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Relations among children's theory of mind, family factors, language development, and story comprehension in L1 and L2 preschoolers

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Abstract

This study examined the relation of family factors, vocabulary, and reading skills to theory of mind development and fables comprehension in children who spoke English as a first language (L1) and children who spoke English as a second language (L2). These factors were examined in 170 preschool children who spoke Arabic, Chinese, Gujarati, Hindi, Punjabi, Tamil, Vietnamese, Urdu, English, or a European language as a first language. All children were being schooled in English. General vocabulary more than any other factor predicted how well L1 and L2 learners performed on theory of mind and fables comprehension tasks. Children's reading skills contributed to fables understanding for L1 but not for L2 children. For all children, sibling status influenced vocabulary skills. Parental education was related to children's vocabulary and reading skills in the L1 group only. The results of this study provide support for the importance of considering the differential needs of first and second language learners.

Keywords: theory of mind; L2 learners; family factors; vocabulary; reading skills

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1. Introduction

Children's cognitive abilities undergo significant changes during the preschool years, especially in terms of theory of mind, language, and reading development. It is well-established that during the preschool years most typically developing children acquire a theory of mind. That is, they are able to understand a person's actions in terms of that person's desires, thoughts, and beliefs (which may be true or false) (for a review, see Astington, 1993; Mitchell, 1997; Wellman, Cross & Watson, 2001). Much of the work in this area has been concerned with normative development and group means, focusing on the age at which children develop this "theory of mind" and the conditions under which it emerges. There has been surprisingly little study on how this understanding of the mind manifests in children who are learning English as a second language. Currently, many children in North America begin school speaking a language other than English, which is typically the language of schooling. Furthermore, recent immigrants to North America arrive with diverse educational and occupational experiences, and often accept employment that is beneath their education and training. It may not be the case that children learning English are from homes with low parental educational levels; yet these children are still challenged by being schooled in an unfamiliar language (Pelletier, 2006). Thus, a better understanding of the interplay among family factors, language abilities, early reading skills, and theory of mind development in this population is deemed important.

Theory of mind is claimed to develop universally among humans across cultures (Liu, Wellman, Tardif, & Sabbagh, 2008). The most widely used measures of theory of mind development are false belief tasks. A standard false belief task involves an unseen change of location (Wimmer & Perner, 1983). As an example, in a task acted out with small figures, a child sees Sam put his shoes in the closet and then leave. While Sam is outside, his mother moves his shoes from the closet to the laundry room to be cleaned. Sam returns and the child is asked, "Where does Sam think his shoes are?" or "Where will Sam look for his shoes?" Children move from responding to these types of questions according to reality (that he will look in the laundry room) to responding according to false belief understanding (that he will look in the closet). This developmental pattern is consistent across numerous task modifications, suggesting that false belief tasks are an accurate measure of theory of mind development (Wellman, Cross, & Watson, 2001).

Whether false belief understanding shows a similar trajectory in children who are learning English as a second language and whose parents emigrated from a non-Western country remains unknown. Only a few studies have examined theory of mind development across cultures (e.g., Callaghan et al., 2005; Liu, Wellman, Tardif, & Sabbagh, 2008; Vinden, 1999; Wellman et al., 2001) and they reached inconsistent conclusions about its development and timing. For example, Callaghan et al. (2005) examined children's theory of mind development across five countries and concluded that there was a universal trajectory and a synchronous timing for its onset, which occurs between 3 to 5 years of age.

Wellman and colleagues' (2001) meta-analysis demonstrated that children's false belief task performance increases with age, supporting the initial claims of significant theory of mind development during the preschool years. They also reported that children from seven different countries exhibited the same trajectory in theory of mind development, but with a different onset across cultures. Liu and colleagues' cross-cultural meta-analysis (2008) comparing children from mainland China and Hong Kong to children from the United States and Canada provided additional support that theory of mind does indeed develop early and universally. Consistent with Wellman et al. (2001), their findings also indicated that theory of mind development appears to follow a different timing across cultures and languages. Researchers explained the observed time-related differences as the product of multiple sociocultural and linguistic factors that converge to shape theory of mind development. However,

false belief understanding and its interplay with family factors, language ability, reading skills and fables understanding in preschoolers who are being schooled in English and are acquiring English as a second language, remains unexplored. Our study aims to shed some light on this issue.

2. Theoretical framework

2.1 Family Factors and Children's Cognitive Abilities: Theory of Mind, Language, and Reading Development

A review of the literature indicated that certain aspects of children's family background, such as parental education and number of siblings can influence children's cognitive development. There is some evidence that family background plays a role in theory of mind development. Cutting and Dunn (1999) found that maternal and paternal occupation and maternal education were highly correlated with children's false belief and language abilities. This was not true for paternal education, which the authors suggested may have been due to the large number of missing data for this variable. They found that children from middle-class families outperformed children from working-class families in theory of mind understanding. In terms of language development, research supports the greater influence of parents and adults over siblings and peers in creating a more language-enriched environment.

A number of studies comparing mothers, peers, and siblings have found that mothers provide more linguistic stimulation and establish more continuous, reciprocal, and responsive communicative interactions with children than do peers or siblings (Dunn & Kendrick, 1982; Wilkinson, Heibert, & Rembold, 1981). Likewise, family environment is important to reading, especially when examining phonological awareness and print knowledge in young children (Petrill, et al., 2006). Familial differences in parent-driven shared environmental influences, such as book sharing, parental verbal skills, and parent attitudes about education are associated with children's reading outcomes (Byrne et al, 2002; Petrill, et al., 2005). Cross-cultural studies have also suggested that family background affects theory of mind development. For example, upper-class Indian children outperformed their more deprived counterparts when making mental versus reality distinctions (Wahi & Johri, 1994).

Similarly, the number of siblings at home can affect the development of children's cognitive abilities (Brody, Kim, Murry, & Brown, 2003). Sibling relationships are unique as they offer children an opportunity to learn about others and themselves throughout development (Dunn, 2000). Theory of mind researchers agrees that siblings seem to have a positive effect on children's false belief understanding. They acknowledge that siblings perform better than only children (Cassidy, Fineberg, Brown, & Perkins, 2005; Jenkins & Astington, 1996; Perner, Ruffman & Leekman, 1994; Peterson, 2000; Ruffman, et al., 1998). However, researchers have not come to a consensus on whether having older or younger siblings are more beneficial for theory of mind development.

Some researchers have found evidence for a first born advantage (Lewis, Freeman, Kyriakidou, Maridaki-Kassotaki, & Berridge, 1996; Ruffman, Perner, Naito, Parkin, & Clements, 1998), whereas other researchers have found a positive effect of having both older and younger siblings (Jenkins & Astington, 1996; Perner et al., 1994; Peterson, 2000). Still, several studies found no relationship at all. For example, Cutting and Dunn (1999), and Cole and Mitchell (2000) both found no link between number of siblings and theory of mind understanding. They suggested that it is not simply the number of siblings that a child has, but rather the quality of the sibling interaction that plays a major role in a child's life. Cutting and Dunn had a somewhat diverse bilingual sample, and they ascribed these findings to the nature of their sample, suggesting that siblings from different family backgrounds may interact in qualitatively different ways. Peterson and Slaughter (2003) also found no effect of siblings but attributed their null findings to a lack of variety among the sibling groups in their sample.

Studies have also been conducted examining the sibling relationship in terms of language and reading development. Research on language development has shown that preschool age siblings adjust their speech for their younger siblings who are beginning to use language (Tomasello & Mannle, 1985). Some researchers have

suggested (e.g., Zajonc, 2001) a first born advantage because first born children are exposed to exclusively adult language. In addition, when second born children reach a level of maturity that allows them to ask more complex questions, first born children become tutors. It is in this tutoring role that first born children gain an intellectual advantage. In contrast, other findings have suggested that is later born children who benefit the most because they get the extra training from adults and older siblings. Indeed, researchers have demonstrated that younger children (with older siblings) outperform older children on theory of mind tasks (Prusky & Pelletier, 2009). Last, only a few studies have examined the link between siblings and reading ability. Petrill and colleagues (2006) observed that older siblings who are close in age to their brother or sister are one step ahead of their younger siblings and are able to scaffold their younger siblings reading.

In sum, research has examined family factors in Western cultures and a few studies have focused on theory of mind development in non-Western cultures. Nonetheless, significant questions remain unanswered: How are family factors related to L2 preschoolers' reading, vocabulary, and theory of mind development? Specifically, does having parents with a college education mean the same for L1 learners as it does for L2 learners? Is the number of siblings in the home associated with L2 children's cognitive development? The current study will attempt to answer these questions.

2.2 Theory of Mind and Language Development

Theory of mind develops gradually in early childhood and it becomes evident in the child's linguistic development (Bartsch & Wellman, 1995). Language is used to refer to psychological states that emerge in a predictable developmental sequence (Lee & Rescorla, 2008), with words indicating physiological states (e.g., sleepy), desires (e.g., want) and emotions (e.g., happy) being the earliest and most common psychological state terms to develop in children's speech. Around the age of three children also begin to make reference to cognitive states of others using expressions such as "she thinks" and "he knows", demonstrating the emergence of the child's ability to theorize about other minds and to reason about the mental states and intentions of others (Robinson, 2007).

Considerable research has shown that there is a strong link between false belief understanding and language ability (e.g., Astington & Jenkins, 1999; Astington, & Baird 2005; Lohman & Tomasello, 2003; Milligan, Astington, & Dack, 2007). For example, 3 and 4 year olds have been found to display marked improvement in false belief task performance after language training (Lohman & Tomasello, 2003). A meta-analysis by Milligan et al. (2007) explored the strength of this relationship in children under age 7 and their findings demonstrated the primacy of vocabulary development in theory of mind understanding. Stronger effects were found in the direction from early language to later false belief and significant differences were not found among different types of false belief tasks. That is, general language ability appears to precede theory of mind understanding, and this can be seen across diverse false belief tasks. However, the meta-analysis by Milligan and colleagues was limited to studies of the relationship between false belief and language in typically developing English speaking children.

Most of the studies investigating the association between theory of mind and language in non-monolingual English speaking children were conducted with bilingual samples (e.g., Bialystok, 1988; Goetz, 2003). Although this research is of utmost importance in that it has demonstrated that bilingual children perform better than monolingual children on false belief tasks, questions pertaining to the association between theory of mind and language in children who are learning English as a second language remain. Of the few published studies examining theory of mind in L2 learners, results have been consistent with findings in L1 learners in which vocabulary was the strongest predictor of false belief task performance (Pelletier, 2006). That is, L2 children who performed better on a vocabulary test had higher theory of mind understanding. Therefore, the second goal of this study was to compare the relationship between English language ability and false belief task performance in L1 and L2 learners.

2.3 Story Comprehension

The ultimate goal of reading is to understand text, which, among other things, facilitates learning (Chall, 1996). Although factors related to reading comprehension have been thoroughly explored in L1 children (e.g., Nagy, Garcia, Durgunoglu, & Hancin-Bhatt, 1993; Reese, Garnier, Gallimore, & Goldenberg, 2000), few researchers have examined variables related to story comprehension for children learning English as a second language (e.g., Hoover & Gough, 1990; Proctor, Carlo, August, & Snow, 2005). In addition, the relative contribution of meta-cognitive factors, including theory of mind, to story comprehension has largely been unexplored, particularly in L2 learners. Thus, a final goal of the current study is to uncover the factors that contribute to story comprehension in L1 and L2 children.

One model of reading comprehension developed for L1 speakers suggests that both decoding skills and listening comprehension skills are necessary to understand text (Gough & Tunmer, 1986). Braze, Tabor, Shankweiler, and Mencl (2007) tested an expanded version of this model and examined whether phonological awareness, decoding, verbal working memory, listening comprehension, word knowledge, and experience with print predicted reading comprehension. Researchers found that vocabulary knowledge captured unique variance in reading comprehension even after listening comprehension and decoding skills were accounted for.

Although word-level reading skills in L2 learners are often within the average range in comparison to norms established for monolingual speakers (Lesaux & Siegel, 2003; Verhoeven, 2000), research has shown that ESL students and Dutch L2 learners lag behind L1 speakers on vocabulary knowledge (e.g., Carlisle, Beeman, Davis, & Spharim, 1999; Verhoeven, 2000). Proctor et al. (2005) tested the model of reading comprehension applied to L1 learners in a group of fourth-grade children who were Spanish speakers. The results indicated that English word-level reading skills were related to English reading comprehension and that both general English listening comprehension skills and English vocabulary knowledge were independently and significantly related to English reading comprehension performance. Thus, in both L1 and L2 children, vocabulary development appears to be one of the strongest predictors of story comprehension.

Meta-cognitive factors, including theory of mind, have also been linked to aspects of story comprehension in both L1 and L2 children (Peskin & Astington, 2004). For example, in English speaking children, Gernsbacher, Hallada, and Robertson (1998) demonstrated that readers require high levels of meta-cognitive understanding to make inferences about a story character's emotional states. Pelletier & Astington (2004) reasoned that understanding mental states may facilitate story comprehension because it leads to an awareness of the intentions of both the characters and the author. In addition, they suggested that it may foster children's critical thinking and prompt them to consider alternative views and to make judgments about important issues, such as morality.

In L2 learners, the majority of research has focused on general meta-cognitive factors in L2 story comprehension. For instance, Tang and Moore (1992) found that providing ESL students who were emergent readers with meta-cognitive training was more effective in raising reading comprehension levels, compared to providing students with pre-reading activities. Similarly, Fitzgerald (1995) argued that second language readers are able to recognize and use meta-cognitive vocabulary and meta-cognitive strategies to monitor their reading comprehension.

One study has directly examined whether theory of mind, meta-cognitive language, reading skills, and vocabulary development predicted fables understanding in L1 and L2 children (Pelletier, 2006). Results from this study indicated that English vocabulary was the only significant predictor of story comprehension in both L1 and L2 learners. Thus, in contrast to some previous studies, which have demonstrated a link between meta-cognitive factors and story comprehension, this study demonstrated that theory of mind was not a significant predictor in L1 and L2 children's ability to comprehend fables. However, meta-cognitive factors of theory of mind and meta-cognitive language contributed more to story comprehension for lower-achieving L2 children in Grade 4 and for lower-language ability L2 children in Kindergarten to Grade 2. Although English

vocabulary development appears to play a significant role in L2 story comprehension, the relative contribution of theory of mind remains unclear in this population.

2.4 Study Goals

Given the scarce research examining the relations among theory of mind, vocabulary ability, reading development, and fables understanding in L2 children, this study was exploratory in nature. The goals of this study were threefold. The first goal was to investigate the role that family factors (parent education and sibling status) play in children's theory of mind, vocabulary ability, reading development, and fables understanding, and whether these variables play the same role for L1 and for L2 learners. The second goal of the study was to explore the relationship between false belief understanding and language ability in children who spoke English as second language. The third goal was to examine predictors of story comprehension in L1 and L2 children.

3. Methodology

3.1 Participants

Data from the present study were collected as part of a larger research project examining the implementation of a school-based readiness program for diverse families and their prekindergarten children. Participants were drawn from eight schools near Toronto, Canada. Although parent, child, and teacher data were collected over a two-year period, the focus in this study was on child data collected in the first year. Participants included 170 kindergarten children ranging from 45 to 71 months with a mean age of 57.34 months (SD = 6.51). All children were enrolled in either junior (3 or 4 years old) or senior kindergarten (4 or 5 years old) at the time of data collection. Eighty-one of the kindergarten children (36 boys; 45 girls) spoke English in kindergarten and spoke a second language at home, and 89 children (41 boys; 48 girls) spoke English in both settings. Of the L2 children, 46% spoke a South Asian language (Gujarati, Hindi, Punjabi, Tamil, or Urdu); 13% spoke an East Asian language (Chinese or Vietnamese); 6% spoke a European language; and 3% spoke Arabic.

The highest level of education obtained by each parent was averaged as an index of socioeconomic status. Parental education was chosen to represent social class because it has been identified in previous literature as one of the most stable components of a family's social status (Featherman, Spenner, & Tsunematsu, 1988). However, it is important to note that occupation level may not match education level due to the challenges faced by recent immigrants to find employment. Independent samples t-tests revealed that there were no significant differences between the L1 and L2 groups on parental level of education, suggesting general equivalency in regards to learning and education across groups.

3.2 Materials and Procedure

Twenty to thirty minute long tasks were administered individually to children in the fall term of the kindergarten year. Children were withdrawn from their classes by a researcher and taken to another classroom. Parents were interviewed (15 minutes) to obtain demographic information. Translators were available when necessary, although most L2 parents were able to communicate in one-on-one interviews.

3.2.1 Parent Questionnaire

Parents provided demographic information about their child (name, gender, date of birth, and grade) and about themselves (parent/guardian name, mother's and father's education, and number and age of children in the household). Parents were asked to indicate for both the child's mother and father their highest level of education attained.

3.2.2 Theory of Mind Tasks (False Belief)

The study objective was to examine and compare L1 and L2 preschoolers' mental state development. Wellman and Liu (2004) urge researchers to consider that second-order false beliefs are often acquired after a first-order understanding of false belief in the early school years (Perner & Wimmer, 1985). Likewise, tasks representing a more advanced theory-of-mind understanding (Happe, 1994) are thought to be acquired later in development and focus largely on metaphor, irony, double deceptions, and complex narratives. Accordingly, the researcher did not include second-order false belief tasks or advanced theory of mind understandings in our study. Instead, the researchers focused on tasks more appropriate for younger children. At each time of testing children were given four standard first-order false belief tasks. The order of the tasks and of test questions within tasks was counterbalanced across children. The tasks were of three kinds: one "unexpected contents" false belief task, one "appearance-reality" task and two "change in location" false belief tasks:

- Unexpected Contents False belief (Gopkin & Astington, 1988; Perner, Leekam, & Wimmer, 1987): A familiar box (e.g., a Smarties box) was shown to the child and then opened to reveal unusual content. After the unusual content was replaced in the box the child was asked what he or she had thought was in the box before it was opened, and what a friend (named in the test question) would think was in the box before it was opened. A different box and its content were used each time. Children earned one point per trial if they responded correctly to all questions for a possible task total of two.

- Appearance-Reality False belief Task: This task was similar to the first, including questions about own belief and friend's belief, but used standard appearance-reality test materials (Flavell, Flavell, & Green, 1983). Children were shown an object in a book and then a partial object through a cut-out circle that looked like part of the original object but was really something else (e.g., the first object was a lion; the occluded object looked like the lion's mane but was actually the rays of the sun). They were asked what they thought the object looked like and what their friend would think it was when he or she first saw it. Children earned one point per trial if they responded correctly to all questions for a possible task total of two.

- Change in Location False belief Task (Wimmer & Perner, 1983): These tasks were acted out with dolls and then the children were asked questions regarding the stories. A boy doll leaves an object in one place and while the boy is away it is moved to a new place by a girl doll. Then the boy returns and the child were asked where the boy will look for the object. Two control questions were asked to ensure that the child remembered where the boy had left the object and that the child knew where it really was later on. For example: "This boy has a candy. He puts it away in the cupboard. Then he goes outside to play. While he is gone his sister takes the candy out of the cupboard. She puts it in the box. Then the girl goes upstairs. The boy comes back. He wants to get his candy. Where will the boy look for the candy? Where did he put his candy before he went outside? Where is the candy really?" Children earned one point per trial if they responded correctly to all questions for a possible task total of three. Because two changes in location tasks were administered to each child, a maximum score of six is possible.

3.2.3 Total ToM Score

Following previous research (e.g., Huges & Cutting, 1999; Randell & Petterson, 2002), the researchers aimed to obtain a sensitive index of theory of mind understanding by adding each participant's performance across multiple false belief tasks to obtain a total false belief score. To check the feasibility of using a total false belief score, the researchers calculated the Cronbach's alpha coefficient across the four false belief tasks (comprising ten false belief questions). The result indicated sound internal consistency (α =.78), justifying the use of this total ToM score in our analyses.

3.2.4 Language Ability

Receptive vocabulary was assessed using the Peabody Picture Vocabulary Test– Revised (PPVT; Dunn & Dunn, 1981). The difficulty of the items on the PPVT ranges from preschool to the superior adult level. Each child was presented with a series of four pictures and in each instance was asked to choose which picture corresponded to a test word spoken aloud by the experimenter. Children begin the test with the appropriate question according to their age and continue through the items until they make eight consecutive errors. There is no time limit. Standardized scoring procedures were used.

3.2.5 Reading Ability

The Test of Early Reading Ability-Second Edition (TERA-2; Reid, Hresko, & Hammill, 1989) was administered according to standardized procedures. It is a widely used measure of emerging literacy and is frequently implemented in research that examines developmental differences in children's reading abilities (Kuby & Aldridge, 1997; Harper & Pelletier, 2008). It has been previously used in studies involving ethnically diverse samples (Hammer, Miccio, & Wagstaff, 2003; Lynch, 2004) and children from various socioeconomic backgrounds (Clark & Kragler, 2005; Tracey & Yong, 2006). Children begin the test with the appropriate question according to their age (e.g., 5-year olds start with item 10) and continue through the items until they make five consecutive errors. Each test item measures a component of early literacy (alphabet knowledge, convention of print, or meaning), and items are presented in a sequence of increasing difficulty, but are not grouped according to their category (i.e., alphabet, conventions, and meaning). The TERA-2 was administered to the children in our study because it was the most recently published version that was available at the time of data collection. The authors of the TERA-2 have reported sufficient content, construct, and criterion validity, and have also indicated strong reliability scores of .91 and .90 for Form A and B, respectively (Reid et al., 1989). Thus, following previous research that used the TERA-2, conclusions about children's overall reading ability were based on one total standard score that accounted for all items on the test (Hammer et al., 2003; Reid & Hresko, 1980; Sacks & Mergendoller, 1997).

3.2.6 Fables Task

The Fables Task was a researcher-developed experimental measure introduced to test story comprehension. The task consisted of two story comprehension items. An example of a fable is as follows: A fox had fallen down a well. A thirsty goat walked by and the fox called out: "Come down here and taste this delicious water." The goat jumped right in and the clever fox climbed on the goat's back and got out of the well. The fox said: "Silly goat, if you had paid attention to where you were going you would not be stuck in the well." Children were asked four questions representing levels of understanding: Knowledge (who had fallen in the well?), comprehension (why did the goat jumped in the well?), understanding of deception (is someone playing a trick? Who?), and higher-level comprehension/evaluation (what is the moral/lesson of the story?) Questions 1 to 3 (knowledge, comprehension, and understanding of deception) were each scored either 0 or 1 point, and question 4 (higher-level comprehension/evaluation) was scored 0 to 5 points. The maximum score for each fable task was eight, making 16 the total maximum score for both fables.

4. Results

4.1 Group Differences

Table 1 presents means and standard deviations for the L1 and L2 groups across all the dependent variables (vocabulary, reading ability, false belief, fables understanding). The L1 group scored significantly higher than the L2 group on vocabulary performance, $t(135) = -8.46$, $p < .001$; false belief understanding, $t(158) = -6.37$, $p < .001$; and on fables comprehension, $t(149) = -2.07$, $p < .05$. There was no significant difference between L1 and L2 groups on reading ability, $t(158) = -.43$, $p = .669$.

Table 1

Means and SD for L1/L2 children in Language Ability, Reading Ability, False Belief, and Fables Understanding

Dependent variables	L1 Children			L2 Children		
	n	*M*	*SD*	*n*	*M*	*SD*
Language Ability	85	104.55	13.25	75	83.24	17.92
Reading Ability	85	100.14	14.95	75	99.13	14.73
False Belief	84	7.95	2.12	76	5.68	2.38
Fables Understanding	85	5.12	2.82	68	4.24	2.36

4.2 Research Question 1: What Are the Effects of Family Factors (SES and Sibling Status) and L2-Status on Children's Cognitive Abilities?

A preliminary analysis was conducted to determine whether children with siblings (youngest, middle, and oldest siblings) performed similarly to children without siblings (only children and twins). Because no significant differences were found, the current study focused on examining the effects of sibling status (oldest, middle, and youngest children) and L2-status on language development, reading ability, theory of mind, and fables understanding. A 2 X 3 (L2-status X sibling status) multivariate analysis of variance (MANOVA) revealed a significant main effect for sibling status on language development, $F(1,92) = 6.74$, $p < .01$, partial $\eta^2 = .13$ (see Figure 1). Post Hoc tests indicated that youngest children ($M = 100.88$, $SE = 1.94$) performed significantly better on the language measure compared to middle children ($M = 91.04$, $SE = 3.42$) and oldest children ($M = 90.56$, $SE = 2.42$). There was no significant difference between middle children and oldest children in language ability. In addition, the researchers found no significant main effect for sibling status on reading ability, $F(1,92) = .23$, $p=.79$, partial $\eta^2 = .00$, theory of mind, $F(1,92) = 2.39$, $p = .10$, partial $\eta^2 = .04$, or fables understanding, $F(1,92)=2.92$, $p = .06$, partial $\eta^2 = .06$.

The researchers found a significant main effect for L2 status on language development, $F(1,92) = 45.97$, $p< .001$, partial $\eta^2 = .33$ and theory of mind, $F(1,92) = 24.43$, $p < .001$, partial $\eta^2 = .21$, (see Figure 2 and 3, respectively) but not reading ability, $F(1,92) = .01$, $p = .936$, partial $\eta^2 = .00$, or fables understanding, $F(1,92)=2.97$, $p = .088$, partial $\eta^2 = .03$. Specifically, L1 children had significantly better developed language skills ($M = 104.59$, $SE = 2.02$) and theory of mind understanding ($M = 7.65$, $SE = .31$) compared to L2 children ($M = 83.73$, $SE = 2.32$ and $M = 5.30$, $SE =.36$, respectively). There was no significant sibling status by L2 status interaction across any of the dependent variables.

Next the researchers explored whether parental education (SES) was related to children's vocabulary development, reading ability, theory of mind, and fables understanding in each of the L1 and L2 groups. The researchers found that, in the L1 group, SES was positively correlated with language ability ($r = .38$, $p < .01$) and reading ability ($r = .23$, $p< .05$), but not with theory of mind ($r = .14$, $p = .212$) or fables understanding ($r = .16$, $p = .156$). In other words, higher levels of parental education were associated with better developed language and reading skills in L1 children. However, this relationship was not observed for L2 children. In the L2 group, SES was not significantly correlated with language ability ($r = -.01$, $p = .931$), reading ability ($r = .06$, $p = .615$), theory of mind ($r = -.06$, $p = .623$), or fables understanding ($r = -.02$, $p = .869$).

4.3 Research Question 2: Does Language Ability Predict Theory of Mind in each the L1 and L2 Groups?

4.3.1 Correlations

The next question of interest involved determining whether language ability was the strongest predictor of theory of mind in the L1 and L2 groups. Pearson product-moment correlations were first conducted to explore the relations among parental education, children's age, vocabulary development, reading ability, false belief, and

fables understanding. As seen in Table 2, in the L1 group, false belief understanding was positively related to children's age (r = .32, p < .01), vocabulary development (r = .59, p < .01), reading ability (r = .35, p < .01), and fables understanding (r = .44, p < .001). Similar correlations were obtained in the L2 group (see Table 3). That is, false belief understanding was positively associated with children's age (r = .37, p < .01), vocabulary development (r = .57, p < .01), reading ability (r = .33, p < .01), and fables understanding (r = .35, p < .01).

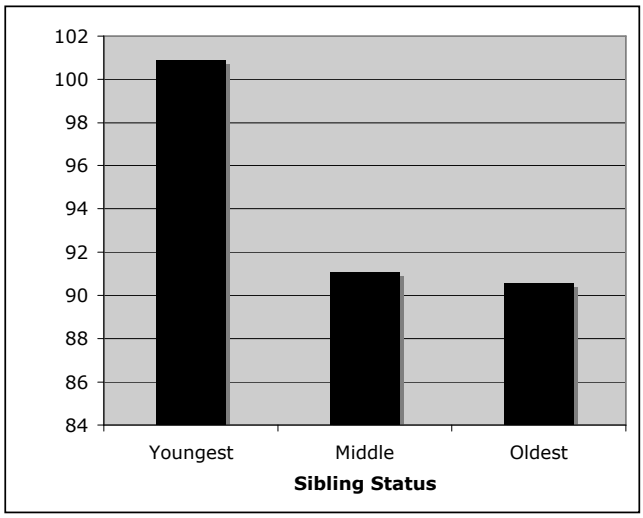

Figure 1. Mean Scores for Language Ability (Peabody Picture Vocabulary Test) for Youngest, Middle, and Oldest Children

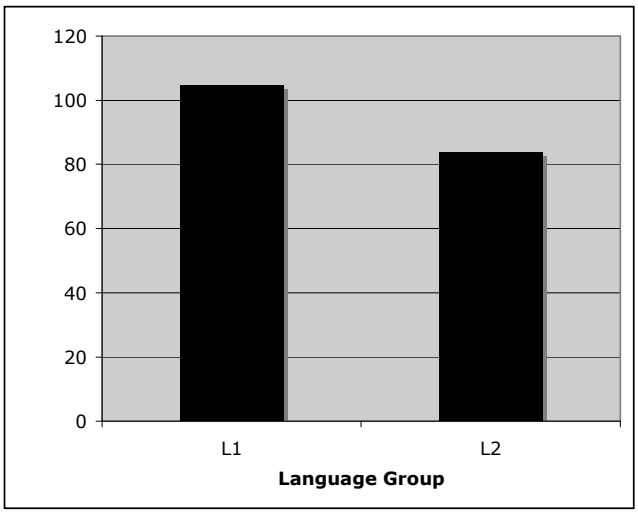

Figure 2. Mean Scores for Language Ability (Peabody Picture Vocabulary Test) for L1 (English as First Language) and L2 (English as a Second Language) Children

Table 2

Correlations of Parental Education (SES), Children's Age, Language Ability, Reading Ability, False Belief, and Fables Understanding in L1 children

	Items	1	2	3	4	5	6
1	Age	1					
2	SES	.02	1				
3	Language Ability	.29**	.36**	1			
4	Reading Ability	.19	.21	.49**	1		
5	Theory of Mind	.32**	.12	.59**	.35**	1	
6	Fables Understanding	.42**	.13	.52**	.40**	.44**	1

Note. **p < 0.01

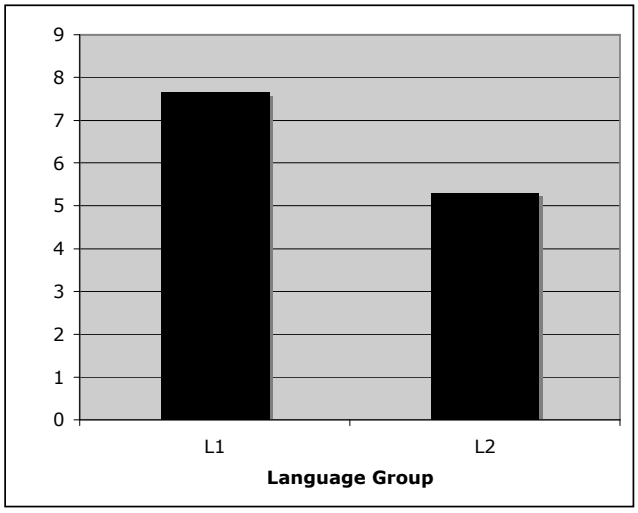

Figure 3. Mean Scores for Theory of Mind (First Order False Belief) for L1 (English as First Language) and L2 (English as a Second Language) Children

4.3.2 Regression Analyses

Multiple regressions were run in each of the L1 and L2 groups to determine which variables from the correlational analyses were the strongest predictors of theory of mind understanding. Among the L1 learners, age, vocabulary development, reading ability, and fables understanding were entered sequentially in the regression analysis to predict theory of mind development. Results indicated that vocabulary development was the strongest predictor of theory of mind (β = .327, p < .01), R^2 change = .176, with age being the only other significant predictor (β = .241, p < .05), R^2 change = .166, $F(2,70) = 18.16$, p < .001.

In the L2 group, age, vocabulary development, reading ability, and fables understanding were entered sequentially in the regression analysis to predict theory of mind. As with L1 children, vocabulary development was the strongest predictor of theory of mind in L2 children (β = .510, p < .01), R^2 change = .294, with age being the only other significant predictor (β = .283, p < .05), R^2 change = .122, $F(2, 53) = 18.83$, p < .001.

4.4 Research Question 3: What Predicts Story Comprehension in Each the L1 and L2 Groups?

4.4.1 Correlations

In the L1 group, fables understanding was positively related to age (r = .42, p < .01), vocabulary development (r = .52, p < .01), and reading ability (r = .40, p < .01) (see Table 2). In the L2 group, fables understanding was positively correlated with age (r = .28, p < .05) and vocabulary development (r = .51, p < .01), but not with reading ability (r = .18, p = .164) (see Table 3).

4.4.2 Regressions

Multiple regressions were run in each of the L1 and L2 groups to determine which variables from the correlational analyses were the strongest predictors of fables understanding. In the L1 group age, vocabulary development, and reading ability were entered into the analysis. Independent variables were entered simultaneously as a block because there was no strong theoretical reason for sequential entry. Vocabulary development was the strongest predictor of fables understanding (β = .379, p < .01), R^2 change = .294, followed by reading ability (β = .259, p < .05), R^2 change = .060, and age (β = .296, p < .05), R^2 change = .049, $F(3,69)=15.51$, p < .001.

In the L2 group, age, vocabulary development, and false belief were entered simultaneously as predictors of fables understanding. Results of the second regression analysis revealed that only vocabulary development was a

significant predictor of fables understanding in the L2 group (β = .499, p < .001), R^2 = .249, $F(1, 57)$ = 18.90, p< .001.

Table 3

Correlations among Parental Education (SES), Children's Age, Language Ability, Reading Ability, False Belief, and Fables Understanding In L2 Children

	Items	1	2	3	4	5	6
1	Age	1					
2	SES	-.21	1				
3	Language Ability	.13	-.01	1			
4	Reading Ability	.07	.06	.56**	1		
5	Theory of Mind	.37**	-.05	.57**	.33**	1	
6	Fables Understanding	.28*	-.03	.51**	.18	.35**	1

Note. **p < 0.01 *p < 0.05

5. Discussion and Conclusions

This study set out to examine the relations among family factors, vocabulary, reading skills, theory of mind development, and story comprehension in L1 and L2 learners. These variables were examined in a group of preschoolers who are acquiring English as a second language while being schooled in English. It was found that L1 and L2 children's vocabulary development was equally influenced by sibling status. However, only in the L1 group were children's vocabulary and reading skills related to parental education. General vocabulary more than any other factor predicted how well L1 and L2 learners did on theory of mind and fables comprehension tasks. Children's reading skills contributed to fables understanding only for L1 but not for L2 children. The results of this study provide support for to the need for educators to consider the differential needs of first and second language learners.

First, this study examined the effects of family factors (parental education and sibling status) and L2 status on children's cognitive abilities. In particular, the researchers explored whether SES (parental education) was related to children's vocabulary development, reading ability, theory of mind, and fables understanding in each of the L1 and L2 groups. Only L1 children's vocabulary and reading skills were related to parents' education. L1 children's theory of mind development or fables understanding was not related to SES. In other words, higher levels of parental education were associated with better developed language and reading skills in L1 children. This relationship, however, was not observed for L2 children. In the L2 group, parental education was not associated with language ability, reading ability, theory of mind or fables understanding.

Cutting and Dunn (1999) also found that SES (maternal education and maternal and paternal occupations) was highly correlated with children's language abilities. Likewise, the finding that L1 children's reading skills were related to parental education is consistent with previous research (Petrill et al., 2006) indicating that family context is important to reading, especially when examining phonological awareness and print knowledge in young children. However, Cutting and Dunn (1999) found an additional association with SES (maternal education and maternal and paternal occupations). Specifically, they found that SES was correlated with children's false belief understanding. Our study found that differences in children's false belief task performance were not explained by differences in the level of parental education in either L1 or L2 children. The relationship between SES and children's theory of mind in L1 children remains unclear and requires further investigation.

If no differences were found in SES between L1 and L2 groups, why were L2 children's language and reading abilities not associated with their parents' education as with L1 learners? Previous cross-cultural studies (e.g., Wahi et al., 1994) have suggested that family background affects theory of mind development. Again, the researchers did not find a link between L2 children's theory of mind and parental education. One reason for the lack of association between these variables might be that the measures in our study were all administered in English. Perhaps if the measures had been delivered in the child's native language, a relationship between

parental education and children's cognitive abilities may have emerged. Because L2 children speak a language other than English at home, their experiences in the family environment, such as speaking and reading with their parents, occur in a non-English context. It is possible that L2 children's cognitive abilities are more readily detected with non-English language measures. This may explain why L2 children scored significantly lower than L1 children on vocabulary performance, false belief understanding, and fables comprehension. It would be interesting for future studies to test children in their native language to explore whether children's cognitive abilities are associated with parental education.

Previous research has illustrated that sibling relationships influence children's cognitive abilities. The current study provides partial support for these findings in L1 and L2 learners. Consistent with previous findings (Prusky & Pelletier, 2009), it was found that oldest and youngest L1 and L2 children performed differently on the vocabulary task. Youngest children (with older siblings) outperformed older children (with younger siblings). This suggests that having older siblings may facilitate vocabulary development. Perhaps oldest children were not performing as well because many of the younger siblings were infants. Therefore, this study did not support a first born advantage. Our finding that siblings do not differ in terms of their reading skills is consistent with previous work (Prusky & Pelletier, 2009), which also found that later born children may benefit the most because they get the extra language training from adults and older siblings. However, our results are at odds with previous research in that all children had similar theory of mind performance.

Cutting and Dunn (1999) suggested that it is not simply the number of siblings that a child has, but the quality of the sibling interaction that plays a major role in a child's life. Cutting and Dunn found no association between the number of siblings (older, younger, both) that a child had and his or her theory of mind understanding. By no means does this imply that siblings do not influence young children's social cognition. Indeed, there is plenty of evidence to the contrary (e.g., Cassidy, Fineberg, Brown, & Perkins, 2005; Jenkins & Astington, 1996). Perhaps it would be beneficial to inquire about the quality of sibling relationships. Previous research reminds us that our findings may reflect the diverse nature of our sample and indicates that siblings from different family backgrounds may interact in qualitatively different ways (Cutting & Dunn, 1999; Dunn, Slomkowski, & Beardsall, 1994). As Cassidy and colleagues suggested (2005), it is possible that living with siblings generates specific kinds of conversations that improve theory of mind abilities. For example, pretend play between siblings has been associated with the use of internal state language (Howe, Petrakos, & Rinaldi, 1998; Howe, Rinaldi, Jennings, & Petrakos, 2002; Youngblade & Dunn, 1995). This increased talk about mental states may play an important role in the development of theory of mind.

The second research question of interest involved determining whether language ability was the strongest predictor of theory of mind in L1 and L2 children. Consistent with Milligan and colleagues' meta-analysis (2007), our study findings showed a stronger direction of effect from language to false task belief than the reverse. In accordance with previous findings with Kindergarten-Grade 2 L2 children, for both groups of children, vocabulary was found to be the strongest predictor of false belief task performance with age being the only other significant predictor (Pelletier, 2006). That is, L2 children who performed better on a vocabulary test had higher theory of mind understanding. Thus, general language plays an equally vital role in the development of false belief understanding, and thus in the development of theory of mind in L1 children and children who are learning English as a second language. Similarly, consistent with previous research (e.g., Liu et al., 2008), our results showed that age plays an important role in the development of theory of mind. These findings are informative in that they replicate previous findings (Pelletier, 2006) making the link between language and theory of mind development in L2 learners more robust. It would be interesting for future longitudinal design research to examine whether children's theory of mind development undergoes a synchronous timing for its onset across cultures.

Whereas previous research has uncovered many of the factors related to story comprehension in L1 children (e.g., Nagy et al., 1993; Reese et al., 2000), the third research question in our study focused on variables related to story comprehension in children learning English as a second language. Moreover, the current study also

examined the role of metacognitive factors, including theory of mind, in L2 children's story comprehension. Not surprisingly, in both the L1 and L2 groups, our measure of vocabulary captured the largest amount of variance in story comprehension. Clearly, if one does not know the meaning of individual words, then one will have difficulty understanding larger strings of text read orally. Indeed, these findings are consistent with previous research that has demonstrated that vocabulary development is one of the strongest predictors of story comprehension in both L1 and L2 learners (Braze et al., 2005; Proctor et al., 2005).

Our finding that theory of mind understanding was not a significant predictor of story comprehension in either the L1 or L2 groups is at odds with the views suggested by other investigators (e.g., Peskin & Astington 2004; Gernsbacher et al., 1998) that readers require high levels of metacognitive understanding to make inferences about a story character's emotional states and intentions. Our findings are somewhat surprising given that our story comprehension task appeared to require metacognitive abilities such as the understanding of deception (e.g., is someone playing a trick? Who?), and higher-level comprehension/evaluation (e.g., what is the moral/lesson of the story?). However, our results are in line with a previous study (Pelletier, 2006) in which the role of theory of mind, metacognitive language, reading skills, and vocabulary development in fables understanding was examined in L1 and L2 children. As with our findings, results from the previous study revealed that vocabulary was the only significant predictor of story comprehension in both L1 and L2 learners. The mixed results regarding the relative contribution of theory of mind to story comprehension remains unclear in the L2 population and requires further investigation.

Unlike Pelletier's study (2006) in which vocabulary development was the only significant predictor of fables understanding in both L1 and L2 children, in our study, reading ability and age were also significant predictors of story comprehension in the L1 group. However, this was not the case for L2 children. One plausible explanation as to why age predicts theory of mind in L1 children but not L2 children may be that for children who have English as a second language, age may not be what predicts theory of mind, but rather the amount of exposure to the English language. The researchers found that children's reading skills contributed to fables understanding only for L1 but not for L2 children.

5.1 Limitations

Several limitations of this study should be considered. First, our demographic questionnaire was limited. In terms of languages spoken at home the researchers had the category "European language", which was too general. It would be interesting to obtain a more detailed understanding of the diverse languages spoken by these children. Similarly, the researchers employed general measures of family background. Future research could examine the specific mechanisms by which individual differences in factors such as parental education affects young children's understanding of false belief tasks. For example, do different parenting styles (e.g., authoritarian versus authoritative) influence young children's cognitive abilities? Do activities that parents and children get involved in play a major role?

In terms of our measures, the TERA-2 provides one total standard score to represent children's overall reading ability (Hammer et al., 2003; Reid & Hresko, 1980; Sacks & Mergendoller, 1997). If this study were to be replicated it would be interesting to use the more recent version of the TERA (the TERA-3), which would allow an examination of whether group differences exist in children's performance on one or two (but not all) the subtests. As Harper and Pelletier (2008) noted, using a total score of children's early reading ability may be problematic, as group differences may not be visible when scores are collapsed. In the present study, results showed that L1 children had significantly higher scores than L2 children on the TERA-2. A combination of the TERA-3 and a more detailed report of language groups would have enabled a more in-depth exploration of group differences.

It is clear that considerable research in this area is needed in order to disentangle the complex relationships among L1 and L2 children's cognitive development and family factors. It will be of particular importance to

clarify the link between L1 and L2 children's SES (measured by either parental education or parental occupation) and children's theory of mind, vocabulary, and reading development. Future studies examining familial differences in parent-driven, shared environmental influences, such as parental verbal skills and book sharing might provide important information in regards to children's outcomes that can better inform parents and teachers in fostering an active learning environment.

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