The Contributions of Temperament and Theory of Mind to Teaching Abilities in Early Childhood

by

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Abstract

Peer tutoring is an effective evidence-based practice commonly used in early childhood settings. Theoretically, to teach effectively the child must understand particular features of the student's mind, an ability referred to as Theory of Mind (ToM). Despite a conceptual connection between ToM and teaching ability, few studies have empirically examined this relationship. In addition, effective teaching is likely supported by certain dispositions that enable the teacher to interact in a regulated and positive way with the student. In childhood, dispositions such as these are captured under the rubric of temperament. This study investigated the contributions of ToM and temperament to children's ability to teach another.

Children aged 3-5 years (24 girls; 28 boys) engaged in 2 teaching tasks in which they taught an age appropriate children's game to an adult. Children also completed 3 tasks assessing ToM and their parents completed the Children's Behavior Questionnaire, a measure of child temperament.

Results showed that although performance on basic ToM tasks did not relate to teaching behaviour, performance on the advanced ToM task did. Children who scored higher on the advanced ToM task demonstrated better teaching skills. In addition, several temperament dispositions were associated with children's teaching performance. Activity level was negatively associated with teaching ability, while attentional ability was positively associated with teaching scores. Ability to suppress pre-potent responses was also positively associated with teaching behaviour. In a regression model including temperament dimensions and ToM scores as predictors of teaching only the temperament dimension of attention was statistically detectable.

Keywords: peer teaching; peer tutoring; theory of mind; temperament; early childhood education; cognitive development

For Mom, Dad, Orit, Yael, Uri, Alon and Tamar

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List of Abbreviations

CBQ   Children's Behavior Questionnaire

ToM   Theory of Mind

ZPD   Zone of Proximal Development

Chapter 1.   **Introduction**

Peer tutoring is a common practice in early childhood settings (Tabacek, McLaughlin, & Howard, 1994). Most often it occurs spontaneously as part of everyday events when a teacher asks one child to teach another child a game or how to do a task, or when a child voluntarily chooses to explain something to another child. Peer tutoring is also used as a more structured teaching method as part of planned curriculum. In this case, examples include children who teach each other math or literacy skills. This type of procedure may take place during or after school hours. Depending on the program, students can be paired with each other on the basis of skill level, randomly, or according to convenience factors such as their living place. One student has the role of tutor and the other as tutee; these roles may alternate between them. As part of peer tutoring, the tutor is often instructed by an adult teacher on a topic to be taught. During this session the tutor masters the skill he/she needs to teach and the adult teacher makes sure the child understands the topic well. Next, the tutor teaches his/her tutee the specific skill that he/she was taught. Studies of peer tutoring show that both tutor and tutee demonstrate improvement on the skills they taught and learned, respectively, during these sessions (Mayfield & Vollmer, 2007; Robinson, Schofield, & Steers-Wentzell, 2005).

Most of the research conducted on peer tutoring has focused on its effectiveness as a teaching method for realizing academic gains. This kind of research has been conducted at all school levels; elementary school (e.g., Simmons, Fuchs, Fuchs, Mathes, & Hodge, 1995), middle school (e.g., Calhoon, 2005), high school (Leikin, 2003) and even postsecondary education (e.g., Bruno et al., 2016). The findings, in general, paint a positive picture of the effectiveness of peer tutoring, highlighting improved outcomes for students in the skills they taught to or learned from peers. Missing from the literature, however, is research addressing the processes of peer tutoring and what attributes contribute to a child being an effective tutor. Moreover, although there is

evidence that young children are able to effectively teach one another (e.g., Ashley & Tomasello, 1998), little research has been conducted in early childhood education settings despite peer tutoring commonly occurring in those settings (Strauss, Ziv, & Stein, 2002).

In the present study I examine attributes of young children hypothesized to correlate with their ability to teach effectively, with a specific focus on Theory of Mind and temperament.

1.1. Peer Tutoring

1.1.1. A definition of Peer Tutoring

Peer tutoring is a social interaction between peers in which one child has the role of the expert and the other child has the role of a novice, meaning the first child teaches the other child (Damon, 1984; Jonson-Pynn & Nisbet, 2002). Such teaching may occur during a spontaneous or a designed situation.

During peer tutoring the tutor can assist the tutee by observing his or her behaviour, and providing guidance, advice or hints for the completion of the task and feedback on the tutee's progress that might include correction or evaluation (Cooper, Ayers-Lopez, & Marquis, 1982)

An important aspect of peer tutoring is that it constitutes an interaction between relatively equal peers. Even though, in the context of the specific teaching situation, the tutor has more authority, by virtue of being peers the children are socially equal to each other despite their temporary roles. Indeed, in some cases they may switch their roles as part of the procedure. Hence, a main difference between peer tutoring and a traditional teacher-child interaction is that in a teacher-child interaction the teacher is, by definition, in a relationship of authority vis à vis the student. As an adult, the teacher always has more power than the child. Peer tutoring however entails different social characteristics than teacher-child interactions. The social characteristics of peer tutoring

allow children to act more freely than they might with a teacher, express more feelings and act more naturally (Sabrin, 1976).

Since peer tutoring involves the act of teaching, it is also important to define teaching. Teaching is a deliberate act aimed at bringing about a change in another person's knowledge or skills (Williams, 2007). An effective teacher has tools to judge whether such change actually occurs. Ideally, teaching occurs in a bidirectional interaction between the student and the teacher; that is, the teacher adjusts his or her teaching in accordance with the student's reactions. A skillful teacher has the ability to understand the student's point of view, comprehension, and goals (Davis-Unger & Carlton, 2008b; Säljö, 1996 (in Williams, 2007); Williams, 2007).

1.1.2. **Previous studies on the effectiveness of peer tutoring**

Research on peer tutoring has been conducted since the 1970's. Studies have mainly focused on the academic outcomes of peer tutoring and have largely been conducted with school-aged children. This section will focus on research findings regarding academic and non-academic benefits of peer tutoring.

Academic outcomes

Research has shown that there are numerous academic benefits to be gained from peer tutoring or, as it is often referred to, peer assisted learning. Studies showed that students can be taught by their peers and this teaching leads to improved academic outcomes. A meta-analysis that examined the achievement and other outcomes of elementary and secondary students who participated in peer tutoring found that children who took part in a peer tutoring environment showed better academic achievement compared to students in non peer instructional arrangements. Findings also showed that the positive academic effect of peer tutoring was found in a variety of subjects including math, social studies and science. The authors reported an overall mean effect size of .75 of peer tutoring across 26 studies (Bowman-Perrott et al., 2013). Other findings indicate significant academic gains in reading performance as a result of peer tutoring among middle school students (e.g., Fogarty & Wang, 1982).

Researchers have also examined the advantages of peer tutoring compared to traditional teacher-student interaction. One of the benefits of peer tutoring is that it creates an individualized teacher-student ratio. Utley, Mortweet and Greenwood, (1997) argued that absence of a low teacher-student ratio is an ongoing problem in the education system that limits the possibility of individualized instruction for students with different needs. These authors suggested peer tutoring as a solution to this problem.

An example of a widely studied peer tutoring program is the ClassWide Peer Tutoring program that was originally aimed at teaching spelling at elementary schools, but has since been expanded to other school subjects. As part of the program's design, students are included in the instruction and are shown how to effectively respond to their pupils, ways to correct errors, testing strategies, and how to provide feedback and reinforce positive behaviours (Delquadri, Greenwood, Stretton & Hall, 1983). A collection of classroom based studies was conducted on the program over a 12-year period. Most studies compared the outcomes of conventional teaching strategies to the ClassWide program for at risk and not-at-risk students (Greenwood & Delquadri, 1995). A summary of findings through the years showed improvements in students' engagement and academic achievement (grades 2,3,4 and 6), and a reduction in the number of students requiring special education and dropping out of school by grade 7 (Utley et al., 1997). Other studies found that programs such as this in elementary schools allowed students to spend more time on academic tasks such as writing, spelling, math and reading (Bowman-Perrott et al., 2013). Studies at elementary schools also found that peer tutoring allows students to work in collaboration and creates a positive competition between students; children motivate their friends to learn which contributes to the tutee's performance in the tasks (Bowman-Perrott et al., 2013; Utley et al., 1997).

Peer tutoring allows students to practice and respond to academic content in a different manner than is possible in conventional teaching, that is, children are not restricted in the ways that they explain to each other and do not need to follow a prescribed curriculum. Children are able to teach each other in any safe environment and are not restricted to the school hours (Can & Ginsburg-Block, 2013). Students are also more engaged in the learning situation than they are in a conventional learning environment. For example, a study that compared dyads of grade 4 and 5 students

experienced with peer tutoring to students who were not experienced in peer tutoring in a math teaching situation found that during a direct observation, the experienced students had higher rates of active task-related behaviours. As well, both tutors and tutees were actively engaged in the task and were productive in the academic task (Ginsburg-Block & Fantuzzo, 1997). In addition a meta-analytic review that was conducted by Ginsburg-Block, Rohrbeck and Fantuzzo (2006) examined relevant studies on peer-assisted learning conducted in elementary schools. The study found that core skills for learning, such as on task behavior, effort, participation and frustration tolerance, were reinforced by peer tutoring for both the tutor and the tutee. The authors reported an overall unweighted mean effect size of .65 of peer assisted learning on these behaviours across 12 studies, indicating that students who received peer assisted learning performed better than students in the control condition.

Peer assisted learning was found to contribute to the learning skills of students coming from different academic backgrounds including children with learning disabilities and those diagnosed with autism spectrum disorder (Shamir & Lazerovitz, 2007; Utley et al., 1997; Young, Radley, Jenson, West, & Clare, 2016). Peer assisted learning has been found to improve reading in low and average achieving students in elementary schools and also students with learning disabilities (Fuchs, Futchs, Mathes & Simmons, 1997; Simmone, Fuchs, Fuchs, Hodge, & Mathes, 1994).

Non-academic outcomes

The non-academic benefits of peer tutoring was less commonly studied than the academic outcomes, however several meta-analyses have been conducted to examine relationships between peer assisted learning and attitudes towards learning, self concept and social behaviour. One of these meta-analytic reviews examined studies conducted on elementary school students and reported that peer tutoring was found to have an unweighted mean effect size of .40 of peer assisted learning on self-concept across 15 studies and an unweighted mean effect size of .52 of peer assisted learning on social outcomes across 30 studies (Ginsburg-Block et al., 2006). Another meta-analysis conducted by Cohen, Kulik and Kulik (1982) on elementary or secondary schools, focused on academic effects but also found a positive effect of peer tutoring on the attitude towards subject matter with average effect size of .29 across 8 studies.

According to Johnson and Johnson (1989), cooperative learning also contributes to the development self esteem, social support, interpersonal attraction and time on task. Even though cooperative learning is not the same as peer tutoring the results of the study are relevant for this review as cooperative learning involves similar social features to peer tutoring due to the fact that students are participating in a learning situation together aimed at reaching a mutual goal.

Studies have also shown that during tutoring situations young tutors improve their mediation style towards other children. The authors defined mediation as task oriented comments such as: focusing on the problem, attaching meaning to objects, linking new knowledge to acquired one, regulation of behaviour and positive feedback on successful tasks. These teaching behaviours enhanced students' ability to apply similar behaviours toward themselves (self-mediate), which contributed to their ability to self-regulate their own learning (Shamir & Lazerovitz, 2007).

Research has also shown that children's attitudes towards schooling improve when they participate in peer tutoring (Allen, 1976), and that children's self esteem improved during a peer tutoring for both the tutor and the tutee (Allen, 1976; Damon, 1984; McMaster, Fuchs & Fuchs, 2002).

1.1.3.   **The theoretical basis of peer tutoring**

Theorists such as Piaget and Vygotsky stressed the importance of social interaction for children's cognitive development. According to Piaget (1951), during interactions with people and objects, children often experience conflict between their beliefs and the information that is before them. This conflict motivates children to examine their old conceptions and construct new ones that accommodate their recent experience.

In his early work, Piaget presented the social world and peer experience as significant factors in the development of children (De Lisi & Golbeck, 1999). Most of his ideas about the significance of peer interaction were raised in his work on children's moral reasoning (Piaget, 1932). Piaget argued that as part of development the child needs to adapt to both the surrounding physical and social worlds. Interactions with

peers were perceived as an important resource for children to test and practice the knowledge they have constructed (Wadsworth, 1995). For that reason, social interactions are necessary for the development of logic and the individual's nature is transformed by those social experiences (Tudge & Rogoff, 1999).

To expand upon Piaget's view of the significance of interactions with peers to the child's cognitive growth it is noteworthy to mention the distinction he made between interactions with peers as opposed to interactions with adults. Piaget described two types of relationships that were summarized by Youniss and Damon (1992). The first is relationships of unilateral authority (e.g., parent-child relationship); in which children accept the authority's ideas without fully understanding them. The second is a relationship of cooperation, a symmetrical relationship in which each participant is able to contribute to the interaction with relatively equal communication and comprehension capabilities. In cooperative relationships the partners are equal in power status; neither has authority over the other. As a result, each partner constructs personal knowledge while explaining ideas to the other. Piaget viewed peers as equal partners and claimed a beneficial interaction arises when peers engaging in a task bring different perspectives to the task (Tudge & Rogoff, 1999).

Damon (1984) elaborated on Piaget's ideas and argued that during peer interactions children tend to speak directly to one another at a level each can easily understand. Children also take seriously feedback they receive from their peers and they are typically motivated to resolve any contradictions. In Damon's view, peer interactions are often less threatening than interactions with adults. Children tend to simply accept adults' feedback while they tend to consider the merits of feedback provided by their peers. The feedback that is provided during peer interactions is one of the building blocks of children's intellectual development. Theoretically, it is these qualities of peer interactions that make peer tutoring such a powerful learning context.

Vygotsky's socio-cultural approach to learning is based on the ideas that human activities (1) can never be disconnected from the social or cultural contexts in which they occur and (2) are mediated by language and other symbolic systems (John-Steiner & Mahn, 1996). Vygotsky's theory emphasizes the constant interaction between the

individual child and the social environment in the construction of knowledge. Development, according to Vygotsky, occurs when socially shared activities are transformed into internalized processes. Vygotsky viewed development as a socio-genetic process that involves children gaining control of cultural tools and signs through interacting with others in their environments. Through socially shared activities, usually with more competent partners, children are assisted to understand the use of the tools and signs that are important to the cultural group they are part of (Hogan & Tudge, 1999; John-Steiner & Mahn, 1996).

The concept of the Zone of Proximal Development (ZPD) is central in Vygotsky's theory of learning and development, and was defined by Vygotsky (1978) as "(t)he distance between the (child's) actual developmental level as determined by independent problem-solving and the (child's) level of potential problem solving as determined through problem solving under adult guidance or in collaboration with more able peers."(p. 86). That is, the child learns from interactions with more capable partners (adult or child) who help the child reach a higher level of ability than the child is capable of on his or her own.

In regards to teaching, Vygotsky argued that the ZPD is more significant for the dynamics of intellectual growth and for the success of instruction than the child's actual level of development. That is, the role of the competent instructor in assisting the child is crucial for the child's intellectual growth (Vygotsky, Rieber, & Carton, 1987). In his notion of the ZPD, peers were mentioned by Vygotsky as possible partners who may assist children to reach their potential levels. However, Vygotsky did not specifically indicate that interactions with peers were most beneficial and, in his discussion of the ZPD, he mainly discussed adults as partners (Hogan & Tudge, 1999).

Despite the fact that Vygotsky did not elaborate on peer interaction, his followers have provided some arguments on the matter. Damon (1984) provided a review of these ideas and noted that, during interactions with peers, children conduct a dialogue with others and exchange ideas. During peer interaction children are exposed to verification of ideas, strategy planning and the symbolic representation of intellectual acts. After repeated peer exchanges the child's own thinking is eventually influenced by the

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reciprocation of ideas. In other words, children internalize the cognitive processes that they experienced during their social interactions with peers and cognitively grow.

1.1.4. **The development of teaching skills[1]**

In addition to the theoretical support for peer tutoring found in the work of Piaget and Vygotsky, there is empirical evidence demonstrating that children are able to act as teachers of others from a fairly young age. For example, evidence for young children's teaching skills was found during naturalistic observations in a daycare study (Verba, 1994). In this study, toddlers in the age range of 18-24 months were observed providing assistance to their peers while trying to complete a task. They showed interest in their peers and were sensitive to their difficulties. These acts may be considered early signs of teaching. By the age 3-4 years teaching may be seen as a more deliberate act when more knowledgeable children provide simple information for an activity by modeling or completing the task for a partner (Vebra, 1998). Teaching also occurs during social play when children explain to each other the playing rules. At around the same age children also begin asking for assistance from the "expert." Children tend to ask for more help from adults around them than from their peers. This tendency is a reflection of a basic understanding of the concept of teaching since the child is asking the more knowledgeable person to teach them. Although signs of teaching behaviour are seen in children as young as 18 months, these teaching skills are not yet mature, and there are further developmental processes that need to occur in order for children to be able to teach (Davis-Unger & Carlson, 2008b; Verba, 1998).

In a study of the development of teaching skills, Davis-Unger and Carlson (2008b) examined 3 age groups: 3.5 year-olds, 4.5 year-olds, and 5.5 year-olds. They found that at 3.5 years children demonstrated real efforts to teach but, as children mature, their teaching becomes much more sophisticated and they use more teaching strategies. Older children combine verbal instructions and demonstration, respond to their students' mistakes, and provide more explanations and warnings. In general, it

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[1] In this study I will use the term "Tutoring" when referring to the specific act of teaching a peer and the term "Teaching" as a more general act or skill.

seems older children are more attuned to the behaviours of the learner and therefore their teaching is more responsive. Older children also demonstrate an ability to reflect metacognitively on their teaching.

A study conducted by Ellis and Rogoff (1982) also demonstrates the development that occurs in children's teaching skills. These authors compared adult teachers' with 9-year-old children's teaching strategies when teaching the same task. They found that adult teachers used more verbal instruction while children tended to demonstrate more. The teachers also provided general information about the task while the children only provided specific details to be completed. These findings illustrate again that children have teaching abilities but these abilities are restricted by different developmental factors. Ellis and Rogoff's (1982) study illustrates how language abilities may limit children's ability to teach, due to the fact that younger children have a restricted vocabulary that not be sufficient to allow them to fully express their teaching intentions verbally. Since children teach each other often and in many occasions are expected by adults to teach other children, it is important to continue to research and explore children's development of teaching abilities and what factors might influence them, as will be done in this research.

1.1.5. **Factors influencing children's teaching ability**

The findings discussed above indicate that there are signs of teaching abilities in early childhood that become more sophisticated with age. This raises the question of what contributes to or enables these teaching abilities to emerge and develop? An examination of the teaching behaviours observed in young children suggests that to teach effectively, the child needs to be aware of what his or her student is able to see and what his or her student knows and does not know. Understanding the learner's desires is also important, for instance, what the learner wishes to learn. To teach, one should also have the ability to impart knowledge to a learner by providing explanation or demonstration of the skills to be taught (Olson & Bruner, 1996; Williams, 2007). To summarize, teaching is enabled when a child: (a) recognizes the gap between his/her knowledge and what the other knows, (b) is able to judge what knowledge the other holds, and (c) holds a goal to cause learning in the less knowledgeable other (Davis-

Unger & Carlson, 2008b). In other words, teaching requires what has been referred to as Theory of Mind.

1.2. **Theory of Mind**

Theoretically, Theory of Mind (ToM) is a developmental achievement that should support children in succeeding in a teaching activity. ToM is defined as the understanding that other people have mental states including thoughts, beliefs and desires (Olson, Astington & Harris, 1988). ToM is a cognitive tool people use to predict and explain the actions of others on the basis of theorizing about what is going on in their minds. Such theorizing is subject to change if new evidence contrasts with one's prediction of the other's knowledge or beliefs (Hogrefe, Wimmer & Perner, 1986; Pillow, 1989).

1.2.1. **The origins and the development of the term Theory of Mind**

Within developmental psychology there is a lengthy history of interest in how children come to understand the mental lives of others. For example, Baldwin's work touched on many of the basic notions found in the ToM literature today. In his book *"The Story of the Mind",* Baldwin (1898) described the growth of the child's personality and introduced the concept of the 'bipolar self', an idea that distinguished between the self and the other (Obiols & Berrios, 2009). This distinction is a crucial part of ToM development as, without the ability to separate the self from others, it is impossible to understand that one can hold different thoughts than the other. Baldwin also described the child's development of understanding the distinction between intention and reality, and how children learn to distinguish between appearance and reality (Obiols & Berrios, 2009; Russell, 1988).

Piaget also addressed children's understanding of the mental lives of others. Piaget's conception of egocentrism formed the theoretical foundation of a large body of research on the development of perspective taking (also referred to as role taking) (Flavell, 2000; 2004). According to Piaget, as a consequence of egocentrism, "[T]he child sees everything from his own point of view, it is because he believes all the world

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to think like himself. He has not yet discovered the multiplicity of possible perspectives and remains blind to all but his own as if that were the only one possible" (Piaget, 1926/1929, p. 167, as cited in Kesselring & Müller, 2011). The child's ability to understand that other people may have different thoughts and ideas from the self is a core idea in the ToM research.

The term ToM was first introduced by Premack and Woodruff (1978) in an article that questioned whether chimpanzees are able to understand others' mental states. The paper reported an experiment involving a chimpanzee. As part of the experiment, a series of videos of a human actor struggling with different problems was shown to the chimpanzee. For example, one video showed a person placed in a room with bananas. The person tries to get the bananas but they are out of his reach. The chimpanzee was given a set of photographs depicting possible solutions to the person's problem. The findings showed that the chimpanzee consistently chose the photograph depicting the solution to the problem shown in the video. On the basis of these findings, the authors concluded that the chimpanzee recognized the intent of the person in the video (to get the bananas) and the presence of a problem (i.e., difficulty reaching the banana) and chose the solution that was consistent with that problem.

This article attracted many comments from other researchers and some of these responses had a profound influence on the subsequent direction of ToM research. Of particular importance were the commentaries of three philosophers: Bennett (1978), Dennett (1978) and Harman (1978). Each of them commented independently on Premack and Woodruff's article and suggested a procedure that would evaluate chimpanzees' understanding of beliefs. They all suggested similar procedures that involved a chimpanzee that sees an individual putting an object in a container and then leaving the room. While the individual is absent, a different individual moves the object into a different location. Understanding of beliefs could be credited to the chimpanzee if it acted as if it expected the returning individual to search for the object in the location he first put it in. A few years later the Austrian psychologists Wimmer and Perner (1983), picked up on these ideas and published their influential study that included "The Unexpected Transfer" procedure based on the philosophers' suggestions. This procedure is still widely used in ToM research today.

Use of the term ToM became more common among researchers during the 1980's following the publication of Premack and Woodruff's (1978) work. For example, a study titled *"Early person knowledge as expressed in gestural and verbal communication: When do infants acquire a "theory of mind"?"* was published in 1981 examining children's perceptions of another's mind through communicative gestures (Bretherton, McNew, & Beeghly-Smith, 1981). Wellman and his colleagues studied children's understanding of mental terms as part of the development of ToM (e.g., Johnson & Wellman, 1980; Wellman, 1985). Studies on concepts such as children's knowledge about the distinction between appearance and reality began to emerge and these studies subsequently became part of the ToM field (Flavell, 2000).

1.2.2. The development and assessment of ToM in childhood

Children begin to acquire ToM as they recognize their own and others' abilities to think, believe, wonder, imagine and pretend. This development reflects an important awareness of the distinction between the physical world and its mental representation. This awareness can extend to other domains such as the distinction between appearance and reality. Children's understanding of mind is considered an important aspect of intellectual development (Olson et al., 1988) that, as will be discussed further, has implications for the development of teaching skills.

According to ToM theorists, the basic mental states are beliefs and desires (Doherty, 2009). People usually act in accordance with what they want and what they believe. Since people usually act in ways that satisfy their desires and in accord with their beliefs, knowing what those desires and beliefs are helps us to predict other's behaviour (Doherty, 2009). Much of the research on ToM has focused on the understanding of beliefs and in particular false beliefs (Doherty, 2009; Wellman, Cross, & Watson, 2001). False belief occurs when a person has an incorrect belief about a situation and acts in accordance with that mistaken notion (Olson et al., 1988; Mitchell & Lewis, 1994; Wellman et al., 2001). Understanding mental states entails the comprehension that they can reflect reality or not. A child's understanding of false belief entails comprehension of the distinction between thoughts and reality or mind and the world (Olson et al., 1988; Mitchell & Lewis, 1994; Wellman et al., 2001).

There are several tests available that measure children's comprehension of false belief. Two of the most widely used in the research on ToM are discussed here. The first of these tasks was developed by Wimmer and Perner (1983) and is referred to as the unexpected transfer test (also known as the change of location test). During this task the child observes a story enacted with a pair of dolls. One of these dolls, Maxi, leaves some chocolate in a kitchen cupboard (location A) and walks away. While Maxi is away the other doll (his mother) enters the kitchen and moves the chocolate to a different place in the kitchen (location B) and walks away. Due to his absence, Maxi did not witness the transfer of the chocolate, and therefore he is ignorant of the fact that it was moved to a different location. The examiner informs the child that Maxi is returning to the kitchen to get his chocolate. The child is asked to predict where Maxi will look for the chocolate. Children who pass this test provide the realistic prediction that Maxi will look for the chocolate in the place that he left it (location A) rather than the place that it was moved to by his mother. Passing the test has been interpreted as indicating that the child understands that Maxi holds a false belief in regard to the location of the chocolate.

The second common false belief task was designed by Perner, Leekam and Wimmer (1987) and is referred to as the unexpected contents task (Doherty, 2009). In this task, children are shown a familiar container (usually a tube of Smarties) and are asked what is inside. Typically, children respond in accordance with what is usually in such a container (i.e., Smarties). They are then shown that there are actually pencils inside the container and that their guess was mistaken. In the next step they are asked to predict what someone else would think is inside the container when first shown it. Similar to the unexpected transfer task, children pass this test when they predict correctly that another person would falsely believe that the tube contains Smarties, rather than pencils.

A major interest in ToM research is the age at which the understanding of false belief emerges. According to Wellman et al.'s (2001) meta-analysis, children usually succeed at the false belief task around the age of 4-5 years. However, there is clear evidence that learning about others' minds begins in infancy (Shatz, 1994). Children begin at a very young age to acquire bits of knowledge about the mind that ultimately integrate to the complex understanding found in older children.

The development of language abilities is an important step in the development of understanding of the mind. The ability to speak allows for more interactions and experiences with other humans. Through conversations with other people on topics such as emotions, intentions and thoughts, children gain knowledge about the mind. After children acquire language they begin to express their internal motivations, understandings and expectations. These expressions help them to discover how internal states are made public (Shatz, 1994).

.According to Flavell (1988), children display knowledge about the mind before the age of 4. He points out that by age 2 or 3 years children learn that they and others can be "cognitively connected." That is, children understand that what is inside one's mind can be shared with others, and that this sharing can be achieved by viewing the same thing (e.g., watching a dog on the street with mom), expressing feeling (e.g., "I fell and it hurts."), knowledge or thoughts or by touching or pointing at things (e.g., the child points at the dog to show his mom). Children can also distinguish to some extent between subjective states and experience. Understanding this distinction means that children are able to interpret perceptions and feelings as mental events within themselves and others. For example, if they see another child crying they are likely to assume that this child is sad. However, young children tend to not understand that it is possible to represent a single situation in different ways. They do not understand that even though something in the world seems a certain way to them, it may be represented mentally in more than one way. Children are not aware of what goes on in people's minds when the others are exposed to something, which means they understand that something is seen by others but not <u>how</u> it appears to them. For example, if a child and another person view an item together that only the child is familiar with, the child might infer that the other person also recognizes the item because they both see it. The young child lacks the ability to understand that the process of recognizing this item may be different for the other person.

Researchers of the early development of the understanding of the mind have tried to evaluate the ability of infants to recognize other's intentional behaviour. To this end, several studies using the habituation paradigm have been conducted. The habituation paradigm is based on Fantz's (1964) observation that infants demonstrate

preference for novel stimuli compared to familiar stimuli by looking longer at novel stimuli. In habituation paradigms infants are presented with stimuli and their gazing time is recorded. Gazing time usually increases when infants are presented with novel objects and decreases when they are presented with a familiar stimulus. Looking time has become a standard index to assess infants' habituation to stimuli (Oakes, 2010). An example of such a study was conducted with 9-12-month-old infants. The infants sat on their parents' lap in a dark room and watched a computer screen that presented an animated circle jumping over a barrier to reach its goal object. The researchers were interested in whether, after watching that animation, infants would anticipate that the circle would reach the goal object. The results of the study showed that infants indeed behaved as if they expected that the circle would jump into its goal as when that expectation was violated the infants' gazing time increased (Csibra, Gergely, Bíró, Koós, & Brockbank, 1999). Similarly, Phillips and Wellman (2005) reported that infants looked longer at an actor trying to reach a goal when he did not reach it. In a different study infants were presented with sequences of continuous everyday actions**.** The infants demonstrated more interest in the scenes if they were paused before the actor completed his or her intentions. These findings suggest that during the first year of life infants demonstrate sensitivity to the structure of intentional actions (Baldwin, Baird, Saylor, & Clark, 2001).

In a study conducted by Meltzoff (1995), 18-month-old toddlers witnessed an adult failing to fulfill novel object-directed goals (e.g., trying to push a buzzer with a stick). After the experimenter failed to reach the goal, toddlers were given the opportunity to experiment with the objects on their own. Children performed the successful goal directed action (e.g., pushed the buzzer with the stick), without ever getting any directions on how to perform the goal act. These results suggest that the toddlers were able to recognize the experimenter's goal intentions. Follow-up studies replicated these results among 15-month-olds (Carpenter, Akhtar, & Tomasello, 1998), but 12 month-olds did not demonstrate the same pattern (Bellagamba & Tomasello, 1999), suggesting that by the age of 15-months infants have the ability to recognize unfulfilled goals (Brandone & Wellman, 2009).

The development of ToM continues after children pass the false belief task as they continue to gain deeper understanding of the mind. As children grow they develop the ability to understand mental states in a more flexible manner in situations that are more complex (Doherty, 2009). The understanding of more complex belief reasoning is usually referred to as *second-order false belief*. Perner and Wimmer (1985) were the first to examine more complex situations of belief reasoning. Their interest focused on what children are able to understand about a character's false belief about a different character's belief. They devised a story in which two characters (John and Mary) were *separately* informed about an ice-cream truck's unexpected move to a different location. That is, both characters knew where the ice cream truck was but John was mistaken about Mary's belief: "John *thinks* Mary *thinks* the truck is still at the old place". Children tested for the understanding of John's second-order belief were asked "Where does John think Mary will go for ice cream?" The results indicated that children began showing an ability to understand second-order false belief around the ages 6-7 years. Children at this age provided correct answers only after they received a memory aid. Within this age group, there was a large range in performance on the task and children did not show a significant improvement with age. The inconsistent results of the study may have been due to the complexity of the story and the difficulty children might have had following it. Therefore Sullivan, Zaitchick and Tager-Flushberg (1994) came up with simpler versions of Perner and Wimmer's (1985) second-order false belief stories. These researchers simplified the stories by adding linguistic control and probe questions and memory aids. In addition, the stories were shorter, included fewer characters and locations and were told by the examiner rather than a recording. Their findings showed that children aged 4.8 years were able to pass the new versions of the story 65% of times, while they were only able to pass Perner and Wimmer's task 43% of times.

A more direct approach to examine second-order false belief was devised by Perner and Howes (1992). In their story there are 3 figures, John, Mary and their mother, who returns from the store with chocolate. Mary leaves the house and John tells her he is going to store the chocolate somewhere. John then puts the chocolate in a drawer and leaves. After John leaves, unbeknownst to John and Mary, the chocolate is transferred to a new location by the mother. In the test children were asked 3 reflection questions: the first, about John's belief ("Where does John think the chocolate is?" (answer: In the

old location.), the second about John beliefs about his false belief: (If we ask John: "Do you know where the chocolate is?" what will John say? (answer: Yes.). Finally, the third question about Mary's belief (What if we go to the library and ask Mary: "Mary, does John know where the chocolate is?" What will she say? (answer: Yes). In this test, children were examined if they were able to understand John's belief about his false belief; that is, in order to answer this question, children need to imagine themselves in John's situation of not seeing the mother transfer the chocolate. Their answer should reflect that John thinks that he knows where the chocolate is. Results of the study indicated that children aged 4-6 answered the first question correctly (first-order false belief). However, when the sample was divided to 2 age groups, younger (4.10-5.8 years) and older (5.9-6.4 years), only half of the younger age group in the study was able to anticipate John's response when asked if John knew where the chocolate was. The results indicated that children were able to follow the story and even recognize John's false belief but it was difficult for them to imagine themselves in his situation and what he thought about it.

In summary, different research methods indicate that children are able to understand second-order false belief between the ages 5-6, approximately 2 years after passing the first-order false belief tasks.

Some second-order false belief tasks tap the child's ability to understand more sophisticated emotions. The basic judgment of emotions is based on satisfaction of desires, that is, if you have what you wish for, you are happy; if not, you are unhappy. Children demonstrate this basic understanding by late infancy (6-12 months) (Wellman, 1990). However, in reality a person may be happy if he thinks that his desires are being satisfied, whether they actually are or not. For instance, a person might think or assume that something has happened and be happy about it when in fact this thing did not happen. In this case, the person holds a false belief about what happened and this false belief influences emotions. In this type of second-order false belief task the child is required to understand the interaction between two mental states within the same person (Doherty, 2009); that is, the interaction between a person's belief and the emotions that are evoked as a result of that belief. Harris, Johnson, Hutton and Andrews (1989) conducted a study aimed at examining children's understanding of the impact of

beliefs and desires on emotions. Their study included three different experiments that examined children's understanding of how characters in a story would react to discovering something they thought was true was actually false. For example, a monkey expected to drink Coke (which makes him happy) and instead he found milk in his can. The results indicated that between the ages 3-7 there is an increase in children's ability to recognize that emotional reactions are influenced by the evaluation of the situation and not necessarily by the situation itself. Younger children often had the ability to recognize the character's false belief, however they failed to make the connection between the character's false belief and his emotions. The ability to link these mental states improved with age.

In summary, understanding of mind is a process that begins in infancy and develops throughout childhood. The understanding of false belief is considered a milestone in ToM development as it indicates the ability to understand mental states. A more advanced form of ToM is called second-order false belief, which refers to a more complex understanding of people's beliefs and also the links between beliefs and emotions.

1.3. **Theory of Mind and Teaching**

A theoretical connection between ToM and teaching was raised by Kruger and Tomasello (1996) who argued that the purpose of teaching is to intentionally promote learning by creating a change in another's mind. To do that, the teacher must have the ability to understand the other's mind. Olson and Bruner (1996) also pointed out a theoretical connection between ToM and teaching. They defined teaching as an activity intended to enhance the learner's knowledge. Accordingly, they argued that in order to teach, one must recognize the learner's lack of knowledge. Frye and Ziv (2005) defined teaching from a ToM point of view and argued that a key point in the definition of teaching is the intent to increase knowledge in another. Although someone might learn from another person without that person intending the learning to occur, this is not considered teaching. Hence, teaching is defined as an intentional activity aimed to increase the knowledge or understanding of another person who lacks particular

knowledge. According to this view, the teacher must be able to recognize what type of knowledge the learner holds in his or her mind in order to be able to teach.

In the process of tutoring a peer, a child must recognize the peer's mental state, for example, if he or she has difficulties understanding what is to be learned. After recognizing the peer's mental state, the child should evaluate what the peer's needs are and respond accordingly; for instance what kind of help would assist the leaner (Wood, Wood, Ainsworth & O'Malley, 1995). A child with a developed ToM can recognize an error that a learner makes and can attribute it to false belief or incomplete knowledge (Strauss, Ziv & Stein, 2002). For example, he or she can infer that the other child cannot play a game due to lack of familiarity with its rules or because of a misunderstanding of them.

Although several investigators have interpreted teaching in terms of ToM, rarely has this connection has been empirically examined. Wood et al. (1995), for example, examined the type assistance that children offered during a teaching situation when the learner was demonstrating difficulties. They found that 7-year-old children's teaching was more contingent, that is, they modified their instruction strategies on the basis of their learners' responses while the 3-and 5-year-old children tended to use limited strategies (i.e., demonstration). The authors interpreted these results as linked to the development of ToM. However, since ToM was not actually measured in this study this was just a theoretical explanation. Astington and Pelletier (1996) examined the concept of teaching as perceived by children in kindergarten and grade one. They observed children during play and asked those children questions about teaching. Their findings showed age related change in children's conceptions of teaching with younger children describing teaching as "showing," older children describing it as "telling" and only the oldest children in the study acknowledging teaching as providing assistance. The authors explained their results as related to children's achievement of a ToM, but as in the study by Wood et al., this was just a theoretical explanation as ToM was not measured.

Ashley and Tomasello (1998) were the first researchers who examined very young children's actual ability to teach. These investigators examined problem solving

and teaching abilities among 2, 2.5, 3 and 3.5 year-old children. Their findings indicated that 2 year-olds lacked the ability to teach, the 2.5-year-old did not notice their students' lack of knowledge, the 3 year-olds demonstrated some sensitivity toward the learner and the 3.5 year-olds actually adjusted their teaching to their learner. The authors discussed their findings with regards to the children's perspective-taking ability and argued that by the age of 3 children begin to appreciate the fact that their partner might view things differently than they do. The authors also mentioned ToM abilities as a developmental explanation for the research results suggesting that by age 3.5 years children are beginning to understand other people's mental states. Again however, the researchers did not examine children's actual ToM abilities.

To date, only a few studies could be found that examined children's actual teaching in relation to their development of ToM. Strauss et al. (2002) examined the relationship between children's developing ToM and actual peer tutoring. The study included 50 dyads of children: 25 with a mean age of 3.5 years and 25 with a mean age of 5.5 years. The participants were observed tutoring their peers a board game that they themselves had just learned. They were also tested on classic false belief tasks and false belief tasks about teaching that were specially designed for the study. Children's ability to understand the gap in knowledge between a teacher and his/her student was also examined. The findings showed significant age differences in children's understanding of teaching and children's ability to engage in tutoring. Younger children had less understanding and ability than the older children. Results also showed positive correlations between children's performance on the different false belief tasks, indicating that children who lacked the ability to recognize classic false belief also lacked the ability to succeed in the false belief tasks about teaching. Differences were found in the teaching strategies used by the 3 year-olds versus the 5 year-olds. Both groups used frequent demonstration and verbal explanation but older children used verbal explanation more frequently than demonstration while younger children used demonstration more. In addition, the 5 year-olds were more responsive to their tutee's behaviours during the game. The research clearly indicated that children's understanding of teaching, their actual teaching style and the teaching strategies that they used changed between the ages 3 and 5 years and that those changes were related to changes in the development of ToM. Further, older children were better at

describing how they taught and what the learner learned indicating on an awareness to their teaching that also developed with age (Strauss et al., 2002).

Similar findings were reported by Davis-Unger and Carlson (2008b) who examined the development of teaching skills among 46 preschoolers aged 3.5 to 5.5 years-old and its relation to the development of ToM. This study was conducted in a research lab and children were asked to teach a research assistant who they were told "was not familiar with the game" that the children had just learned. Children were also tested on two ToM tasks. Findings showed that teaching skills improved with age and that older children taught longer and explained the game's rules better than younger children. After controlling for age, ToM was found to be positively correlated with children's teaching skills.

In another study, these same authors (Davis-Unger & Carlson, 2008a) investigated the connection between children's teaching skills and the development of ToM, using the same teaching tool as in their previous study and three ToM tasks. Also included in this study was an examination of children's executive functioning. Eighty-two children aged 3.5 to 5.5 years participated in the study. Findings showed that performance on the battery of ToM tasks significantly predicted children's teaching abilities suggesting that children who passed the ToM tasks and recognized that knowledge can be displayed differently were also better at sharing their knowledge with and responding to their tutees in a sensitive manner.

Ziv, Solomon, Strauss, and Frye (2016) also examined the links among children's ToM, their understanding of the teaching intentions and their actual peer teaching strategies. The study included 75 children aged 3 to 5 years, out of which 30 were randomly chosen to teach a peer a board game. Findings showed that teaching strategies changed with age. Three-year-olds used demonstration while 4-5 year-olds added verbal explanations and adjusted their teaching according to the learner's knowledge changes. Correlations found among ToM, understanding of teaching intentions and tutoring level, indicated that the development of ToM was related to the development of tutoring ability.

The current investigation of associations between young children's ToM development and their teaching skills will extend prior research in several important ways. In previous studies of teaching and ToM, the classic false belief task was used to assess ToM. This task assesses a basic level of ToM (first-order false belief), differentiating between children who are and are not aware that others can hold a false belief. In the current study, I will supplement the classic false belief task with a measure of more sophisticated ToM awareness. This task assesses children's understanding that, just as they can reflect on the beliefs and desires of others, so too can others reflect on their beliefs and desires. In other words, this task measures children's ability to coordinate others' perspectives with their own; an ability that theoretically should support effective teaching. In addition, this more advanced ToM task assesses children's awareness of the impact of beliefs and desires on emotions, another capacity that should enhance teaching ability.

Different from previous studies that only included one teaching task, in the current study; I include two teaching tasks that differ in complexity. The two tasks are designed to tap a broader spectrum of teaching skills to assess children who might have some ability to teach but are unable to do so when a task is too complex for them to follow. In this way I hope to be able to examine the development of teaching skills in relation to the development of ToM.

To sum up, previous studies that examined the links between ToM and teaching used only basic ToM tests; the current study will add an additional and more advanced measure for ToM abilities. Furthermore, previous studies that examined links between ToM and teaching used one teaching task; the current study will include an additional simple teaching task to examine basic teaching skills.

In addition to an awareness of others' mental and emotional states and the ability to coordinate perspectives, effective teaching is likely supported by dispositions that enable the teacher to interact with and attend to the learner with a positive demeanour, focus and patience. Dispositions such as these, particularly in childhood, are captured under the rubric of temperament and are discussed in the following sections.

1.4. Temperament

1.4.1. The history of Temperament and the main temperament theories

The term temperament originated from the Latin word *temprare,* which means to mix, indicating a mix of characteristics that together create the person. According to the Greek physician Galen, each individual holds four basic body fluids that produce the temperament (a mixture of moods): warm, apathetic, sad, and easily angered. Most contemporary researchers that study individual differences among children kept using the Latin term temperament with a view that a child's temperament influences his/hers behaviour (Mervielde & De Pauw, 2012).

Temperament was not always an acceptable explanation for individual differences in behaviour. Modern research on infant and child temperament began in the 1950s; however, since the 1980s has there been an increase in research on temperament and its applicability to work with children in the fields of developmental psychology and child psychiatry (Kristal, 2005; Zentner & Bates, 2008). Even though many studies have been conducted to investigate the structure and meaning of temperament, ongoing discussion regarding its definition, structure and measurement continues. The main differences among theories of temperament are in regard to the structure of temperament and how much emphasis is placed on components such as emotional processes, attention processes, and style of behaviour as the core of temperament (Mervielde & De Pauw, 2012).

Most researchers agree that temperament refers to biologically based individual differences in behavioural style that are relatively stable across contexts and time (Goldsmith et al., 1987; Wachs & Kohnstamm, 2001). Zentner and Bates (2008) reviewed several approaches to temperament and proposed a list of key inclusion criteria for a child temperament as is presented in the following table:

Table 1.1:   Inclusion Criteria for Child Temperament

Inclusion Criteria for Child Temperament
Individual differences in normal behaviors pertaining to the domains of affect, activity, attention, and sensory sensitivity
Typically expressed in formal characteristics such response intensities, latencies, durations, thresholds, and recovery times
Appearance in the first few years of life (partial appearance in infancy, full expression by preschool age)
Counterpart exists in primates as well certain social mammals (e.g., Canis familiaris)
Closely, if complexly linked to biological mechanisms (e.g., neurochemical, neuroanatomical, genetic)
Relatively enduring and predictive of conceptually coherent outcomes (e.g., early inhibition predicting internalizing, early difficultness externalizing disorders)

(Source: Zentner & Bates, 2008, p. 15)

Shiner et al.'s (2012) definition of temperament attempts to integrate the major approaches to the topic. According to their definition: "[t]emperament traits are early emerging basic dispositions in the domains of activity, affectivity, attention, and self regulation, and these dispositions are the product of complex interactions among genetic, biological, and environmental factors across time" (p. 437).

In the following section I briefly review the basic concepts and ideas of three major approaches to the study of child temperament that continue to stimulate research today; Thomas and Chess's approach, Buss and Plomin's approach and Rothbart's approach.

The Thomas and Chess Approach

In the 1960s Alexander Thomas and Stella Chess formulated one of the most popular models of temperament (Strelau, 1998). In the context of their clinical practice, Thomas and Chess observed that children differed in their reactions to identical situations. Moreover they noted that some children, despite being reared in a sensitive and nurturing environment, demonstrated behavioural problems whereas other children who were neglected by their parents did not demonstrate behavioural problems (Kristal, 2005). These observations led them in 1956 to initiate the New York Longitudinal Study (NYLS; Thomas, Chess & Birch, 1959; Chess & Thomas, 1966; Thomas & Chess, 1977) in which they followed individuals from infancy to adulthood. In this study, the

researchers conducted interviews with parents regarding their children's primary reactions in different situations. Patterns were discerned in the children's reaction, which were sorted into 9 categories (Rothbart, 2012; Thomas et al., 1959): activity level, rhythmicity approach/withdrawal, adaptability, sensory threshold, quality of mood, intensity of mood expression, distractibility, and persistence/attention span (Thomas & Chess, 1986). Although there are a multitude of possibilities for combinations of these categories, based on their research, Thomas et al. (1968) identified 3 broad temperament styles that they labeled *easy*, *difficult* and *slow-to-warm-up*. Children categorized with "easy" temperaments (about 40%) tend to be readily adaptive to change, respond positively to new situations and transitions, generally tend to be of positive mood and have regular bodily functions. Children categorized as "difficult" (about 10%) have low adaptability to change and new situations, tend to have a negative mood, intense reactions, low self-regulation skills, and difficulties developing a sleeping and feeding routine. Children who are "slow-to-warm-up" (about 15%) are low in activity and intensity levels; they reject new places, situations and people, and are often described as shy. The remaining 35% were not classified and were a combination of a number of categories (Thomas et al., 1968).

Thomas and Chess also recognized that child behaviour classification based on parent report may be influenced by parental values, cultural views, attitudes and practice. In their theory they introduced the term *goodness-of-fit*, a concept that emphasized the interaction between the child's temperamental characteristics and the caregiver's reactions in explaining child outcomes. That is, psychological development is not exclusively influenced by a child's temperament; it is also, influenced by parental responses and how adequately those responses fit with the child's temperament (Zenter & Bates, 2008).

Following Thomas and Chess' work more temperament theories emerged and research in the field expanded. One of the major approaches that emerged in the field is the Buss and Plomin approach that will be described next.

The Buss and Plomin Approach

Buss and Plomin (1984) defined temperament as "inherited personality traits present in early childhood". This definition emphasizes the two main elements of their theory: the first is that temperament is genetically based and the second is that it must be present early in childhood (during the first 2 years of life). According to their theory, temperament is an essential component of human personality and functions as a basis for personality in later years.

According to this approach, temperament is comprised of individual differences on three dimensions, Emotionality, Activity and Sociability (EAS), that are persistent across time and situations. *Emotionality* refers to how easily a person becomes upset. It ranges from stoic lack of reaction to extreme emotional reactions such as crying or expressions of fear or anger (Buss & Plomin, 1986). *Activity* refers to the levels of activity and energy a person has. It is measured by the rate and magnitude of speech and movement and the duration of energetic behaviour (Buss & Plomin, 1984). *Sociability* refers to the tendency to actively seek the company of other people. The wish to be among other people is an internal preference. People who are more sociable feel rewarded by social interactions and are more upset when they are not present (Buss & Plomin, 1986).

Rothbart's theory also emerged at the beginning of the 1980's. Since the current study uses a tool developed by her, in the following section I will expand my discussion on her approach to temperament.

The Rothbart Developmental Theory of Temperament

Rothbart and her colleagues (Rothbart & Derryberry, 1981; Derryberry & Rothbart, 1984, 1988) proposed a developmental theory of temperament that focuses on the child from a psychobiological point of view. This theory has become popular among temperament researchers due to the fact that it describes developmental changes that occur in temperament.

In the current study, I utilize Rothbart's approach to temperament. My reason for choosing this approach lies in the fact that Rothbart's approach is one of the most

extensively researched. In addition, as is described in the Method section, Rothbart's measure of temperament, the Children's Behaviour Questionnaire, is well validated and widely used among contemporary temperament researchers.

Rothbart's definition of temperament

According to Rothbart, temperament is defined as "constitutionally based individual differences in reactivity and self-regulation, in the domains of affect, activity, and attention" (Rothbart & Bates, 2006, p. 100). To elaborate on the components of the definition, the term "*constitutional*" points to the biological basis of temperament. "*Reactivity"* refers to latency to and intensity of reaction to stimuli as well as time it takes to recover from one's reaction (Rothbart, 2011). In other words, it is a person's threshold for reaction to stimulation; that is, how much stimulation is needed in order to evoke a reaction (Rothbart, 2012) and how quickly one recovers from that reaction. *Self-regulation* refers to processes that regulate reactions to situations. It reflects the tendency to approach or withdraw from a stimulus and the amount of attention directed towards it. It also includes one's ability to control his/her actions and emotions towards the stimulus (Rothbart, 2012). In other words, self regulation enables modulation of automatic, non-deliberative responses to situations or stimulation.

Children's Behaviour Questionnaire

Based on the approach to temperament described above Rothbart et al., (2001) developed a tool aimed at measuring temperament in childhood: the Children's Behaviour Questionnaire (CBQ). The rationale of the researchers for creating a new tool was that previous instruments focused on infants and did not address some of the main elements found in Rothbart's theory that include the central elements of temperament: emotional reaction, arousal and self regulation. The questionnaire includes temperament scales that are derived from Rothbart's theory's central dimensions and were aimed to represent them (Rothbart, 2001; 2011).

The CBQ contains 15 subscales that factor analytic studies have repeatedly shown to cluster into three super-factors. These three broad factors of temperament that emerge over the course of early childhood have been labeled *Surgency/Extraversion, Negative Affectivity* and *Effortful Control.* Surgency/Extraversion includes the scales of

approach, impulsivity, high intensity pleasure (sensation seeking), and activity level plus a negative contribution of shyness. This factor assesses children's tendency to positively approach novel situations or conversely, withdraw from such situations. Children who are shy are likely to score low on this factor. The second factor, *Negative Affectivity*, is defined by the tendency to experience discomfort, fear, anger-frustration, sadness and low soothability. It concerns the tendency for irritability, negative reactions or mood and may be characterized as distress during novel situations. The third factor, *Effortful Control,* includes inhibitory control, attentional focusing, low intensity pleasure and perceptual sensitivity. This factor captures the ability to regulate emotions and attention, to control one's actions and can be generalized as self-control (Rothbart, 2011; Rothbart & Hwang, 2005). The summary of the subscales and the 3 super factors combining them is presented in Table 1.2 .

In the following section I present the rationale for examining the contributions of temperament to a child's teaching abilities.

Table 1.2   Scale Definitions and sample items for the Children's Behaviour Questionnaire

Scale	Definition (sample item)
Factor 1- Surgency/Extraversion	
Activity Level	Level of gross motor activity including rate and extent of locomotion. ("Tend to run, rather than walk from room to room.")
Approach/Positive Anticipation	Amount of excitement and positive anticipation for expected pleasurable activities.("Shows great excitement when opening a present.")
High Intensity Pleasure	Amount of pleasure or enjoyment related to situations involving high stimulus intensity, rate, complexity, novelty and incongruity. ("Likes to go high and fast when pushed on the swing.")
Impulsivity	Speed of response initiation. ("Often rushes into new situations.")
Shyness (negative loading)	Slow or inhibited approach in situations involving novelty or uncertainty. ("Sometimes prefers to watch rather than join other children playing.")
Smiling and Laughter	Amount of positive affect in response to changes in stimulus intensity, rate, complexity, and incongruity. ("Smiles when looking at a picture book.")
Factor 2- Negative affectivity	
Anger/Frustration	Amount of negative affect related to interruption of ongoing tasks or goal blocking. ("Gets angry when told she has to go to bed.")
Discomfort	Amount of negative affect related to sensory qualities of stimulation, including intensity, rate or complexity of light, movement, sound, texture. ("Is bothered by light or color that is too bright.")
Falling Reactivity/Soothability (negative loading)	Rate of recovery from peak distress, excitement, or general arousal. ("Rarely cries for more than a couple of minutes at a time.")
Fear	Amount of negative affect, including unease, worry or nervousness related to anticipated pain or distress and/or potentially threatening situations. ("Is afraid of the dark.")
Sadness	Amount of negative affect and lowered mood and energy related to exposure to suffering, disappointment and object loss. ("Cries sadly when a favorite toy gets lost or broken.")
Factor 3 - Effortful control	
Attentional Focusing	Tendency to maintain attentional focus upon task-related channels. ("When drawing or coloring in a book, shows strong concentration.")
Inhibitory Control	The capacity to plan and to suppress inappropriate approach responses under instructions or in novel or uncertain situations. ("Can easily stop an activity when s/he is told 'no.'")
Low Intensity Pleasure	Amount of pleasure or enjoyment related to situations involving low stimulus intensity, rate, complexity, novelty and incongruity. ("Enjoys sitting on parent's lap.")
Perceptual Sensitivity	Detection of slight, low-intensity stimuli from the external environment. ("Notices even little specks of dirt in objects.")

(Source: Rothbart, 2011, p. 51-52)

1.5. **Temperament and Teaching**

The argument that temperament is important to teaching is supported by research showing that adults characterized by greater temperamental self-regulation (e.g., higher in restraint, lower in activity level, and lower in sociability) were more likely to keep their students on task and to stay instructionally focused than were less temperamentally regulated adults (Osborne, 1985).

A search of the literature revealed no research on links between temperament and teaching in childhood. However, a study conducted by Davis-Unger and Carlson (2008a), examined the association between teaching skills and executive functioning. The authors defined executive functioning as a combination of skills that function as monitors and controllers of thought and actions and include: inhibitory control, attention, working memory, planning cognitive flexibility, error detection and correction. Findings indicated that executive functioning was a strong predictor of children's ability to teach. These finding are relevant since some of the qualities that define executive functioning are also considered temperamental tendencies including: inhibitory control, the ability to sustain attention and flexibility.

In addition, the extensive research on links between temperament and social functioning (e.g., Eisenberg et al., 1993; Fabes et al., 1999) suggests a connection between temperament and teaching. For example, Fabes et al. (1999) examined the relations between children's self-regulation, measured by Effortful Control, and the quality of their everyday social interaction with their peers. Results indicated that children rated high in self-regulation were less likely to experience negative emotions during peer interactions. In addition, findings showed that during intense or stressful peer interactions, children who were higher in self-regulation, tended to respond in a more socially competent manner. These results indicate that temperamental self-regulatory skills contributed to children's social abilities, especially during stressful social situations. Teaching is a social interaction between two individuals, thus the child-teacher is required to respond in a certain manner to his/her student in order for the teaching

interaction to be successful. In addition, since the child-teacher is required to complete a task while teaching this interaction may be more stressful than a conventional social interaction for a child. For this reason the results of the study are relevant for the current study.

Eisenberg et al.'s (1993) study was aimed at examining the contributions of preschool children's emotionality and self-regulation tendencies to their social skills. Findings showed that boys' regulation skills (coping and attentional control) were positively related to their social skills; that is, boys who demonstrated better regulation abilities also had better social skills. Boys with higher negative affect showed lower scores in their social skills. Acting out, difficulty with regulating emotions and emotional intensity were negatively related to children's social skills. Even though this study examined social skills and peer status the finding are relevant for this review as children's ability to connect to a peer is important to maintain a teaching situation and children who lack social abilities may be also hesitant while teaching other individuals.

Research has also been conducted on the links between peer relationships and temperament. Findings mainly focus on the association between temperamental inhibition and social withdrawal (e.g., Burgess, Rubin, Cheah, & Nelson, 2001). Pérez-Edgar and her colleagues (2011), for example, conducted a study that examined the relation between early temperamental behavioural inhibition and levels of social withdrawal at age 5 years. The researchers collected data on 5 year-olds using lab observations, task performance and temperament questionnaires. They found a strong correlation between behavioural inhibition that was measured at age 24 and 36 months and social withdrawal. Findings such as these are relevant for the current study inasmuch as children who lack social abilities or who demonstrate difficulties in social situations might also demonstrate the same difficulties in a teaching situation. For example, children with inhibited temperaments who tend to withdraw from social situations might demonstrate the same tendency in a teaching situation, being hesitant to engage with their tutees in order to teach them. In addition, children who show difficulties regulating their behaviours in social situations might also struggle in a teaching situation. For instance, a child might struggle with the requirement of sitting still

and explaining to another child or show difficulties sharing a toy with another child, acts that require the ability to self regulate.

Children with different temperamental dispositions will likely respond differently to a teaching situation and that might affect their ability to teach. For example, teaching demands the child observe the student's behaviour and provide guidance or advice, actions that require a certain level of attention. Hence, it is hypothesized that more successful teaching will be related to the ability to sustain attention. As another example, learning is not always immediate and therefore children who get frustrated easily might find it difficult to teach if their student demonstrates difficulties understanding. Impulsive children might also struggle in a teaching situation as teaching requires patience and allowing the other child sufficient time to think things through before providing the answer. And finally, positive affect and the tendency to smile and create a good atmosphere may also be an important component in a teaching situation.

In summary, based on previous research on temperament and social and peer relations, and due to the social characteristics of the teaching situation, it is predicted that connections will be found between teaching and various dimensions of temperament. For the purpose of this study, only 5 scales of the CBQ (Rothbart, 2001) were of interest based on their conceptual links to teaching ability. Following is a description of the scales and the rationale for choosing those.

Attentional focusing is a scale that reflects on the child's ability to stay focused on task and sustain attention, qualities that are important for a teaching situation as the teacher needs to be focused both on the content taught and pay attention to the student. It is also related to executive function which has already been shown to relate to teaching ability. *Impulsivity* is a scale that measures the speed that a child initiates a response to situations. Children who are highly impulsive tend to have quick reactions to situations before dedicating thought to their immediate response. The ability to suppress reactions and think about suitable ones seems to be an important ability for effective teachers as they need to constantly respond to the student and to be able to hold their immediate responses. For example not to stop an activity if the learner makes a mistake, instead, the teacher should better explain to the learner patiently what needs to be

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done. *Shyness* refers to the level of comfort around other people. Children who are shy tend to have a slow or inhibited approach to social situations. Since teaching is a social process that involves interaction with another person, it seems relevant to assess how a child tends to react during social situations and how that might influence the child's ability to teach. For example if a child tends to be silent during a social interaction that may influence the ability to instruct someone. *Activity level* refers to the levels of gross motor activity and movement. Children who have high activity levels demonstrate difficulties sitting for long period of times. Since teaching often involves a requirement to sit still and concentrate in a task, high levels of activity may influence children's ability to maintain a teaching situation effectively. Finally, *inhibitory control* is the ability to plan responses and suppress inappropriate responses. Since a main factor in teaching is reactions to a student, the ability to control one's reactions seems relevant for this study.

1.6. **Defining the Research Question and Hypotheses**

The overarching question of the current study is: What are characteristics of a good child teacher?

Following Strauss and Ziv (2012) who define teaching as a natural cognitive ability, and due to the facts that teaching takes place during social interactions between individuals and requires social and emotional abilities, the specific research questions for this study can be divided into two broad domains: cognitive and socio-emotional.

Cognitive domain

Teaching requires the child have the cognitive ability to understand the tutee's mind, an ability that is reflected in the development of the ToM. Evidence for a connection between ToM and teaching has already been found in a few previous studies (e.g., Strauss et al., 2002). My aim is to replicate these findings.

Extending previous studies that examined only one level of ToM, in the current study I will examine more than one level of ToM to test whether children's teaching skills improve when children possess higher levels of ToM

It is hypnotized that:

Children who succeed on a classic false belief ToM task will demonstrate more advanced teaching skills than those who do not succeed on this task.

Among children who have basic false belief understanding, more advanced ToM skills (awareness of emotions and ability to coordinate perspectives) will be positively associated with more advanced teaching skills.

Socio-emotional domain

Temperament influences the child's social and emotional tendencies in response to external situations. Taken together, the social nature of teaching and previous findings on links between temperament and peer relationships, suggest that similar links would be found between teaching and temperament. The specific dimensions of temperament that seem especially relevant for teaching include: attention, shyness, activity level, impulsivity, and inhibitory control

It is hypnotized that:

Shyness, activity level and impulsivity will be negatively correlated with teaching ability.

Attentional focusing and inhibitory control will be positively correlated with teaching ability.

Finally it is hypothesized that Temperament and ToM will make significant and independent contributions to the prediction of teaching ability.

Chapter 2.   **Method**

2.1. **Participants**

Participants included 52 typically developing children (24 females, 28 males) ranging in age from 31 to 61 months (M=47.27, SD=6.98) recruited from preschools around Metro Vancouver, Canada. Only children whose parents signed and returned the consent form were included in the study. Descriptive information on the socio-demographic characteristics of participants can be found in Table 5.1.

2.2. **Procedure**

Following approval from the University Office of Research Ethics, directors of preschools were contacted and provided with information about the study. With their permission, information packages were provided to the educators. These packages included detailed information about the study and what it required of educators. With educators' permission, packages containing study information, informed consent forms (see Appendix A), and questionnaires (see Measures below) were distributed to children in the centre to take home to their parents The information sheet described the purpose of the study and nature of children's involvement. Parents were informed that there would be no consequences for them or their child should they elect to have their child not participate. Moreover, they were informed that even if they did give permission for their child's involvement, they and their child could opt out of the study at any time without consequences. Parents were asked to return completed consent forms and questionnaires in a sealed envelope to their child's teacher.

Data from the children were collected during regular hours of the child care centres in accordance with teachers' and centres' schedules. Parents were invited to

attend the session with their child but none chose to do so. Each child was individually

tested on three occasions. In the first session, lasting 15 to 20 minutes, the child's

language ability was assessed. In the second session, lasting 15 to 20 minutes, children

completed the unexpected content false belief test and the first teaching task. In the

third session, lasting 15 to 20 minutes, children were first tested using the belief desire

reasoning false belief task and then completed the second teaching task.

For coding purposes children were videotaped by a stationary camera on a tripod

while participating in the described study tasks. If children demonstrated interest in the

camera, the investigator explained its purpose to them. The recordings were only

available to the study team for coding purposes.

2.3. **Measures**

2.3.1. **Theory of Mind Ability**

The unexpected-contents task

Following procedures developed by Perner et al. (1987), children were presented

with a familiar box that contained an unexpected item (a crayon box containing a small

doll). While the box was still closed the child was asked, "What do you think is inside the

box?" After the child answered, the box was opened and the child found the unusual

item. The child was then asked, "What is inside the box?" After answering correctly, the

box was closed and the child was asked, "Before you looked inside, what did you think

was in the box?'' and "What is really inside the box?" Next, the child was asked what

their teacher, who had not seen inside the box, would think was inside it before it was

opened: "What would (*name of the teacher)* think is in the box if she entered the room?"

As well, a second control question was asked, "What is in the box really?'' Children

passed the test if they answered all questions correctly. Responses were coded

dichotomously, 1 for passing and 0 for not passing. Inter-rater reliability was calculated

on 30% of the tests. Raters achieved perfect (100%) agreement on the scores. The

remainder of questions were scored by the author.

Change-of-location false-belief task

This task is based on Wimmer and Perner's (1983) standard procedure for a change of location false belief story. Two puppets named Max and Sally were used to enact the story. In this story, Max puts an object (a ball) in a specific place (cupboard) and goes away. While Max is away Sally moves the object to a new place (a box). Then Max returns and the child is asked the test question: "Where will Max look for the ball?" If the child does not respond a prompt is given: "Will Max look in the cupboard or in the box?" Control questions are asked to ensure the child remembered where Max left the object: "Where was the ball first of all?" and where it was moved to: "Where is the ball really?" Children were rated as successful on this task only if they responded correctly to the test question and both control questions. Responses were coded dichotomously with 1 for passing and 0 for not passing. Inter-rater reliability was assessed on 30% of the tests. Two raters watched a video of the tests and scored them independently. Perfect (100%) agreement was achieved. The remainder of questions were scored by the author.

Belief-desire reasoning task

This task is based on Harris et al. (1989) procedure in which children are told a story involving two puppets (Larry Lion and Chris Crocodile), a miniature Coke can, and a miniature milk carton according to the following script:

"This is a story about two friends, Chris the Crocodile and Larry the Lion. Chris is a very naughty crocodile, and likes to play tricks on his friend Larry. Now, Larry really likes Coke, mmmm. In fact it is his very favorite drink. Look! Here is Larry's can of Coke. (Q1: How does Larry feel when he gets a can of Coke?). Larry doesn't like any other drinks though and he really doesn't like milk, yuck, yuck. Look here's some milk. (Q2: How does Larry feel when he gets some milk?). One day, Larry went out for a walk, and naughty Chris decided to play a trick on his friend Larry. He poured out the coke `` Pssshhhh!'' and instead he poured in some milk `"glug - glug - glug ". Then he put the milk away, and went outside to watch Larry through the window. Now when Larry comes back from his walk, he's really thirsty. He can see the can on the table, but he can't see what's inside the can. (Q3: When Larry first comes back from his walk, how does he feel,

happy or not happy? Q4: Why does he feel happy? Q5: What does Larry think is in the can? Q6: What's in the can really? Q7: How does Larry feel after he's had a drink, happy or not happy? Q8: Why is he not happy?)" (Hughes et al., 2000, p. 489).

The task includes two emotion contingency questions as a comprehension check (Q1 and Q2), and the task is discontinued if the child fails either question. (None of the children in this study failed in their answer to these questions.) The main part of the story includes two types of test questions: *false-belief prediction* and *emotion-inference* based on the attributed false belief. Responses to all questions were scored dichotomously; 0 was given if the child provided an incorrect answer and 1 was given if the child's answer was correct. Children were scored 1 on Q5 only if they also responded correctly to Q6. Overall scores were computed by summing across questions 3, 4, 5, 7, and 8.

Inter-rater reliability was assessed on 30% of the tests. Two raters watched a video of the tests independently, scored the responses and achieved perfect (100%) agreement. The remainder of questions were scored by the author.

2.3.2. **Teaching Ability**

Children's teaching ability was assessed with two tasks. The first task was developed for this study and was intended to assess very basic teaching skills. The second task was more complex and required the child to demonstrate more advanced teaching and comprehension abilities.

Teaching task I – stacking cups

The examiner sat with the child by a table, showed the child a set of 7 stacking cups and said: "*Let's play with the cups together.*" After the examiner judged rapport had been established with the child, the examiner asked the child: "*Have you played with these cups before?*" and then said, "*Let me show you how I play with them.*" She then demonstrated to the child how to arrange the cups, stacking them on top of each other according to descending size, with the largest cup at the base of the stack, the smallest on top and putting a doll on top of the stack (see photo of the game in Appendix B).

Next, she asked the child to try the game to make sure the child understood how to do it correctly.

The experimenter then got up to leave the room. As she prepared to leave, she told the child that she would be right back and that while she was out her helper would come in. The helper arrived and was introduced to the child. Before leaving the room, the experimenter asked the child to please teach the helper how to properly play with the cups.

While the experimenter was gone the helper, a research assistant, followed this protocol:

1. The research assistant makes a direct request to be taught: *"I was told I can play with these cups. Can you teach me what I'm supposed to do?"*
2. After the child responds to the request for teaching, the research assistant demonstrates a physical cue of confusion by grabbing the cups and feigning inability to separate them*.*
3. The research assistant adds a verbal cue: *"What do I do with the doll?"*
4. The research assistant makes a successful move putting the largest cup at the base of the stack.
5. The research assistant makes a mistake stacking cups in incorrect order.

The child's responses to each of the research assistant's cues were scored according to the following categories: (a) no response; (b) acknowledges but does not act; (c) shows the research assistant what to do; (d) verbally explains what to do; and (e) shows the research assistant what to do and explains (see full coding instructions Appendix C). Inter-rater reliability was assessed on 34% of the tasks. The principal investigator and the research assistant first watched 5 "practice" tasks together while the experimenter explained the coding system to the research assistant. Following training, the experimenter and research assistant each separately coded 15 tests. The percent agreement over all of the task's categories was 82.67%. Cohen's kappa was computed for each separate response category. Three of the scores were acceptable with K>.70 (see Table 5.2). In cases where an agreement between the judges was not reached during the inter-rater reliability coding the disagreement was calculated as disagreement

for the purpose of the reliability test, but later the coders revaluated the test together until an agreement was reached and what they agreed on was the data used for the general analysis. The remainder of questions were scored by the author.

Teaching task II – board game

Teaching ability was also assessed with the teaching task procedure described by Davis-Unger and Carlson (2008), which was an adaptation of the method developed by Strauss et al. (2002). For this task children were taught an age-appropriate board game.

The game contains a rectangular board representing a circular road with arrows pointing in a counter clockwise direction. Each player received a toy flower pot with a flower stem designed to hold differently coloured flowers. Materials also included a plastic car and a die with six sides: a red, yellow, and orange flower; a happy face, a sad face, and a wild flower. Along the inside of the road, six flowers in 3 colours repeated twice, interspersed around the road are affixed with Velcro (see photo of the game in Appendix B).

The goal of the game is to obtain all three colours of flowers for one's own flower stem by dumping the dice out of the car and matching it with the flower next to the car. See appendix D for complete instructions.

Procedure:

The experimenter taught children the rules of the board game according to a standardized verbal script and demonstration (see Appendix D).

Following the instructions, children took a practice turn and were asked questions about each of the 8 rules as a check of their understanding about how to play the game. If children responded incorrectly, the experimenter repeated the check of rules up to four times. If children still answered incorrectly, the examiner and the child continued to a practice turn where the examiner made sure the rules were clear. Most children answered correctly after the first or second time they were asked and all children demonstrated a sufficient understanding of the game to continue the procedure.

The experimenter then played the game with the child until either the child had made one match (the colour of the flower on the board matched the colour of the flower on the dice) or 3 minutes had elapsed. If, at any point during the game, children demonstrated they did not understand how to play the game, the experimenter provided a verbal correction.

The experimenter then told the child she had to leave to do some work and asked the child to teach a research assistant how to play the game. The confederate research assistant entered the room and the child proceeded to teach the confederate how to play the game.

Scoring

Teaching phase variables. During the teaching phase in which the child taught the confederate, the total number of rules out of 8 described by the child to the confederate and the total time spent teaching were recorded. Children's rule descriptions were coded according to the following categories:

Verbal explanation – description of a rule not accompanied by additional demonstration.
Verbal explanation with demonstration - description of a rule combined with gestures,
    e.g., explaining while pointing to items on the game board, moving the truck.
Checking in - statements conveying the child was testing whether the confederate
    understood the game, e.g., "Do you remember?"
Supplementary teaching - instances in which children explained and/or demonstrated a
    rule more than once, e.g., multiple statements of one rule.

The number of instances of each coding category was recorded. The teaching phase was considered complete when children uttered statements such as "I'll go first," or "Let's play now."

Play phase variables. During game play, the confederate committed three explicit pre-determined errors in random order: moving the car in the wrong direction on the track, taking a flower when the colours did not match, and stopping where a flower had already been taken. Recognition of an error was operationally defined as an utterance

and/or behaviour that indicated the child was aware the confederate had made a mistake. Following Davis-Unger and Carlson's (2008) original procedure, the number of mistakes was recorded and converted to the percentage of errors recognized out of three.

Children's responses during the play phase were coded according to a nearly identical scheme used in the teaching phase with the exception of rule reminders replacing the coding category of checking in. Rule reminders included an utterance and/or demonstration by which the child prompted the confederate to recall rules of the game. See Table 5.3 for a summary of coding categories.

A sum of the instances of each coding category (verbal explanation, verbal explanation with demonstration, supplementary teaching, and rule reminders) formed the play phase summary variable.

Reflection on teaching score. After completing the game, children were asked by the confederate examiner:

a. "*How did you teach me how to play the game*?" Children's responses were coded according to the following categories: (i) simply restating the rules they taught to the confederate learner – 1 point; (ii) using variants of the terms "taught," "told," or "explained" to describe how they taught the confederate learner – 2 points; and (iii) making statements indicating reflection on teaching for, example, "she taught me and then I taught you and then you learned how to play the game"– 3 points.

b. "*How do you know that I learned how to play the game?*" Responses were coded according to the following categories: (i) children made reference to their own teaching as evidence that learning occurred (i.e., stating that they taught, told, showed, or explained) – 1 point; or (ii) children referred to the actions of the confederate learner as a marker of learning - 2 points. Table 5.4 summarizes the Reflection on teaching scoring.

Inter-rater reliability was calculated for 30% of the tests using the same procedure as for the first teaching task. Raters reached 100% agreement on the "total

time teaching" scores and the number of mistakes recognized; there was 98.6% agreement on the number of rules taught. Correlations between the raters' scoring were computed to examine agreement on: total number instances of different strategies taught: $r(13) = .82$, $p < .01$. ; verbal explanation: $r(13) = .94$, $p < .01$, Verbal explanation with demonstration: $r(13) = .90$, $p < .01$, Supplementary teaching: $r(13) = .88$, $p < .01$, rule reminders: (not applicable) and finally, total number of actions: $r(13) = .94$, $p < .01$.

2.3.3. **Temperament**

Children's behaviour questionnaire

Child temperament was assessed with the short version of the Children's Behaviour Questionnaire (CBQ; Putnam & Rothbart, 2006) (see Appendix), a 94-item parent report measure of temperament of children aged 3-8 years. The 94 items assess 15 dimensions of temperament. Parents were asked to rate their child's behaviours on 7-point Likert scales, ranging from 1 (*extremely untrue of your child*) to 7 (*extremely true of your child*). Parents were also provided with the option to mark "not applicable" if the child had not been observed in the described situation. For the purpose of this study only 5 temperament scales were of interest based on their conceptual links to teaching ability: Attention, Shyness, Activity level, Impulsivity and Inhibitory control. All scales contain 6 items except Activity level, which has 7 items. Internal consistency (alpha) was acceptable for each scale in the current sample (see Table 5.5).

2.3.4. **Language Ability**

Receptive vocabulary test - Peabody Picture Vocabulary test, Forth Edition (PPVT4)

Based on findings that children's false belief understanding is related to language ability (see Milligan, Astington, & Dack, 2007), children's language ability was controlled in this study. The language measure used for this purpose was the Peabody Picture Vocabulary test, Fourth Edition (PPVT4; Dunn & Dunn, 2007), a well-established measure of receptive vocabulary.

Table 5.7 summarizes the tests and scores used for this study.

Chapter 3. **Results**

3.1. **Data accuracy**

Prior to data analysis, the accuracy of coding and data entry were checked by randomly sampling the original paper files and comparing them to the electronic data file. No errors were found. Next, means, standard deviations and minimum-maximum values for all variables were examined to make sure all values were within range, were plausible and the codes for missing data were programmed correctly (Tabachnick & Fidell, 2007).

3.2. **Missing data**

A missing data analysis was conducted for the CBQ temperament scales for items not completed or if parents responded to the item as "not applicable." In the Inhibitory control scale less than 5% of the data were missing; in the activity level, attention and shyness scales 5.8% of the data were missing and in the impulsivity scale 15.4% of the data were missing. Little's MCAR test for these scales produced a chi-square = 22.50 (*df* =24, *p*=.55) indicating data were missing at random (Tabachnick & Fidell, 2007). Missing temperament items were replaced with individual respondent's mean scores from the remaining items comprising the scale rather than the group mean in order to avoid problems associated with the latter approach (see Tabachnick & Fidell, 2007).

On the first teaching task a relatively high percentage of data were missing (13.46% of all teaching task 1 variables). Data were missing for a few reasons. In some instances the researcher was not able to collect information during the test due to unexpected dynamics with a child, for example if a child invented a new way to play with the cups than the one first learned and taught it the wrong way. In other instances

children left the childcare centre prior to data collection and in others children stated explicitly that they refused to teach. For each child who participated in this task, a teaching summary score, based on the number of tasks for which they could be scored, was computed (Teaching 1 total score). This score was divided by the maximum possible total score based on the number of tasks the child completed, and a percent summary score was calculated. This allowed all participants to have comparably scaled scores even if items were missing.

All other missing data in the study were left as missing.

3.3. **Preliminary analyses**

3.3.1. **Reduction of board game teaching data**

To reduce the board game teaching data, first, five of the variables were transformed to standard z-scores. These included: average number of strategies used in the teaching phase per rule; percent of number of rules taught (out of 8); total time of teaching in seconds; percent of errors recognized (out of 3); and the average number of strategies in the play phase. Next two teaching summary scores were created. The teaching phase total score was the sum of the z-scores of: Average number of strategies used in the teaching phase per rule, percent number of rules taught and total time teaching. The play phase total score was the sum of the z-scores of percent of errors recognized and average number of strategies in the play phase.

3.3.2. **Descriptive statistics**

Descriptive statistics for all continuous variables can be found in Table 5.8.

The distributions of children's responses to the "Reflection on Teaching" metacognitive questions are presented in Table 5.9 and Table 5.10. Most children re-described the game process when asked the first reflection question. Most children's responses did not fit any of the categories, that is, their answers did not demonstrate any

metacognitive reference or they did not respond at all when asked the second reflection question.

3.3.3.   **Associations with age**

Since previous studies show positive association between teaching skills and age, and ToM and age, a Pearson correlation analysis was conducted to examine these associations. As can be seen in Table 5.11, 6 of the 8 teaching variables were statically detectably and positively associated with age, indicating that teaching improves with age. Further, age was positively correlated with the unexpected content false belief task: $r(45) = .41$, $p < .001$; change of location task: $r(45) = .46$, $p < .001$; and belief-desire reasoning task (ToM3): $r(46) = .47$, $p < .001$.

Table 5.12 presents the percentage of children who passed the ToM false belief tasks, unexpected content (ToM1) and change of location (ToM2), according to their age group. As seen in the table, for both tasks the percentage of children passing tended to increase with age with the exception of the unexpected content test for which passing rates remained relatively stable across the middle and oldest age groups. An age by test outcome (pass/fail) chi square was not statistically detectable for the unexpected content test ($X^2 (2) = 4.59$, $p=.10$) but was for the change of location task ($X^2 (2)=7.53$, $p=.02$).

Table 5.13 presents the percentage of children in each age group passing specific items on the belief desire reasoning test (ToM3) as well as the mean ToM3 score for each age group. As seen in the table, more children tended to pass the questions as age increased and the summary score was higher as children were older. A one-way ANOVA revealed a statistically detectable differences among age groups in the belief-desire reasoning task summary score, $F (2, 45) =5.97$, $p=.005$. Post hoc comparisons using the Tukey HSD test indicated that the belief desire reasoning test mean score for the 31-43 months age group was detectably lower than the 51-60 months age group, and the mean score for the 44-50 months age group was detectably lower than the 51-60 months age group. However, the 31-43 months age group did not statistically differ from the 44-50 months age group.

3.3.4. **Study variables as a function of sex**

A multivariate analysis of variance (MANOVA) was calculated to investigate mean differences in teaching scores between boys and girls. This analysis did not reveal a statistically detectable multivariate main effect for sex (*Wilk's* Λ = .59, $F(1,40)$ =1.55, p= .17 partial $\eta2$ = .41)

A chi-square test of independence was calculated to examine the association between gender and passing the ToM tests. Results for the unexpected content (ToM1) task were not statistically detectable ($X^2(1)$ = .79, p=.55) indicating no difference between boys' and girls' rates of success on this task. For the change of location test, a statistically significant effect was found ($X^2(1)$ = 8.93, p<.001) indicating that more girls passed the test than boys. The frequencies are presented in Table 5.15

A one-way analysis of variance (ANOVA) was conducted to examine if performance on the belief desire reasoning task (ToM3) differed between boys and girls. The analysis did not reveal a detectable difference, $F(1, 46)$ = .00, p = .98 (r=.00, d=.01).

A MANOVA was also calculated to investigate mean differences on the Temperament scales between sexes. This analysis did not reveal a detectable multivariate main effect for sex (*Wilk's* Λ = .97, $F(1,51)$ =.24, p .94 partial $\eta2$ = .03). As presented in Table 5.14, univariate tests revealed no significant differences between boys and girls.

An ANOVA was conducted to examine if language skills were different between boys and girls. The analysis revealed a non-detectable difference, $F(1, 47)$ = .96, p = .33 (r=.14, d=.29).

3.3.5.   Associations with language ability

Based on previous findings of a positive association between ToM and language ability and the possibility that language ability is related to teaching ability, a Pearson correlation analysis was conducted to examine these associations. As can be seen in

Table 5.16 language scores were positively correlated with the belief-desire reasoning task (ToM3). In addition, 2 of the 8 teaching variables (% of errors recognized and Teach1 total score) were statically detectably and positively associated with language, suggesting that teaching improves with better language skills,

3.3.6.   Associations between ToM and temperament

Since previous studies reported associations between ToM abilities and Temperament, a Pearson correlation analysis was conducted to examine these associations. As seen in

Table 5.17 no correlations were statistically detectable.

3.4. Research hypotheses

3.4.1.   Association between Theory of Mind and teaching abilities

A MANOVA was computed to examine differences in teaching abilities between children who passed and failed the unexpected content and change of location tasks. A statistically detectable difference was not found between groups on either task: (unexpected content) $F(7, 35) = .52$, $p = .81$; *Wilk's Λ* = .91, partial $\eta2 = .10$; (change of location) $F(7, 35) = 1.14$, $p = .36$; *Wilk's Λ* = .82, partial $\eta2 = .19$.

A Pearson correlation analysis was conducted between the belief desire reasoning test scores and teaching scores as presented in Table 5.18. Several teaching variables were found to statistically detectably and positively correlate with the ToM3

task, including: teaching phase total score, percent of rules taught, average number of strategies per rule, average number of strategies in the play phase and percent of errors recognized. Given the association of age with both ToM3 and teaching, partial correlations controlling for age were also computed. With age controlled, all correlations between ToM3 and teaching were not statistically detectably different from zero with the exception of the association between ToM3 and errors recognized (also see Table 5.18).

3.4.2.   **Associations between temperament and teaching abilities**

A Pearson correlation analysis was conducted to examine the associations between dimensions of temperament and teaching. As seen in Table 5.19, activity level and attention statistically detectably correlated with the play phase total score and the percent of errors recognized, with lower activity level and greater attention being associated with better teaching. Inhibitory control also statistically detectably correlated with percent of errors recognized with children who scored higher on Inhibitory control tending to recognize more errors.

3.5. **The relative contributions of temperament and belief desire reasoning task to teaching ability**

To assess the relative contributions of temperament and theory of mind to teaching ability, regressions were computed. Percent of errors recognized was chosen as the outcome as it was the teaching variable that most consistently correlated with both ToM and temperament. The independent variables most strongly associated with teaching – attention, activity level and the belief desire reasoning task – were chosen as the predictors.

Given that teaching performance and the belief-desire reasoning task were both correlated with age and language ability, age and language were controlled by entering them on Step 1. The two temperament variables (attention and activity level) and the belief-desire reasoning task were entered on Step 2.

At Step 1, age and language ability were statistically detectable predictors of the percent of errors recognized. On Step 2, the temperament variables and the belief desire reasoning task made a statistically detectable contribution to the prediction of percent of errors recognized, beyond the effects of age and language (see Table 5.20 and Table 5.21). The full model explained 44.2% of the variance in the percent of errors recognized. Within the full model, the only statistically detectable predictor of the percent of errors recognized was the temperament dimension of attention (ß=8.293, p=.039).

Chapter 4.   **Discussion**

For many years, peer tutoring has been a well-established and commonly used method in educational settings. Studies have repeatedly demonstrated the effectiveness of the method in promoting academic skills in various populations. However, even though the practice of children teaching one another has been common in early childhood settings, studies on teaching abilities in the early childhood years are scant.

The primary aim of the current study was to examine the association of ToM and Temperament to teaching abilities in early childhood. Age related changes in teaching ability and ToM during the early childhood years were also addressed and these findings are discussed first.

4.1. **Age Influences**

4.1.1.   **The development of teaching**

Consistent with the work of others (e.g. Davis-Unger & Carlson, 2008b; Ronfard & Corriveau, 2016; Verba, 1998), findings from this study indicated that teaching skills improved with age. All three summary scores from the two teaching tasks were positively correlated with age, indicating a general trend of improvement in teaching between the ages of 3 and 5 years.

An interesting observation made in this study was that regardless of their performance on the teaching tasks, all but two children were willing to participate in the teaching tasks and were motivated to teach the confederate learner. Even the youngest children in the sample made a real attempt to teach the games when they were asked, despite their teaching skills being less developed than those of older children. The fact that children had teaching intentions and a desire to teach may provide an indication of

teaching skill that is still in its early stages. This observation was reminiscent of findings reported by Verba (1994) on toddlers who showed sensitivities to their peers' difficulties and children aged 3-4 years who deliberately taught others.

4.1.2.   **The development of Theory of Mind**

In the current study children's theory of mind was evaluated with three tests: "the unexpected content", "change-of-location", and "belief desire reasoning" tasks. The first two tasks were aimed at assessing the basic level of false belief understanding, and the third task was intended to evaluate a more advanced form of ToM understanding that includes awareness of the impact of beliefs and desires on emotions. As anticipated and in concurrence with previous studies (e.g., Wellman et al., 2001), the percentage of children who passed the change of location test increased with age. The results also demonstrated a sharp increase in the percentage of children passing among the 44-50 months age group in relation to the 31-43 months age group, and a smaller increase among the 51-61 months age group. These results indicate that the age the majority of the sample passed the test in the current study is slightly younger than most other studies report. While most studies report that the majority passed around the age of 5 (Callaghan et al., 2005), in the current study the majority of the sample passed around the age of 4. Performance on the unexpected content task also increased with age, with a sharp increase among the 44-50 months age group. However, the percentage of children passing the test between 51-61 months remained relatively stable in relation to the 44-50 months age group. The relatively young age of children who passed these tests in this sample may be due to the fact that the children in this study had highly educated parents and attended quality childcare facilities. Links between family background, such as parents' education and occupation, and children's false belief understanding have been reported by Cutting and Dunn (1999) who found that higher levels of parental education and SES were associated with children's more advanced ToM.

The majority of the sample in the present study did not pass the unexpected content task. All the children who passed the unexpected content task also passed the change of location task, but children who passed the change of location task did not

necessarily pass the unexpected content task. This indicates that the change of location test was easier for children than the unexpected content task. These results raise questions regarding the reasons why the unexpected content test was more difficult than the change of location task for most children. The two tests differ in that the change-of-location task examines a child's understanding of another person's false belief while the unexpected-content task requires children to demonstrate that their own beliefs could be wrong (Hogrefe et al., 1986; Perner et al., 1986). Perhaps because of this requirement for self-reflection the unexpected content task was more difficult for children. Another possible explanation is that the unexpected content test requires children to demonstrate more abstract thinking than the change of location test. Children were asked what was inside the crayon box and then were further asked what their teacher would have answered to the same question had s/he been in the room. Answering this question may be a complex task for younger children, as it requires them to imagine the answer of someone who is not actually present. In the change of location test the children were asked about the thoughts of characters (dolls) that were physically in front of them. It appears that the concrete visual cue provided by the presence of the dolls may make the task easier for the children. In future studies, it would be interesting to examine whether children perform better when the person whose response the child is supposed to predict is actually present in the room.

In general, the literature on false belief tasks refers to the unexpected content and change of location tasks as tests that measure the same skill -- false belief understanding, and, children are usually reported to perform similarly on both tasks (Doherty, 2009). The discrepancy with the results of the present study is difficult to explain. It is suggested that future studies compare performance on these tests while examining different factors that may influence passing rates.

As expected, results of the present study regarding the belief-desire reasoning task also demonstrated an increase with age, indicating that as children got older, they performed better on the test.

4.2. **Research Hypotheses**

4.2.1. **The contributions of Theory of Mind to teaching abilities**

It was hypothesized that children who succeeded on the false belief ToM tasks would demonstrate more advanced teaching skills than those who did not pass these tasks. Findings from the current study did not support this hypothesis as no differences in teaching skills were found between children who passed the two basic false belief tasks (the unexpected content and change of location) and those who did not. However, statistically detectable correlations between the advanced ToM task and teaching scores were found, indicating that higher scores on the belief-desire reasoning task corresponded to higher scores on teaching the game prior to actually playing it. More specifically, during the teaching phase of the game, children who performed better at the belief-desire reasoning task taught more rules of the game, and used more teaching strategies to do so than children who did not perform well on the test. During the play phase, while children were playing the game with the confederate learner, children who performed better on the belief-desire reasoning task also used more teaching strategies and were better able to detect the mistakes that the learner made than children who performed less well on the belief-desire reasoning task .

These findings do not necessarily indicate that false belief is unrelated to teaching as in order to perform well on the belief-desire reasoning task test, a child must have false belief understanding; that is, children need to realize that a different person may carry different beliefs than their own. Basic false belief understanding is actually evaluated in one of the test's questions ("What does Larry think is in the can?") and in fact, in the current study the majority of children who did not pass the change of location test also failed the false belief question in the belief desire test. Therefore, it is suggested that false belief understanding is necessary, but not sufficient, for teaching. That is, basic ToM is necessary for advanced ToM and advanced ToM is associated with better teaching. It appears that the additional component of understanding others' emotions that is assessed by the advanced ToM task contributes to teaching competence.

Recognition of the learners errors was also related to performance on the belief-desire reasoning task, and while recognition of mistakes does not indicate the teacher's behaviour in response to the recognition it does indicate attention to the tutee and his or her behaviour, expressions and understanding of the game. That is, the child-teacher's recognition of a mistake made by the learner indicates that the child-teacher was attentive to his/her learner and noticed the moves she was making. After noticing mistakes, the child-teacher usually made a move aimed to correct the mistake and promote learning; however, despite observing these adjustments, were not coded, as they were not part of the coding scheme adapted for use in this study. It is suggested that future studies examine teaching behaviours following recognition of a student's mistakes as they may provide further information about how children adjust their teaching to their learner. Indeed, Ronfard and Corriveau (2016), who examined preschoolers in a teaching situation, found that children infer their student's learning from the student's mistake. Moreover, their study also found that, following a mistake, children tended to use more explicit teaching strategies, such as providing information for the learner about the mistake and what should actually be done.

The findings of the present study are consistent with those reported by other researchers who used different procedures and assessment tools than were used herein. For example, Strauss et al (2002) reported that developmental changes in ToM were related to changes in children's teaching. Their study method required children to teach a peer rather than an adult confederate and the tools they used to assess teaching were different from those used in the current study. Davis-Unger and Carlson (2008b) also found a connection between ToM and teaching. The second teaching task used in the current study was based on the tool used by these researchers, however they used different tools to examine false belief understanding, and their study was conducted in a lab rather than a classroom. Similar results on the links between teaching and ToM found in the present study were also reported in another study by Davis-Unger and Carlson (2008a) who used the same teaching tool as the current study and found that ToM was a unique predictor of teaching skills. Similar to the current study, the researchers used the "change of location" and "unexpected content" false belief tests,

but they used a third, different ToM tool and created a composite score. Finally, Ziv et al (2016) also found links between the development of ToM and children's teaching behaviours. Their study method required children to teach a peer rather than an adult confederate, but they used a similar teaching tool to the one used in the current study. Similar to the current study, the researchers used the "change of location" false belief test, but also used an additional ToM tool that examined intentions. Despite differences in methods and measures, findings across studies examining the association between ToM and teaching are consistent with the results found herein suggesting that the development of ToM is associated with changes in children's teaching abilities.

4.3. The Contributions of Temperament to Teaching Abilities

4.3.1. Associations between activity level, impulsivity and shyness with teaching

It was hypothesized that the temperament dimensions of shyness, activity level and impulsivity would be negatively correlated with teaching ability.

As predicted, children's activity level was negatively related to the play phase total teaching score and to the percent of errors recognized. This finding is consistent with the results of Osborne (1985) who examined associations between temperament and teaching behaviour in adult teachers. Like the adults in Osborne's study, the children in the current study tended to be more aware of their tutee's errors when they were temperamentally less active. This suggests that activity level plays a role the child's ability to teach. The possible reasons for this are discussed in the following section.

In the current study the teaching task required children to sit still for a relatively long period of time to be able to meet the task's demands. For children with higher activity levels the requirement to sit for long periods may be challenging and the effort required for them sit still may distract them from attending to their learner's needs. It may be that the active children in this study did not necessarily have poorer teaching skills but that the teaching task itself did not fit well with their temperament and prevented

them from expressing their teaching skills to their full potential. For instance, if the task had been a more active one, children may have been better able to display their teaching ability. This issue could be addressed in future studies that allow children to teach in different styles and settings.

The study results did not support the anticipated connection between children's impulsivity levels and teaching. Although the obtained correlation between impulsivity and number of errors recognized did not meet the threshold for statistical significance, it was close (p =.063), hence, it is suggested that future studies re-examine this association in a larger sample size.

The hypothesis that shyness would be negatively related to teaching ability was also not supported. The reason may be related to the fact that during data collection, by the time the teaching task occurred, children had become familiar with both the researcher and the confederate learner. For that reason, children did not interact with a complete stranger and may not have experienced the anxiety that shy children tend to experience in novel social situations. In addition, it may also be related to the fact that the learner was a friendly adult. An interaction with a peer might have been more challenging for a shy child due to the fact that children tend to be less predictable in their responses than adults who tend to adjust their responses to their partner. In future studies, it would be interesting to examine the same research question using an unfamiliar peer learner instead of an adult learner.

4.3.2. Links between attentional focusing and inhibitory control and teaching ability

It was hypothesized that children who had greater ability to sustain attention, and children who were higher in inhibitory control, would show better teaching skills. Two teaching scores were found to be related to children's attentional focusing – the play phase total score and the percent of errors recognized. This indicates that, indeed, children with higher attention levels demonstrated better teaching abilities. According to Rothbart and Jones (1998), attention refers to the child's ability to stay focused on a task and be able to shift the focus onto a different task if needed. Teaching is a dynamic situation in which the teacher needs to sustain his/her attention in many dimensions, that

is, the teacher is required to stay focused on the content being taught and at the same time to pay attention to the learner's reactions that are subject to change.

In the current study, the links between attention and teaching were demonstrated during the play phase of the task, a complex situation that required children to remember the rules of the game, to play it and to teach it simultaneously. Children maintained those acts while keeping track of the learner's reactions. The ability to stay focused on the learner was reflected in the percent of errors recognized, a score that was also found to be related to children's levels of attention.

The results of the study also indicated associations between inhibitory control and children's ability to recognize errors, suggesting that children who were better able to suppress their responses were also better in recognizing the learner's errors. Inhibitory control reflects the child's capacity to plan reactions and to maintain self control if the situation requires doing so. Teaching is a practice that requires focus on the learner's needs rather than one's own. Therefore, children who have a better ability to suppress their own needs and focus on their learner needs are likely to teach better.

Children who are high in inhibitory control are also better in following instructions; they pay attention to rules and can stop an activity upon request (Rothbart et al., 2001). It is possible that children with higher levels of inhibitory control were able to listen more carefully to the rules of the game that they had just learned and were able to better implement those rules in the actual play situation with the learner. For that reason, they were also better in detecting the learner's errors when the learner failed to follow the rules. Self control was reflected in the children's ability to stop the flow of the game to address the learner's need for elaboration of the instructions.

4.4. The contributions of temperament and ToM to the prediction of teaching ability

It was hypothesized that temperament and ToM would make significant and independent contributions to the prediction of teaching ability. The relative contributions of ToM and temperament to teaching were examined while controlling for age and

language abilities. The results indicated that while age, language, the belief-desire reasoning task and temperament (in the domains of attention and activity level), each statistically improved the prediction of teaching ability as represented by the percent of errors recognized, considered simultaneously, only attention was statistically detectable in predicting the percent of errors recognized.

These results emphasize the importance of attention to teaching ability and point out that this temperamental tendency is crucial for teaching beyond ToM development. As discussed previously, being able to sustain attention is important as it allows the child to stay focused on a task and respond to the learner's needs while managing the content that needs to be taught. A child may have ToM ability and recognize the fact that the learner may hold different thoughts and beliefs, but if their attention on the learner cannot be sustained, teaching will be impeded.

4.5. **The assessment of teaching**

The assessment of teaching in this study was conducted by using two tasks: the first was designed by the author, and the second was adopted from a previous study and the procedure was replicated. The first task was designed to provide an opportunity for younger children to demonstrate teaching skills using a simpler game than the relatively complex game used in the second task. Since the task was novel, many unexpected issues arose during the procedure that affected the validity of the test.

One of the issues, for example, was that, quite surprisingly, children found much interest in the stacking cups game; they enjoyed the free play and found creative ways to play with the materials. This sometimes distracted them from the research task. In addition, the task had a sequence that needed to be followed (a direct request to be taught, act of confusion, verbal cue, a successful move and a mistake) but the sequence could have been easily interrupted due to a slight change in the child's response during the interaction, for example, if the child decided to play the game differently. This resulted in an unexpected flow of interaction between the child and the confederate learner who could not follow her original procedure script. The coding of the test was difficult and resulted in several missing values, which eventually affected the results of

the research hypothesis regarding this test. Data for this test is presented in the results section but no meaningful findings were found.

The rationale for including a simple teaching task in studies such as the current one is still valid, since as mentioned previously, younger children in this study demonstrated teaching abilities and this task was designed to provide them the opportunity to teach a simpler game. It is therefore suggested that future studies would explore a new procedure with a simple game that would allow the researcher to maintain a more stable teacher-student interaction that could be coded more accurately.

4.6. **Limitations of study**

Despite yielding some interesting findings on the links among ToM, temperament, and teaching ability in early childhood, the present study is not without limitations. For example, there were unanticipated difficulties with the first teaching task such that it did not fulfil its intended use as a simple teaching task for the children. Since the results did indicate that even the youngest children demonstrated an ability to teach, it is recommended that new and simpler methods to examine children's basic teaching abilities be investigated.

In addition, in both teaching tasks children's teaching skills were evaluated according to their ability to teach an adult confederate learner. This approach was chosen to allow control of the learner's reactions by using a script. However, this approach limits the ability to infer the results to a peer tutoring interaction. Therefore, it is suggested that future studies further explore children's ability to teach peers.

This study used quantitative methods for analyzing the results, but it was obvious to the researcher during the analysis that some significant aspects of teaching were missed due to limitations of the coding system. Therefore a mixture of quantitative and qualitative measures, such as unstructured observation of teaching may be valuable in future studies.

The study sample included middle class children of highly educated working parents who attended quality childcare centres and this may have influenced the study results. The fact that children in the study attended an educational setting may have also influenced their performance on the study tasks. Children in high quality childcare centres have the opportunity to practice social interactions with peers daily and this may have contributed to their development of ToM and teaching abilities. In addition, due to the demanding nature of the data collection that required one-on-one interactions with the children on several occasions, the sample was relatively small. It is therefore recommended to expand the scope of population in a similar study using a larger and more diverse sample.

Many studies have been conducted on the practice of peer tutoring and its contributions to both the tutor and the tutee; however, most of these studies have been conducted on children in the grade school years (e.g. Bowman-Perrott et al., 2013). The current study contributes to the understanding of teaching abilities in early childhood and provides support for the practice, as children demonstrated clear capabilities to teach. More naturalistic studies should be conducted in early childhood settings that examine the ways that peer-tutoring occurs in those settings and evaluate its contributions to children's learning and development.

Finally, caution is recommended in interpreting any specific statistically detectable finding owing to the large number of tests carried out.

4.7. **Study Implications and Significance**

This study contributed to the understanding of young children's ability to teach. In particular, it examined the roles of ToM and temperament in teaching ability. The study indicated that regardless of age all children responded positively to the teaching tasks and were motivated to teach the games they were asked to. This adds to previous findings that children are capable of teaching in early ages, and indicating that it is a legitimate practice in early childhood settings. From informal conversation with educators in the field during data collection, it was clear that the practice of children teaching is

commonly used; findings of the study, therefore, support the feasibility of the already common practice.

The study suggested that advanced ToM and temperamental dispositions were associated with children's ability to teach. Educators should adapt their expectations and the level of support provided for children with different types of temperament when requesting them to tutor. For example, educators can provide assistance and scaffolding to children who tend to have difficulties in sustaining attention when they participate in teaching activities. In addition, educators should consider taking steps to support children's ToM understanding. One example of how this might be achieved is to engage children in structured conversations that involve explanations for others' feelings, desires, thoughts or motives (see Ontai & Thompson, 2008).

Chapter 5.   **Tables**

Table 5.1:   Socio-demographic characteristics of participants

Variables	classifications	
Marital status of parents	Married or domestic partnership	88.5%
	Single, never married	3.8%
	Separated	1.9%
Average number of children in family	1.61 (SD=.75, range1-4)	
Birth order	First child	51.9%
	Second child	34.6%
	Third child	11.5%
First language	English	69.2%
	Russian	9.6%
	Hebrew	7.7%
	Mandarin	3.8%
	Other	%9.5
Mothers' highest level of education	Post secondary technical training	1.9%
	Some college or university	7.7%
	Undergraduate degree	42.3%
	Post graduate degree	42.3%
Fathers' highest level of education	High school	%1.9
	Post secondary technical training	13.5%
	Some college or university	11.5%
	Undergraduate degree	32.7%
	Post graduate degree	32.7%
Employment mothers	Employed for wages	63.5%
	Self employed	19.2%
	Home makers, searching for a job or students	%9.6
Employment fathers	Employed for wages	57.7%
	Self employed	28.8%
	Students or retired	%3.8

Table 5.2:   **Cohen's kappas calculation for Teaching task 1 Inter-rater reliability test**

	K	*p*
Direct request to be taught	1	.00
Physical cue of confusion	.72	.00
Verbal cue of confusion	.60	.00
Successful move	.88	.00
A mistake	.55	.00

Table 5.3:   **Categories for the Classification of Children's Behaviours and Utterances in the Teaching Task**

Category	Research Variable	Example
Verbal explanation	Teaching phase summary variable Play phase summary variable	*You have to get the same color flower if you want to take it.*
Verbal explanation with demonstration	Teaching phase summary variable Play phase summary variable	*You can't go backwards; you have to follow the arrows.* *(Child points to arrows and moves truck around the* *track in the correct direction)*
Checking in	Teaching phase summary variable Play phase summary variable	*So, do you understand the game?*
Supplementary teaching	Teaching phase summary variable	*You can't take it if they don't match. See, mine don't match, you can't take it if that happens.*
Rule Reminders	Play phase summary variable	*Remember, the colors have to match*

(Source: Davis-Unger & Carlson, 2008, p. 31)

Table 5.4:   Categories to Classify Responses to the "Teach" and "Learn" Questions

Category	Score	Example
How did you teach me how to play the game?		
Redescription	1	First you had to drive the truck; then you had to dump the block out.
Taught, Told or Explained	2	I just told you.
Metacognitive Reference	3	Jim taught me and I taught you…it's like a pattern. Jim, Mary, and Jamie. I might be able to teach mommy.
How do you know that I learned how to play the game?		
Taught, Told or Explained	1	I taught you how to get each single matching flower.
Behaviors observed in the learner	2	I knew because you were playing really good

(Source: Davis-Unger & Carlson, 2008, p. 32)

Table 5.5:   Cronbach's alphas scores for Temperament subscales

Subscale	Number of items	*α*
Attention	6	.86
Shyness	6	.88
Activity level	7	.81
Impulsivity	6	.82
Inhibitory control	6	.78

Table 5.6:   Correlations between age and teaching scores (*n*=45)

	Teach 1 Total score	Teach phase total score	Play phase total score	Total time teaching	Rules taught (% out of 8)	Average number of strategies per rule	Average number of strategies in the play phase	Errors recognized (% out of 3)
age of the child	.35*	.40**	.35*	.22	.44**	.44**	.21	.35*

*p<.05 ; **p<.01

Table 5.7:   Summary of variables used for the study

Name of variable	Type	Components
Independent variables		
Theory of Mind		
unexpected content (ToM1)	Dichotomous - pass/fail	
Change of location (ToM2)	Dichotomous - pass/fail	
Belief-desire Reasoning (ToM3)	Scale (0-5)	Sum (Q3, Q4, Q5, Q7, Q8)
Temperament		
CBQ Attention CBQ Shyness CBQ Activity level CBQ Impulsivity CBQ Inhibitory control	Scale (1-7)	
Dependent variables		
Teaching		
Teaching task 1		
Teaching 1 - Total score (teach1)	scale	A summary score of the child responses to: direct request to be taught the learner's physical cue of confusion the learner's verbal cue of confusion the leaner's successful move the leaner's mistake
Teaching Task 2		
Teaching Phase score	scale	Summary score Average number of strategies the child used per rule Percent of rules taught Total time teaching
Play Phase score	scale	Percent number of errors recognized Average number of strategies play phase
Reflection on teaching score		
Control variable		
PPVT4 standard score	scale	Peabody Picture Vocabulary Test

Table 5.8: **Means and Standard Deviations of the Temperament scales (n=51) and Standard and Raw Scores of the Peabody Language Test (N=49)**

Scale	Mean	*SD*
CBQ Activity Level	4.87	.89
CBQ Attention	4.78	1.20
CBQ Impulsivity	4.02	1.14
CBQ Inhibitory Control	4.70	1.02
CBQ Shyness	3.93	1.48
PPVT4 Raw score	81.55	23.83
PPVT4 standard score	112.10	15.05

Table 5.9: **Distribution of responses to the reflection on teaching first question: "How did you teach me how to play the game?" (*N*=45)**

	Percent of responses
Redescription	40%
Taught, told or explained	15.56%
Metacognitive reference	6.67%
No response or an irrelevant response	37.78%

Table 5.10: **Distribution of responses to the reflection on teaching second question: "How do you know that I learned how to play the game?" (*N*=45)**

	Percent of responses
Taught, told or explained	33.33%
Behaviors observed in the learner	2.22%
No response or an irrelevant response	64.44%

Table 5.11:   Correlations between age and teaching scores (*N*=45)

	Teach 1 Total score	Teach phase total score	Play phase total score	Total time teaching	Rules taught (% out of 8)	Average number of strategies per rule	Average number of strategies in the play phase	Errors recognized (% out of 3)
age of the child	.35*	.40**	.35*	.22	.44**	.44**	.21	.35*

*p<.05 ; **p<.01

Table 5.12:   Percentage of children passing the false believe tests (unexpected content (ToM1) and change of location (ToM2)) by age group

	31-43 months (n=15)	44-50 months (n=15)	51-61 months (n=17)	Total (n=47)
ToM1	20%	53.33%	52.94%	42.55%
ToM2	46.67%	80%	88.24%	72.34%

Table 5.13: **Percentage of children passing the questions of the belief desire Reasoning Test and the Means and Standard Deviations of the total score by age group**

	31-43 months (*N*=15)	44-50 months (*N*=15)	51-61 months (*N*=18)	Total (*N*=48)
Q1	80.00%	66.67%	83.33%	77.08%
Q2	80.00%	92.31%[a]	94.44%	89.13% [aa]
Q3	46.67%	40.00%	61.11%	50.00%
Q4	13.33%	26.67%	55.56%	33.33%
Q5	20.00%	33.33%	72.22%	43.75%
Q7	80.00%	86.67%	94.44%	87.50%
Q8	66.67%	80.00%	94.44%	81.25%
Means (SD) of ToM3 total score	2.27(1.28)	2.67(1.63)	3.78(1.00)	2.96(1.44)

Q1: How does Larry feel when he gets a can of Coke?; Q2: How does Larry feel when he gets some milk?; Q3: When Larry first comes back from his walk, how does he feel happy or not happy?; Q4: Why does he feel happy?; Q5: What does Larry think is in the can?;Q7: How does Larry feel after he's had a drink, happy or not happy? ;Q8: Why is he not happy?
([a] *N*=13 [aa] *N*=46)

Table 5.14: **MANOVA Results Showing Differences by Sex on Temperament scales (*N*=28 males, 23 females)**

Dependent Variable	df	F	Mean (*SD*) males	Mean (*SD*) females	p
Activity level	1	.06	4.90 (.95)	4.84 (.83)	.81
Attention	1	.11	4.84 (1.12)	4.72 (1.31)	.74
Impulsivity	1	.07	3.98 (1.22)	4.07 (1.04)	.80
Inhibitory control	1	.26	4.64 (.10)	4.79 (1.07)	.61
Shyness	1	.09	3.98 (1.58)	3.86 (1.39)	.77

Table 5.15   Distribution by Sex on of passing or not passing The unexpected content and change of location ToM tests (*N*=27 males, 20 females)

	ToM1		ToM2	
	Pass	Not pass	Pass	Not pass
Boys	10	17	15	12
Girls	10	10	19	1

Table 5.16:   Correlations between language, ToM and teaching scores

	ToM1	ToM2	ToM3	Teach 1 Total score	Teach phase total score	Play phase total score	Total time teaching	Rules taught (% out of 8)	Average number of strategies per rule	Average number of strategies in the play phase	Errors recognized (% out of 3)
PPVT4	.070	.059	.415**	.260	.266	.026	.301*	.249	.207	.159	4.54**
N	46	46	44	44	44	44	44	44	44	44	42

*p<.05 ; **p<.01

Table 5.17:   Correlations between Temperamant scales and ToM scores (*N*=46)

	Activity	Attention	Impulsivity	Inhibitory control	Shyness
ToM1	.014	.033	-.083	-.270	.053
ToM2	.040	.169	-.126	-.085	.135
ToM3	-.112	.270	-.010	-.276	.176

Table 5.18:   Partial and Zero-order correlations between Believe Desire Reasioning ToM test and Teaching Scores

	Belief desire reasoning	
	Zero order correlation	*Partial correlation controlling age*
Teach1 total score	.144	.005
Teach phase total score	.335*	.184
Play phase total score	.28	.038
Total time teaching	.142	.037
Rules taught (% out of 8)	.384**	.227
Average number of strategies per rule	.393**	.245
Average number of strategies play phase	.335*	-.301
Errors Recognized (% of 3)	.468***	.362*

*p<.05 ; **p<.01 ***p<.001

Table 5.19: Correlations between Temperamant scales and Taching scores (*N*=44)

	Activity	Attention	Impulsivity	Inhibitory control	Shyness
Teach1 total	-.13	.07	-.17	.19	.19
Teach phase total	-.05	.08	.05	.07	-.08
Play phase total	-.34*	.46**	-.23	.28	-.03
Total time teaching	.12	.09	.13	.00	-.07
% Rules taught	-.12	.06	-.01	.08	-.10
Average # of strategies per rule	-.14	.08	.00	.11	-.05
% Errors recognized	-.46**	.52**	-.28	.36*	-.09
Average # of strategies play phase	-.08	.20	-.08	.08	.03

*p<.05 ; **p<.01

Table 5.20: Summary of regressions predicting errors recognized (% of 3)

Block	a Variables	Errors recognized R^2	*F*-change
1	Age of the child PPVT4	.143	3.345*
2	Activity level Attention ToM3	.442	6.611***

*p<.05 ; ***p<.001

Table 5.21:   Full Model from regression predicting percent of errors from Age, ToM3, Temperament (activity level and attention)

	Unstandardized *B*	Standard *Error B*	*Beta*
Age	.791	.664	.171
PPVT4 standardized	.264	.322	.115
ToM3	4.164	3.579	.190
CBQ Activity Level	-9.276	5.253	-.256
CBQ Attention	8.293	3.872	.325*

*p<.05

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Appendix A.

Information letters and consent form for parents

SFU

Ethics application number [2013s0877]

The Contributions of Temperament and Theory of Mind to Tutoring Abilities in Early Childhood

<u>Please note</u>: that when it says "you" in this document, it is referring to you and your child.

The Contributions of Temperament and Theory of Mind to Tutoring Abilities in Early Childhood

Letter of Information for Parents

Dear Parent,

My name is Hilla Hammerman, I am a PhD Candidate in the Faculty of Education at Simon Fraser University. I would like to tell you about a study I will be conducting and to invite you to participate in this study. The title of my study is:

The Contributions of Temperament and Theory of Mind to Tutoring Abilities in Early Childhood

As a parent you are likely aware that during interactions with each other at daycare and preschool, children often teach each other things such as the rules of games, how to use materials, stories and more. These teaching occasions can occur spontaneously or be part of an educator's pedagogic approach. The act of children teaching one another is often referred to as "peer tutoring".

In this study I am interested in examining how children's social orientations and their understanding of the thoughts and feelings of others contribute to their ability to teach others.

My study is motivated by research showing that (a) children demonstrate an ability to teach effectively as early as the age of 3 and (b) peer tutoring is an effective educational approach and beneficial for children. The act of tutoring contributes to children's social skills, learning outcomes, motivation and self esteem. Even though peer tutoring is commonly seen in early childhood settings, very little research has been done on the topic. I hope that my findings will help early childhood educators use peer tutoring more effectively in their classrooms

To complete this study I will need the participation of approximately 60 children aged 3-5 that can speak English and have no severe verbal impairments and one of their parents. Agreeing to participate entails the following:

1. You will be asked to complete a questionnaire regarding your child's temperament, if any of the questions on the questionnaire makes you uncomfortable you do not have to answer it and may skip it. The information in the questionnaire will be completely anonymous and will only be viewed by the researchers.
2. A research assistant and myself will visit the childcare centre and ask your child to participate twice in a play based activity that will examine his/her tutoring skills, as well

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as to listen to a story that will evaluate his/her understanding of others thoughts and feelings. These sessions will be videotaped for coding purposes and will take approximately 10-20 minutes. <u>Your child can stop participating in these activities whenever he/she wishes to.</u>

**Please note that the research will be conducted during the regular hours of the childcare centre in accordance with the teachers. There is no need for the parents to attend during the time of the research. If you do wish to attend during the time of the research please state that in the consent form.

Simon Fraser University is committed to ensuring that the research conducted by its students brings no harm to those who are involved. I know of no risks associated with being involved in this study for you or your child. Indeed, we expect that participation in this study will benefit both families and teachers by supporting peer tutoring which in turn, should contribute to better learning environments in early childhood centres.

Permission to conduct this research study from the childcare management has been obtained prior to sending you this letter.

I am asking for your permission to participate in this study. Of course, you have the right to choose not to participate. If you do choose to participate, you and your child have the right to withdraw from the study at any time; if you decide to withdraw, we will not use the data we collected on your child until if you ask us not to. Choosing not to participate in the study carries with it no consequences for you or your child.

I would like to assure you of the confidentiality of the data I collect. The data will only be available to members of the research group for the purposes of this study and will not be shared with anyone including the child centre personnel or parents. Identifying information for participants will be kept in a secure location such as a password-protected computer file saved on a removable disk that will be held in a locked cabinet accessible to the researcher only. All tapes and printed material will be kept in a locked cabinet in the research lab of Dr. Lucy Le Mare, in SFU's Education Building, room 7500.1. The tapes will be destroyed once the data coding is complete. All coded data will be kept in a locked cabinet until September 2018 and then will be destroyed.

When the study has been completed we will make the overall results available to participating families and childcare centres.

If you have any questions about the study please contact Hilla Hammerman at 778.245.8382 or hhammerm@sfu.ca or Dr Lucy Le Mare, my senior supervisor, at 778.782.3272 or lemare@sfu.ca

The Contributions of Temperament and Theory of Mind to Tutoring Abilities in Early

Childhood

If you have any concerns about your rights as a research participant and/or your experiences while participating in this study, you may contact Dr. Jeffrey Toward, Director, Office of Research Ethics at jtoward@sfu.ca or 778-782-6593.

If you give your permission to participate in this study, please sign the attached Consent Form.

Yours sincerely,
Hilla Hammerman

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Childhood

The Contributions of Temperament and Theory of Mind to Tutoring Abilities in

Early Childhood

Consent Form

Your signature below indicates that you have received a copy of this consent form for your own records and that you have read the Letter of Information for the study entitled "*The Contributions of Temperament and Theory of Mind to Tutoring Abilities in Early Childhood*". You also understand the nature of the research and your questions about it have been answered to your satisfaction.

The researchers wish to make sure that you understand that you have the right to withdraw your consent for participation in the study at any time and that the information collected during the study will be used for research and educational purposes only.

I (Please print your full name):_____ agree to participate in the research conducted by Hilla Hammerman and Dr. Le Mare of the Faculty of Education at Simon Fraser University.

Full name of the child: _____

Name of the daycare centre: _____

Telephone number: _____

E mail: _____

Signature: _____

Date: _____

The Contributions of Temperament and Theory of Mind to Tutoring Abilities in Early Childhood

The Contributions of Temperament and Theory of Mind to Tutoring Abilities in Early Childhood

Letter of Information for Childcare Centre Staff

Dear Educator,

My name is Hilla Hammerman, I am a PhD Candidate in the Faculty of Education at Simon Fraser University. I would like to tell you about a study I will be conducting and invite your childcare centre to participate in it. The title of my study is:

The Contributions of Temperament and Theory of Mind to Tutoring Abilities in Early

Childhood

From your professional experience you are aware that during interactions with each other, preschool children often teach each other things such as the rules of games, how to use materials, stories and more. These teaching occasions may occur spontaneously or be part of an educator's pedagogic approach. The act of children teaching one another is often referred to as "peer tutoring".

In this study I am interested in examining how children's social orientations and their understanding of the thoughts and feelings of others contribute to their ability to teach others.

My study is motivated by research showing that (a) children demonstrate an ability to teach effectively as early as the age of 3 and (b) peer tutoring is an effective educational approach and beneficial for children. The act of tutoring contributes to children's social skills, learning outcomes, motivation and self esteem. Even though peer tutoring is commonly seen in early childhood settings, very little research has been done on the topic. I hope that my findings will help early childhood educators use peer tutoring more effectively in their classrooms.

To conduct this study I need the participation of approximately 60 preschool (ages 3-5) children and one of their parents. If your centre agrees to be involved in this study I will need the centre's assistance in:

1. Informing parents and staff about the study by distributing information sheets with consent form for parents to sign.
2. Providing space and time for children with consent to engage in the study activities. Each child will be asked to participate twice in a play-based activity designed to assess his/her tutoring skills, as well as to listen to a story that will evaluate his/her understanding of others thoughts and feelings. These sessions will be videotaped for coding purposes and

Page 1 out of 2
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The Contributions of Temperament and Theory of Mind to Tutoring Abilities in Early

Childhood

If you have any concerns about your rights as a research participant and/or your experiences while participating in this study, you may contact Dr. Jeffrey Toward, Director, Office of Research Ethics at jtoward@sfu.ca or 778-782-6593.

If you give your permission to participate in this study, please sign the attached Consent Form.

Yours sincerely,
Hilla Hammerman

Appendix B.

Teaching tasks games

Figure B1.   Teaching task 1 game - stacking cups

Figure B2.   Teaching task 2 - board game

Appendix C.

Coding form

Date of observation: _____   Participant #_____

Rater_____   Male/Female

Time of recording _____ Place_____

False Belief Tasks

Unexpected contents

What do you think is in the box?_____

What would (name of teacher) think is in the box? _____ 0 1

Control: what is really in the box? _____ 0 1

Total _____ (do not include control - if control failed other equals zero)

Change of location

Where will he look for the ball? _____ 0 1

Why? _____ 0 1

Control questions:

Where did Max put the ball? _____ 0 1

Where is the ball really? _____ 0 1

Total _____ (do not include control - if control failed other equals zero)

Total false belief (maximum 3) _____

Teaching task

Tutoring task I – stacking cups.
  1. Child's response to direct request to be taught
        a. Ignores other (0)
        b. Acknowledges other but does not act (1)
        c. Acknowledges and shows other (2)
        d. only verbally explains (3)
        e. Acknowledges and tells while showing other (4)
  2. Child's response to the learner's physical cue of confusion:
        a. No response
        b. Acknowledges but does not act
        c. Shows other what to do
        d. verbally explains
        e. Shows other what to do and explains

1 / 5

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Observation 2

Date of observation: _____   Participant #_____

Rater_____   Male/Female

Time of recording _____ Place _____

ToM

<u>Comprehension check questions :</u>

Q1: How does Larry feel when he gets a can of Coke?_____   0 1

Q2: How does Larry feel when he gets some milk?_____   0 1

Stop the task if fails to answer

Q3: When Larry first comes back from his walk, how does he feel happy or not happy?_____   0 1

Q4: Why does he feel happy? _____   0 1

False belief

 Q5: What does Larry think is in the can? _____   0 1

<u>Control question:</u> Q6: What's in the can really? _____   0 1

Emotion-inference:

Q7: How does Larry feel after he's had a drink, happy or not happy? ?_____   0 1

Q8: Why is he not happy ?_____   0 1

Total _____ (<u>do not</u> include control - if control failed other equals zero)

Teaching task (turn page)

- Practice turn + verbal rule check (8 rules) - the child understands the game - 0/ 1

*(If child responds incorrectly, the experimenter will repeat the rule check no more than 4 times).

1. Teaching phase summary variable

Rule descriptions (write the rule) up to 8	**Category (please circle)**	Description
car direction	Verbal explanation/ Verbal explanation with demonstration/ Checking in/ Supplementary teaching/	
Colours of flower on dice matches the flower stopped next to	Verbal explanation/ Verbal explanation with demonstration/ Checking in/ Supplementary teaching/	
Colours of flower on dice doesn't match the flower stopped next to	Verbal explanation/ Verbal explanation with demonstration/ Checking in/ Supplementary teaching/	
Colours of flower on dice matches the flower stopped next to but you already have the flower	Verbal explanation/ Verbal explanation with demonstration/ Checking in/ Supplementary teaching/	
Wild flower	Verbal explanation/ Verbal explanation with demonstration/ Checking in/ Supplementary teaching/	
Happy face	Verbal explanation/ Verbal explanation with demonstration/ Checking in/ Supplementary teaching/	
Sad face	Verbal explanation/ Verbal explanation with demonstration/ Checking in/ Supplementary teaching/	
First to fill the stem with flowers	Verbal explanation/ Verbal explanation with demonstration/ Checking in/ Supplementary teaching/	

Total time of teaching _____

2. Play phase summary variable-

Check yes/ no to the mistakes that the child recognized:
- Moving the truck in the wrong direction on the track - yes/ no
- Taking the flower when the colours do not match - yes/no
- Stopping where a flower has already been taken - yes/no

Total number of mistakes recognized: _____

4/ 5

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Check if you observe any of the following behaviours and write the description:

	Check if you observe the behviour	Description
Verbal explanation		
Verbal explanation with demonstration		
Supplementary teaching		
Rule Reminders		

3. Reflection on teaching score (write the child's answer)

A. How did you teach me how to play the game?

Redescription	1
Taught, Told or Explained	2
Metacognitive Reference	3

Score: _____ (to be filled by the researcher)

B. How do you know that I learned how to play the game?

Taught, Told or Explained	1
Behaviors observed in the learner	2

Score: _____ (to be filled by the researcher)

Appendix D.

Scripts for the observation procedures

Observation procedure and scripts

1.Peabody

2. Unexpected contents

What do you think is in the box?_____

OK, now let's open the box and see (open the box)

What would (name of teacher) think is in the box?

<u>Control</u>: what is really in the box?

3.Change of location

(1) Here's Sally, and here's Max . . . and here's a cupboard and here's a box. (2)

Now, Sally has a ball, and she puts her ball in the box, like that, and

then she goes out to play. (3) But, while she's away, what's happening here?

(4) Max goes to the box, and he takes Sally's ball . . . (5) and he puts it into

this cupboard, like that. And then he goes out to play too [Max leaves in the opposite

direction to Sally]. (6) A bit later, Sally comes back.

Belief question: Where will she look first for her ball?

why?

Reality question: Where is the ball really?

Memory question: Where did Sally put the ball in the beginning?

4. *"This is a story about two friends, Chris the Elephant and Larry the duck. Chris is a very naughty Elephant, and likes to play tricks on his friend Larry. Now, Larry really likes Coke, mmmm. In fact it is his very favorite drink. Look! Here is Larry's can of Coke. (Q1: How does Larry feel when he gets a can of Coke?). Larry doesn't like any other drinks though and he really doesn't like milk, yuck, yuck. Look here's some milk. (Q2: How does Larry feel when he gets some milk?). One day, Larry went out for a walk, and naughty Chris decided to play a trick on his friend Larry. He poured out the coke `` Pssshhhh!" and instead he poured in some milk `"lug - glug - glug ". Then he put the milk away, and went outside to watch Larry through the window. Now when Larry comes back from his walk, he's really thirsty. He can see the can on the table, but he can't see what's inside the can. (Q3: When Larry first comes back from his walk, how does he feel happy or not happy? Q4: Why does he feel happy? Q5: What does Larry think is in the can? Q6: What's in the can really? Q7: How does Larry feel after he's had a drink, happy or not happy? Q8: Why is he not happy?)"*

1

1. Teaching - stacking cups

The examiner will show the child a game of stacking cups and say: "Let's play with the cups together". After the examiner feels that rapport has been established with the child, the examiner will ask the child: "have you played with these cups before?" And then will say: "let me show you how I play with them". She will then demonstrate to the child how to arrange the cups, stacking them on top of each other according to descending size, with the largest cup at the base of the stack and the smallest on top and switching between the top and a doll on top of the stack.

The experimenter will then get up to leave the room telling the child that she will be right back "I have to go make a phone call why don't you teach Helen how to play with the cups"|and that the child can continue playing with the cups by him/herself. The experimenter will also tell the child that before her return, a helper will come. The experimenter will ask the child to please teach the helper how to properly stack the cups.

While the experimenter is gone a research assistant (helper) will enter the room and act as follows:

1. The research assistant makes a direct request to be taught:

"I was told I can play with these cups. Can you teach me what I I'm supposed to do?"

2. The research assistant demonstrates a physical cue of confusion after the child responds to the request of teaching: *Grabs the cups and can't separate them.*

3. The research assistant makes a successful move: *Puts the largest cup at the basis of the stack.*

4. The research assistant makes a mistake:

    *Puts a w*rong cup on the stack.

5. The research assistant adds a verbal cue: *"What do I do with the doll?"*

2

99

The child's responses to the research assistant will be scored, with 1 point assigned to each proper response to the learner's cues (maximum 5 points).

2. Teaching Task Instructions - board game

I'm going to teach you how to play this fun game. Then you and I can play the game together.

Here is the game board (Experimenter unfolds board and places it on the table).

We will use this car and this block to play the game. On your turn, you will move the car along the road in this direction and stop next to one of the flowers (Experimenter demonstrates while explaining).

When you stop, you will dump the block and see what color flower you get.

See, the color of the flower on my block matches the color of the flower I have stopped next to (match block with flower color and show to child), so I can remove the flower and put it on the stem that has the same color. See, like this (Experimenter demonstrates).

Let's do another one (Experimenter demonstrates). Again, I move the truck along the road in this direction and stop next to one of the flowers. Now this time let's say that I have rolled a yellow flower but I have stopped at an orange flower. Uh oh! You can only take a flower if the color on the block matches the color of the flower you have stopped next to.

Also, you can have only one flower of each color. If you get a happy face, then you get to take another turn. But, if you get a sad face you lose your turn (Experimenter shows Child the different sides of the die). And this flower with all of the colors on it is called a "wild flower"—that means that you get to make it match the flower you are next to and put it on your stem! (demonstrate).

Remember, on your turn, you are going to dump the block out of the truck like this (Experimenter demonstrates). Now you try.

The first player to get all four different colored flowers on their stem wins!

Do you have any questions?

RULE CHECK

"Let's make sure we know all of the rules before we get started."

RC1: "Which way do you move the truck? Do you have to follow the arrows or can you go backwards?"

RC2: "If the color of the flower on the block and the color of the flower you have stopped next to are the same, like this, can you take the flower or do you have to leave it?"

RC3: "If the color of the flower on the block and the color of the flower you have stopped next to are different, like this, can you take the flower or do you have to leave it?"

RC4: "What if they are the same but you already have that color flower on your

stem? Can you take the flower or do you have to leave it?"

3

RC5: "What happens if you get a wild flower on your turn? Can you make it match the flower you are stopped next to and take the flower?"

RC6: "What happens if you get a happy face on your turn? Do you lose your turn or get another turn?"

RC7: "What happens if you get a sad face on your turn? Do you lose your turn or get another turn?"

RC8: "If you are the first one to fill your stem with flowers, are you the winner?

OK, let's play the game!"

WARM-UP PHASE:

(Child and Experimenter play the game until they each make one match or 3-min elapse).

"Wow, this game is fun! I have to go work on some papers now. Jenny has neverseen this game before and she doesn't know how to play. Will you teach Jenny how to play this game? Then you two can play the game together!"

PLAY PHASE:

(Confederate learner enters and states):

"I hear you are playing a fun game in here. How do you play this game?"

Mistakes:

- Moving the truck in the wrong direction on the track
- Taking the flower when the colours do not match
- Stopping where a flower has already been taken

Reflection on teaching - After the completion of the game, children will be asked by the confederate examiner:

a. "How did you teach me how to play the game

b. "How do you know that I learned how to play the game?"

4

Appendix E.

Background and Children's behaviour questionnaire

Background Questionnaire

For the purposes of the study some background information will be collected, you may skip questions that you fill uncomfortable answering. Information about your child's sex, age and date of birth is crucial for this study and therefore you cannot skip those questions. The information collected in this form will be kept completely confidential, and the identification number will only be used to match this data to other data collected in this study.

(Starred items (*) cannot be skipped)

<u>**Information about the child**</u>

Subject No

*Date of child's birth: _____
                        Month   Year

*Today's Date: _____
                        Day   Month   Year

*Sex of Child: Male/ Female

*Age of Child   _____
                  Years   Months

Total number of siblings: _____

Birth order of the child participating in the study	First child	Second child	Third child	Other (specify)

Ethnicity:

- White
- South Asian (e.g., East Indian, Pakistani, Sri Lankan, etc.)
- Chinese
- Black
- Filipino
- Latin American
- Arab
- Southeast Asian (e.g., Vietnamese, Cambodian, Malaysian, Laotian, etc.)
- West Asian (e.g., Iranian, Afghan, etc.)
- Korean
- Japanese
- Other - Specify_____

Child's first language: _____

_____

Language most frequently
spoken at home: _____

Information about parents
Age of parents: Mother _____

Father _____

Select your highest level of education (Mother)

- Less than high school
- Completed high school
- Post-secondary technical training
- Some college or university
- Undergraduate degree
- Post graduate degree

Select your highest level of education (Father)

- Less than high school
- Completed high school
- Post-secondary technical training
- Some college or university
- Undergraduate degree
- Post graduate degree

What is your marital
status?

Single, never married	Married or domestic partnership	Widowed	Divorced	Separated

What is your employment Status?

- Employed for wages
- Self-employed
- Out of work and looking for work
- Out of work but not currently looking for work
- A homemaker
- A student
- Military
- Retired
- Unable to work

Occupation:_____

Children's Behavior Questionnaire
Short Form Version I

Instructions: Please read carefully before starting:

On the next pages you will see a set of statements that describe children's reactions to a number of situations. We would like you to tell us what your child's reaction is likely to be in those situations. There are of course no "correct" ways of reacting; children differ widely in their reactions, and it is these differences we are trying to learn about. Please read each statement and decide whether it is a "true" or "untrue" description of your child's reaction within the past six months. Use the following scale to indicate how well a statement describes your child:

Circle #	If the statement is:
1	extremely untrue of your child
2	quite untrue of your child
3	slightly untrue of your child
4	neither true nor false of your child
5	slightly true of your child
6	quite true of your child
7	extremely true of your child

If you cannot answer one of the items because you have never seen the child in that situation, for example, if the statement is about the child's reaction to your singing and you have never sung to your child, then circle NA (not applicable).

Please be sure to circle a number or NA for every item.

	1	2	3	4	5	6	7	NA
	extremely untrue	quite untrue	slightly untrue	neither true nor untrue	slightly true	quite true	extremely true	not applicable

My child:

1.   Seems always in a big hurry to get from one place to another.

l   2   3   4   5   6   7   NA

2.   Gets angry when told s/he has to go to bed.

l   2   3   4   5   6   7   NA

3.   Is not very bothered by pain.

l   2   3   4   5   6   7   NA

4.   Likes going down high slides or other adventurous activities.

l   2   3   4   5   6   7   NA

5.   Notices the smoothness or roughness of objects s/he touches.

l   2   3   4   5   6   7   NA

6.   Gets so worked up before an exciting event that s/he has trouble sitting still.

l   2   3   4   5   6   7   NA

7.   Usually rushes into an activity without thinking about it.

l   2   3   4   5   6   7   NA

8.   Cries sadly when a favorite toy gets lost or broken.

l   2   3   4   5   6   7   NA

9.   Becomes quite uncomfortable when cold and/or wet.

l   2   3   4   5   6   7   NA

10.   Likes to play so wild and recklessly that s/he might get hurt.

l   2   3   4   5   6   7   NA

11.   Seems to be at ease with almost any person.

l   2   3   4   5   6   7   NA

12.   Tends to run rather than walk from room to room.

l   2   3   4   5   6   7   NA

1	2	3	4	5	6	7	NA
extremely untrue	quite untrue	slightly untrue	neither true nor untrue	slightly true	quite true	extremely true	not applicable

<u>My child:</u>

13. Notices it when parents are wearing new clothing.

I   2   3   4   5   6   7   NA

14. Has temper tantrums when s/he doesn't get what s/he wants.

I   2   3   4   5   6   7   NA

15. Gets very enthusiastic about the things s/he does

I   2   3   4   5   6   7   NA

16. When practicing an activity, has a hard time keeping her/his mind on it.

I   2   3   4   5   6   7   NA

17. Is afraid of burglars or the "boogie man."

I   2   3   4   5   6   7   NA

18. When outside, often sits quietly.

I   2   3   4   5   6   7   NA

19. Enjoys funny stories but usually doesn't laugh at them.

I   2   3   4   5   6   7   NA

20. Tends to become sad if the family's plans don't work out.

I   2   3   4   5   6   7   NA

21. Will move from one task to another without completing any of them.

I   2   3   4   5   6   7   NA

22. Moves about actively (runs, climbs, jumps) when playing in the house.

I   2   3   4   5   6   7   NA

23. Is afraid of loud noises.

I   2   3   4   5   6   7   NA

24. Seems to listen to even quiet sounds.

I   2   3   4   5   6   7   NA

1	2	3	4	5	6	7	NA
extremely untrue	quite untrue	slightly untrue	neither true nor untrue	slightly true	quite true	extremely true	not applicable

<u>My child:</u>

25. Has a hard time settling down after an exciting activity.

    I   2   3   4   5   6   7   NA

26. Enjoys taking warm baths.

    I   2   3   4   5   6   7   NA

27. Seems to feel depressed when unable to accomplish some task.

    I   2   3   4   5   6   7   NA

28. Often rushes into new situations.

    I   2   3   4   5   6   7   NA

29. Is quite upset by a little cut or bruise.

    I   2   3   4   5   6   7   NA

30. Gets quite frustrated when prevented from doing something s/he wants to do.

    I   2   3   4   5   6   7   NA

31. Becomes upset when loved relatives or friends are getting ready to leave following a visit.

    I   2   3   4   5   6   7   NA

32. Comments when a parent has changed his/her appearance.

    I   2   3   4   5   6   7   NA

33. Enjoys activities such as being chased, spun around by the arms, etc.

    I   2   3   4   5   6   7   NA

34. When angry about something, s/he tends to stay upset for ten minutes or longer.

    I   2   3   4   5   6   7   NA

35. Is not afraid of the dark.

    I   2   3   4   5   6   7   NA

36. Takes a long time in approaching new situations.

1	2	3	4	5	6	7	NA
extremely untrue	quite untrue	slightly untrue	neither true nor untrue	slightly true	quite true	extremely true	not applicable

_____

My child:

    I   2   3   4   5   6   7   NA

37.   Is sometimes shy even around people s/he has known a long time.

    I   2   3   4   5   6   7   NA

38.   Can wait before entering into new activities if s/he is asked to.

    I   2   3   4   5   6   7   NA

39.   Enjoys "snuggling up" next to a parent or babysitter.

    I   2   3   4   5   6   7   NA

40.   Gets angry when s/he can't find something s/he wants to play with.

    I   2   3   4   5   6   7   NA

41.   Is afraid of fire.

    I   2   3   4   5   6   7   NA

42.   Sometimes seems nervous when talking to adults s/he has just met.

    I   2   3   4   5   6   7   NA

43.   Is slow and unhurried in deciding what to do next.

    I   2   3   4   5   6   7   NA

44.   Changes from being upset to feeling much better within a few minutes.

    I   2   3   4   5   6   7   NA

45.   Prepares for trips and outings by planning things s/he will need..

    I   2   3   4   5   6   7   NA

46.   Becomes very excited while planning for trips.

    I   2   3   4   5   6   7   NA

47.   Is quickly aware of some new item in the living room.

    I   2   3   4   5   6   7   NA

48.   Hardly ever laughs out loud during play with other children.

	1	2	3	4	5	6	7	NA
	extremely untrue	quite untrue	slightly untrue	neither true nor untrue	slightly true	quite true	extremely true	not applicable

I   2   3   4   5   6   7   NA

49. Is not very upset at minor cuts or bruises.

I   2   3   4   5   6   7   NA

50. Prefers quiet activities to active games.

I   2   3   4   5   6   7   NA

51. Tends to say the first thing that comes to mind, without stopping to think about it.

I   2   3   4   5   6   7   NA

52. Acts shy around new people.

I   2   3   4   5   6   7   NA

53. Has trouble sitting still when s/he is told to (at movies, church, etc.).

I   2   3   4   5   6   7   NA

54. Rarely cries when s/he hears a sad story.

I   2   3   4   5   6   7   NA

55. Sometimes smiles or giggles playing by her/himself.

I   2   3   4   5   6   7   NA

56. Rarely becomes upset when watching a sad event in a TV show.

I   2   3   4   5   6   7   NA

57. Enjoys just being talked to.

I   2   3   4   5   6   7   NA

58. Becomes very excited before an outing (e.g., picnic, party).

I   2   3   4   5   6   7   NA

59. If upset, cheers up quickly when s/he thinks about something else.

I   2   3   4   5   6   7   NA

60. Is comfortable asking other children to play.

1	2	3	4	5	6	7	NA
extremely untrue	quite untrue	slightly untrue	neither true nor untrue	slightly true	quite true	extremely true	not applicable

My child: Page 7

    I   2   3   4   5   6   7   NA

61.   Rarely gets upset when told s/he has to go to bed.

    I   2   3   4   5   6   7   NA

62.   When drawing or coloring in a book, shows strong concentration.

    I   2   3   4   5   6   7   NA

63.   Is afraid of the dark.

    I   2   3   4   5   6   7   NA

64.   Is likely to cry when even a little bit hurt.

    I   2   3   4   5   6   7   NA

65.   Enjoys looking at picture books.

    I   2   3   4   5   6   7   NA

66.   Is easy to soothe when s/he is upset.

    I   2   3   4   5   6   7   NA

67.   Is good at following instructions.

    I   2   3   4   5   6   7   NA

68.   Is rarely frightened by "monsters" seen on TV or at movies.

    I   2   3   4   5   6   7   NA

69.   Likes to go high and fast when pushed on a swing.

    I   2   3   4   5   6   7   NA

70.   Sometimes turns away shyly from new acquaintances.

    I   2   3   4   5   6   7   NA

71.   When building or putting something together, becomes very involved in what s/he is doing, and works for long periods.

    I   2   3   4   5   6   7   NA

1	2	3	4	5	6	7	NA
extremely untrue	quite untrue	slightly untrue	neither true nor untrue	slightly true	quite true	extremely true	not applicable

<u>My child:</u>   Page 8

72.   Likes being sung to.

    I   2   3   4   5   6   7   NA

73.   Approaches places s/he has been told are dangerous slowly and cautiously.

    I   2   3   4   5   6   7   NA

74.   Rarely becomes discouraged when s/he has trouble making something work.

    I   2   3   4   5   6   7   NA

75.   Is very difficult to soothe when s/he has become upset.

    I   2   3   4   5   6   7   NA

76.   Likes the sound of words, such as nursery rhymes.

    I   2   3   4   5   6   7   NA

77.   Smiles a lot at people s/he likes.

    I   2   3   4   5   6   7   NA

78.   Dislikes rough and rowdy games.

    I   2   3   4   5   6   7   NA

79.   Often laughs out loud in play with other children.

    I   2   3   4   5   6   7   NA

80.   Rarely laughs aloud while watching TV or movie comedies.

    I   2   3   4   5   6   7   NA

81.   Can easily stop an activity when s/he is told "no."

    I   2   3   4   5   6   7   NA

82.   Is among the last children to try out a new activity.

    I   2   3   4   5   6   7   NA

83.   Doesn't usually notice odors such as perfume, smoke, cooking, etc.

    I   2   3   4   5   6   7   NA

1	2	3	4	5	6	7	NA
extremely untrue	quite untrue	slightly untrue	neither true nor untrue	slightly true	quite true	extremely true	not applicable

<u>My child:</u>

84. Is easily distracted when listening to a story.

   I   2   3   4   5   6   7   NA

85. Is full of energy, even in the evening.

   I   2   3   4   5   6   7   NA

86. Enjoys sitting on parent's lap.

   I   2   3   4   5   6   7   NA

87. Gets angry when called in from play before s/he is ready to quit.

   I   2   3   4   5   6   7   NA

88. Enjoys riding a tricycle or bicycle fast and recklessly.

   I   2   3   4   5   6   7   NA

89. Sometimes becomes absorbed in a picture book and looks at it for a long time.

   I   2   3   4   5   6   7   NA

90. Remains pretty calm about upcoming desserts like ice cream.

   I   2   3   4   5   6   7   NA

91. Hardly ever complains when ill with a cold.

   I   2   3   4   5   6   7   NA

92. Looks forward to family outings, but does not get too excited about them.

   I   2   3   4   5   6   7   NA

93. Likes to sit quietly and watch people do things.

   I   2   3   4   5   6   7   NA

94. Enjoys gentle rhythmic activities, such as rocking or swaying.

   I   2   3   4   5   6   7   NA

Please check back to make sure you have completed all the pages of the questionnaire. Thank you very much for your help!