having mental states while four other films represented the triangles as simply inanimate through moving objects. The respondents used button press response and oral descriptions to evaluate the films.

Other tasks:

One of the other tasks is "false-photograph" which contributes to the theory of mind's development. The photograph in question has either a location or identity altered. A child needs to point out the differences between current state of affairs and what is shown in the photograph.

A story is told to the child about a character that places an object in a location (e.g., Toys in a red cupboard) and then shoots a Polaroid photograph of the scene. While the photograph is developing, the object is shifted to a different location (e.g., to a green cupboard).

Two control questions are asked to the child:

1. When the picture was taken, where was the Toy?
2. Where is the Toy now?

The subject is also asked a false-photograph question:

3. Where is the Toy in the picture now?

The task is passed if the child correctly recognizes the location of the object in the photograph and the actual location of the object during the time of the question.

The theory of mind research has begun employing “non-verbal” paradigms, to make these tasks more accessible for young children, non-human animals and autistic individuals.

2.9 Training and ToM:

Studies by Hale and Tager-Flusberg (2003), investigates the role of “language” in the development of ToM. 60 pre-schoolers who failed “false-belief and sentential complement” pre-tests were randomly assigned training on these topics individually and other relative clauses (as different control groups). They were then tested on a set of “different” ToM tasks and sentential complements.

Key findings were that the group trained on sentential complements not only absorbed the linguistic acquaintance promoted by the training, but also substantially improved their grades on a range of theory of mind assignments. In contrast, “false-belief” training only led to better ToM results but had no influence on language improvement.

The control group who was trained on relative clauses, showed no improvement on the ToM post test. These findings prove that the acquisition of “sentential complements” contributes heavily to the progress of Theory of Mind in pre-schoolers. Another independent study corroborating with the de Villiers & de Villiers, (2000) study found that instructing pre-schoolers the rules of “complement syntax” improved the kids’ performance on false belief tasks as well (Lohmann and Tomasello, 2003).

CHAPTER III

3. METHODOLOGY

3.1 AIM

To compare the performance of children with Learning Disabilities and children who are typically developing on the Theory of Mind tasks and also to assess the relation between Language age (LA) and ToM performance. The present study was a cross sectional study with children from a middle socio economic status (Venkatesan, 2011). Children between the grades of lower kindergarten and fifth grade were chosen using purposive sampling for subject selection. They were distributed into the comparison and clinical groups based on the following criteria.

3.2 SELECTION CRITERIA

Study group: The study group included a total of 20 children with Learning Disabilities (LD) who fulfilled the following criteria:

- ✓ Children from a middle socio economic status (Venkatesan, 2011).
- ✓ Children between the grades of lower kindergarten and fifth grade
- ✓ Diagnosed as having Learning Disabilities.
- ✓ Children matched for language age range between 4 years to 5 years 11 months
- ✓ Matched for their language age with typically developing children.
- ✓ Attending school in English medium and Kannada as the mother tongue.
- ✓ Positive parental consent

The following children were excluded from participation in the study

- ✓ Children who had been diagnosed to have cognitive & behavioral disorders
- ✓ Children who have any other medical diagnosis (epilepsy)

Study Group	n	Gender		LA range	CA range	Mean CA \pm SD
		Male	Female			
	20	12	8	4 – 5.11	6y – 8y9m	7.16 \pm .75909y

Table 1: Details of subjects in the study group

n = number of subjects

CA = chronological age

LA = language age

SD= Standard deviation

y = years

m = months

Comparison group: The comparison group included a total of 20 children with typical development who were selected based on the following criteria:

- ✓ Children attending school in English medium and Kannada as the mother tongue
- ✓ Children between the age range of 4 years to 5 years 11 months

Comparison Group	n	Gender		LA range	CA range	Mean CA \pm SD
		Male	Female			
	20	11	9	4 – 5.11	4y – 5y11m	4.93 \pm .72277y

Table 2: Details of subjects in the comparison group

n = number of subjects

CA = chronological age

LA = language age

SD= Standard deviation

y = years

m = months

3.3 MATERIALS

Tests to evaluate ToM included:

1. Theory of mind scale (Wellman and Liu's, 2004)

To evaluate Language the following was used:

1. Assessment of Language Development (ALD), Lakkanna et al., 2007

3.4 PROCEDURE

Positive parental consent and child assent were obtained before data collection (See appendix). The mother of every child was interviewed about the child's demographic data before the child was assessed. The subjects within the comparison group were tested first, followed by the children within the study group. They were tested in a noise-free and distraction-free room to the best possible extent. Each subject (child) was tested individually. Each subject was assessed using The Assessment of Language Development' (ALD) by Lakkanna et al., (2007), for their language skills to determine their Language age. On meeting the inclusion criteria for each group, the subjects were assessed on the ToM tests.

The '**Theory of mind scale**' (Wellman and Liu, 2004) was modified with permission and used to evaluate the performance of the children on the ToM task (Appendix). It was modified to suit the Indian cultural needs. The following are the subtests from the 'Theory of Mind scale' that were administered to each child.

1. Diverse Desires
2. Diverse Beliefs
3. Knowledge Access
4. Contents False Belief, and
5. Real-Apparent Emotion.

The subtests are arranged in increasing complexity (a scalogram). The subtests comprised both target and control questions, to check if the children had comprehended the task. Children were given a score of 1 if they answered the target question and scored 0 if they did not. Each child could get a score between 0-5. The control questions were not scored. However to get a score of 1 for each of the target question, the child had to answer the control question correctly.

This was done to eliminate a guessed response for the target question. Since this test is a scalogram a subject who, for example, got a score of '4', indicated that he/she had responded correctly to the first 4 subtests and not the 5th subtest. Similarly a score of '2/5', indicated that the subject had answered the first 2 subtests accurately. Each subject was reinforced after every correct response with a small smiley shaped eraser. The subject's response was tabulated in the response sheet/data entry sheet and appropriate statistical tools were applied on the same.

CHAPTER IV

4. RESULTS AND DISCUSSION

The present study aimed at comparing the performance of children with Learning Disabilities and children who are typically developing on the Theory of Mind (TOM) tasks. It also aimed at understanding the relationship between language age and performance on the ToM tests.

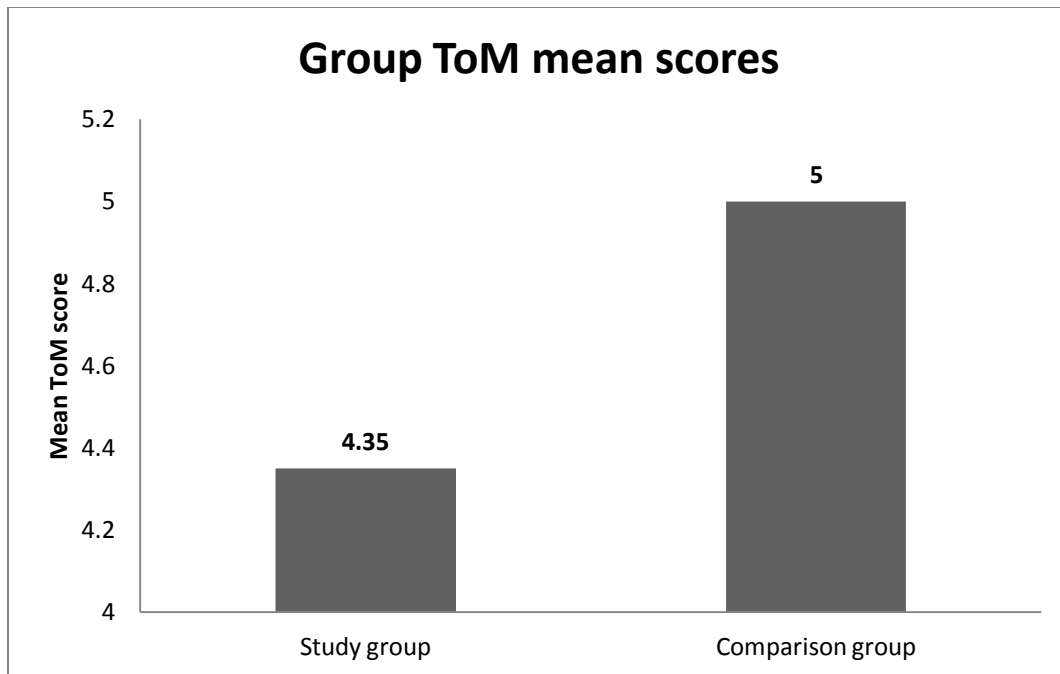
All participants with typical development (comparison group) within the age range of 4 years to 5 years 11 months passed the 5 subtests on the “ToM scale” by Wellman and Liu (2004). Performance of the participants in the clinical group on the “ToM Scale” by Wellman and Liu (2004) is presented and discussed in the following paragraphs.

The performance of the 20 subjects in the study group (age range- 6 years to 8 years 9 months) on the ToM tasks was not as in the comparison group (age range – 4 years to 5 years 11 months) though the subjects in the study group were matched for their language age with the subjects in the comparison group.

There were only 9 children with LD who passed all 5 subtests on the ToM scale (score = 5) with a mean score and standard deviation of $4.35 \pm .6708$, whereas all subjects in the comparison group passed all 5 subtests (score = 5).

The 9 children in the study group who had succeeded in all 5 subtests were older children (age range – 6 years 9 months to 8 years 2 months). Clearly then, there is a delay in the acquisition of ToM, in children with LD (study group). This finding is in line with researchers who have found such a delay (Charman and Campbell, 1997).

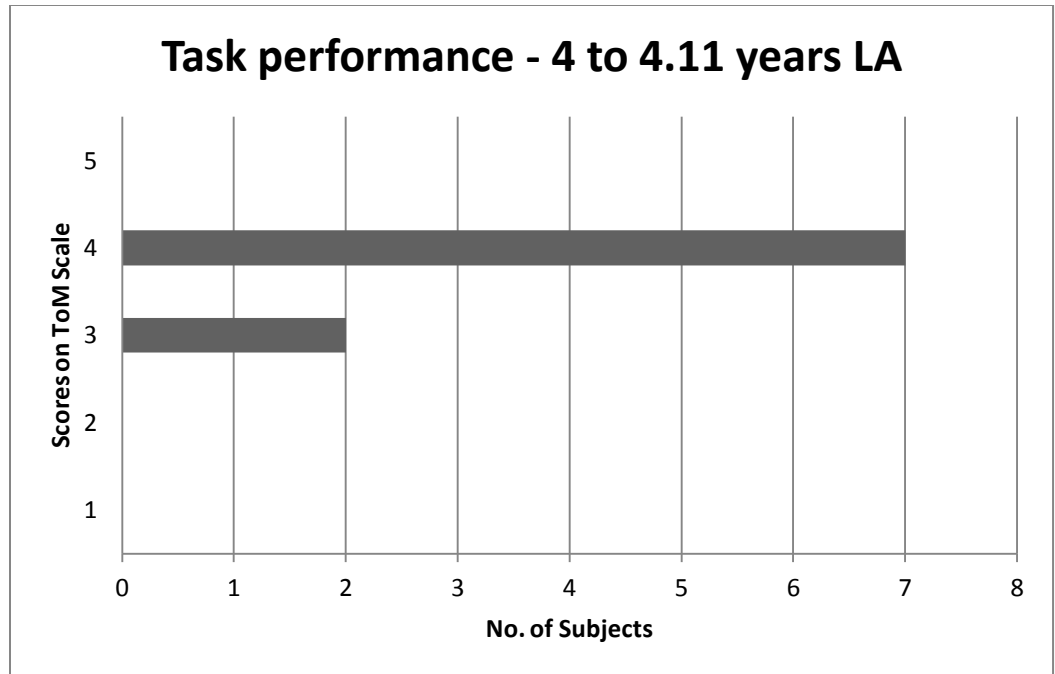
There are many factors that could have influenced this delay in acquisition. Some of the factors include the tendency for the increased use of concrete language at the cost of more abstract emotional language in the child's environment due to language abilities not being age appropriate. The following graph represents the difference in the mean scores of the study group (children with LD) and comparison group (children typically developing).



Since all 20 subjects in the comparison group with chronological age and language age in the age range of 4 years to 5 years 11 months were able to pass all 5 subtests on the 'ToM scale' it was not possible to perform further statistical analysis to compare the children with typical development and Learning Disabilities.

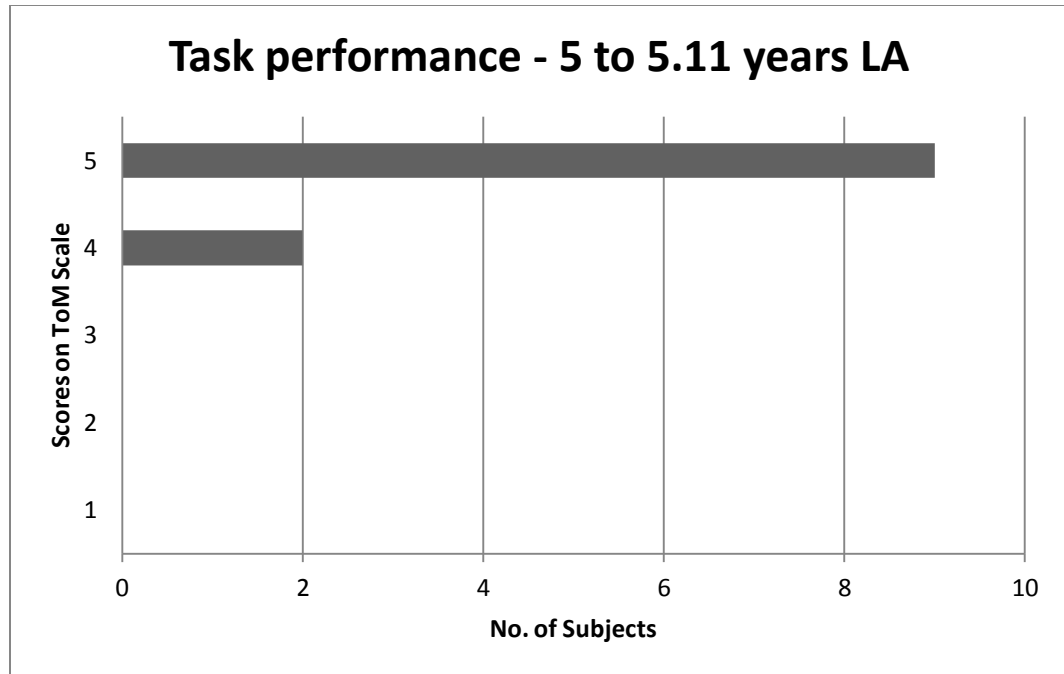
4.1 THE EFFECT OF LANGUAGE AGE ON THEORY OF MIND PERFORMANCE

To understand the effect of Language Age (LA), in the study group it is observed that irrespective of the chronological age there is a highly significant difference in the mean ToM test score of 4 years to 4 years 11 months language age range children versus the mean ToM test score of 5 years to 5 years 11 months language age range children. The 5 years to 5 years 11 months children having significantly higher mean score compared to the 4 years to 4 years 11 months age range children.



Based on the results of the statistical analysis, ToM performance is significantly different amongst the participants studied. It is clear that with an increase in the LA, there is an improvement in ToM task performance.

LA describes the child's ability in terms of both comprehension and expressive abilities. LA is an important variable, in one, helping the child to comprehend the task and express his/her opinion/response. Secondly, an increase in LA also reflects that there is an increase in the quality and quantity of language input, thus the scope of accommodating MSL is higher in the group with a greater LA. Briefly put "better language skills allow greater access to mental state talk, which promotes ToM development" (Rommel and Peters, 2009).



The statistical analysis using independent T test reveals the following:

Table 3: Comparison of performance on the “ToM scale” among different language age groups:

Language Age (LA)	No. of subjects (n= 20)	Performance on ToM scale Mean±SD	Range on ToM scale		P value
			Minimum	Maximum	
4 years – 4 years 11 months	9	3.78±0.44	3	4	.000*
5 years – 5 years 11 months	11	4.81±0.40	4	5	

** p<0.01

It is clear that there is a delay in ToM acquisition in children with LD and this could be due to the interplay of language age, chronological age and the home environmental use of language. This delay can be explained in totality based on a hypothesis given by Peterson and Siegel (1995) for children with hearing impairment and the same can be extended to explain theory of mind deficits in children with Learning Disabilities

These researchers postulated the “early conversation hypothesis” to explain ToM deficits in children. They state that early conversational experiences with the family who also incorporated mental state language into their utterances facilitate the development of ToM. The paucity of language limits the child from understanding what his/her parents talk about other people’s motives/ actions or beliefs. They do not get to understand others talking about their own thoughts, feelings and how they share the same. Thus, paucity of early inter personal communication about mental processes at home, is likely to account for the observed delays in the ToM in children (Courtin, 2000).

All children in this study have had deprivation of early conversation as indicated by their language delay. More the involvement of mental state conversations at home, more it facilitates children to develop and succeed in ToM tasks (E.g., Dunn et al., 1991). A child with Learning Disabilities loses out on this input because majority of the mothers

use concrete words (e.g. table, banana) to communicate with their children and hardly any abstract words (e.g. imagine, wonder).

This highlights the need for the inclusion of MSL as a part of speech-language intervention. The use of mental state language has to be structured during initial stages and later generalized. This also calls for the need of assessment tools, which includes areas that assess use of mental state language by parents and its application by children in different domains, one being ToM and pragmatics.

However the results of the present study must be interpreted and generalized with caution since theory of mind acquisition is not necessarily an all-or-none process and subjects may perform at an intermediate level because they have a partial grasp of the concepts or representational abilities required, but not a complete or firm grasp. In such cases the nonspecific task information processing requirements, such as language comprehension, memory abilities, etc., which are also required to pass the task (in addition to theory of mind understanding), may influence whether an individual subject passes or fails on any particular trial

CHAPTER V

5. SUMMARY AND CONCLUSION

Theory of Mind (ToM) is the ability to understand another person's mind. Presence of ToM is necessary for a mature understanding of social situations and relationships. Children with Learning Disability (LD) represent a group of children who show an inconsistency in the acquisition of ToM (Charman & Campbell, 1997). Research in this area is lacking in our country.

The present study investigated the ToM in Indian children with LD. The study involved 20 typically developing children as the comparison group. A total of 20 children with LD comprised the study group. The "Theory of Mind scale" (Wellman and Liu, 2004)

The performance of the children with LD did not match the comparison group children. Older children, with better language skills, performed better than the rest of the children in the group. The mothers of the children with LD reported lack of or minimal use of mental state language while conversing with their children. This leads to the conclusion that the acquisition of ToM is delayed in children with Learning Disabilities compared to children who are typically developing. Further it is observed that with the increase of age children show an improved performance on the Theory of Mind tasks.

It is recommended that the use of mental state language which enables the process of acquisition of ToM, thus in turn enhances a child's social functioning, must be included as a part of the prescribed language habilitation program.

5.1 Clinical implications:

- ✓ Children with LD can be trained in acquiring the ToM to communicate better. It is our duty as speech language pathologists to ensure that we provide therapy focused on Theory of Mind to the children with Learning Disabilities. This enhances their interpersonal communication
- ✓ It is also important that we create awareness among the parents of children with Learning Disabilities on the benefits of involving mental state language in their daily interaction with the child.

5.2 Limitations of the study:

- ✓ Small sample size in the study.
- ✓ Subjects for the study with LD have been obtained from only one school. Thus the study has to be replicated on other children from different schools and check for their ToM abilities.
- ✓ Since language age was a crucial factor in the inclusion of the children into different groups, the language abilities of each child could have been established

in greater detail in terms of the components of language (Eg., semantics, morpho-syntax).

Future directions:

- ✓ A detailed assessment procedure can be developed to assess use of mental state language by the family during their early interaction with their children.
- ✓ Assessment of ToM skills in adults with LD and correlate it with the pragmatic disturbance they face as adults.
- ✓ Assessment of the ToM performance in children with LD who have varying degrees of impairment
- ✓ An intervention module for use of mental state language during speech-language intervention for the children with Learning Disabilities.

However the results of the present study must be interpreted and generalized with caution since theory of mind acquisition is not necessarily an all-or-none process and subjects may perform at an intermediate level because they have a partial grasp of the concepts or representational abilities required, but not a complete or firm grasp. In such cases the nonspecific task information processing requirements, such as language comprehension, memory abilities, etc., which are also required to pass the task (in addition to theory of mind understanding), may influence whether an individual subject passes or fails on any particular trial

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APPENDIX I:

Theory of Mind Scale: A five-item version of Wellman and Liu's (2004) scale has been modified (with permission) and will be administered in the following order. The scoring procedures including asking control questions to check for comprehension and memory will be done as given in the Wellman and Liu script.

(a) **Diverse Desires:** Tests the child's understanding that different people may have different desires. The child will be asked which of two foods (carrot or chocolate) he/she would want for a snack. Then the child will be told that a character (Shiva) prefers the other food (e.g., carrot if the child prefers chocolate). Then the child will be asked which food Shiva will pick for his snack. The child is scored as correct if he/she chooses the food that Shiva wants, rather than the food that the child wants.

(b) **Diverse Beliefs:** Tests the child's understanding that different people can have different beliefs. The child will be told that a character (Rani) wants to find her cat, and asked to guess in which of two locations (bushes or house) the cat is hiding. Then the child will be told that Rani thinks the cat is in the other location (e.g., bushes if the child thinks house). Then the child will be asked where Veena will look for the cat. The child will be scored as correct if he/she chooses the location where Veena believes the cat is, rather than the location where the child believes the cat is (note: the true location of the cat is unknown).

(c) **Knowledge Access:** Tests the child's understanding that perceptual access leads to knowledge. The child will be asked to guess what is inside an unlabeled cardboard box. Then the child will be shown that the box actually contains a small toy elephant. Then the child will be told that a character (Mani) has never seen inside the can, and asked if Mani would know what is inside. The child will be scored as correct if they respond that Mani does not know, even though the child has seen inside & does know.

(d) **Contents False Belief:** Tests the child's understanding that people may hold false beliefs. The child will be shown a Cadbury chocolate box and asked what is inside (all children said chocolate). Then the child is shown that the box actually contains a 1 rupee coin. Then the child will be told that a character (Mahesh) has never seen inside the box, and asked what Mahesh thinks is inside. The child is scored as correct if he/she responds that Mahesh thinks there are chocolates inside, even though the child knows that belief is false.

(e) **Real-Apparent Emotion:** Tests the child's understanding that people's facial expressions may not match how they feel inside. The child will be told a story about a boy (Venu) who is being teased by some other children but does not want the other children to know that he is upset. The child is shown drawings of a happy face, a sad face, and a neutral face and asked to indicate how Venu really feels and how he tries to look on his face. The child is scored as correct if he/she indicates that Venu feels more negative than he looks.

1. APPENDIX II

INFORMED CONSENT FORM

INFORMATION TO THE FAMILY

I, Ms. Thulasi Prasad, am carrying out a research study on children with Learning Disabilities under the guidance of Dr. Shyamala Chengappa as a part of my post-graduation at All India Institute of Speech and Hearing, Mysore University.

This would require that I spend about 1 hour with you or/and your child to assess your child based on non-invasive tests. All the information will be kept confidential. The information obtained will be used only for this study. We would like to have your contact details, as well, so that if needed, we are in a position to keep in touch with you for follow up.

This research is a step towards a better understanding of children with Learning Disabilities on a range of Theory of Mind tasks. Theory of mind is the ability to understand one's own and others' minds. This research may not be of immediate benefit to your child; however your participation would be deeply appreciated as it is likely at some future date, to benefit a group of children with Learning Disabilities.

UNDERTAKING BY THE INVESTIGATOR

Your consent to allow your ward to participate in the above study is sought. You have the right to refuse consent or withdraw the same during any part of the study without giving any reason. If you have any doubts about the study, please feel free to clarify the same. Even during the study, you are free to contact any of the investigator for clarifications if you so desire. Contact number is provided below.

CONSENT

I have been informed about the procedure of the study. I have understood that I have the right to refuse my consent or to withdraw it any time during the study. I am also aware that I may be contacted by the investigator, if needed.

I the undersigned, give my consent for my ward to be a participant of this investigation/study program.

Signature of the parent/guardian Signature of the investigator

Name:

Address:

Date:

Phone number:

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