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Theory of Mind in Bilingual and Monolingual Preschool Children

Mokhtar Farhadian[1], Rohani Abdullah[1], Mariani Mansor[1], Ma'arof Redzuan[1], Neda Gazanizadand[2] and Vijay Kumar[3]

1. Department of Human Development and Family Studies, Faculty of Human Ecology, University Putra Malaysia, Serdang 43400, Malaysia
2. Department of Community health, Faculty of medicine and health science, University Putra Malaysia, Serdang 43400, Malaysia
3. Department of English, Faculty of Language and Communications, University Putra Malaysia, Serdang 43400, Malaysia
Telephone: 0060173525390, E-mail: mokhtar_farhadian@yahoo.com

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ABSTRACT This research examined whether theory of mind (ToM) development differs in bilingual and monolingual preschool children. Three false belief tasks were given to 163 Kurdish-Persian bilingual and Persian monolingual preschool children. Bilingual children performed significantly better than monolingual children in their ToM. Hierarchical multiple regression analysis revealed that, bilingualism contributed significantly to the prediction of preschoolers' ToM development when age and verbal ability were controlled.

INTRODUCTION

Cognitive development in preschool children is marked by significant advancement in social understanding. Perhaps one of the most interesting abilities that begin to emerge during preschool years is children's capability to appreciate other individuals. Children's ability to attribute causal mental states in order to explain and predict behavior is called theory of mind (ToM) (Premack and Woodruff 1978). Children's ToM has been an active area of research in developmental psychology for the past twenty years. Work in the area investigates young children's understanding of themselves and other people as mental beings (Milligan et al. 2007).

The most widely used measures of ToM development are false belief tasks. Much of the research has focused on children's understanding of false belief (Wellman and Lui 2004). One version of it involves changing the location task (Wimmer and Perner 1983). In this version, a child sees another child named Maxi; Maxi puts his chocolate in a cupboard and then leaves. While Maxi is outside, his mother moves the chocolate to the drawer. Then Maxi returns. The child is asked the false belief question "Where will Maxi look for the chocolate?" Or memory question, "Where is the chocolate now?" This developmental pattern is consistent across numerous task modifications, thus establishing that false belief tasks measure critical conceptual development (Wellman et al. 2001). The false belief tasks assess a child's ability to reason about the behavioral consequences of holding a mistaken belief.

Accordingly, there is marked variation in the age that individual children achieve success on false belief tasks. Even on the same version of the false belief tasks, some children succeed at 3 years of age and some not until 5 years old (Jenkins and Astington 1996). In addition, it has been suggested that the ToM ability develops in preschool children between the age of 3 to 5 years (Bialystok and Senman 2004).

Furthermore, it has been suggested that ToM is impossible without language (Segal 1998). The socio-cognitive abilities that separate humans from chimpanzees include the use of language, the ability to "read the mind" of other individuals, and the ability to "see" things from someone else's view.

In all these studies, language has been implicated as an important contributing factor to many aspects of social and emotional development. Flavell (1999) argues that most of the earliest studies into the children's mind development were directly or indirectly products of Piaget's work. Piaget (cited in Farrant et al. 2006) argues that language plays a causal role in the development of intelligence/logic thought. Therefore, some researchers believed that there is a clear

relationship between performance on false belief tasks and standardized measure of language ability in typically developing children (Astington and Jenkins 1999; Cutting and Dunn 1999; Hughes and Dunn 1997; Jenkins and Astington 1996).

The relationship between ToM and language has been examined in a diversity of ways. Jenkins and Astington (1996) found that general language ability correlates with performance on false belief tasks. This relationship is not always found when other measures of language ability, such as mean length of the utterance, are used (Welch-Ross 1997). Astington and Jenkins (1999), in a longitudinal study, found that language competence predicted the development of ToM ability. Recently, Farrant et al. (2006) carried out a study on both specific language impairment and typically developing children. The results showed that acquisition of ToM is delayed in children with specific language impairment.

In the past two decades, acquisition of two languages simultaneously during the early childhood years has become increasingly common, and the focus of considerable scientific attention (Comeau and Genesee 2001). For example, Peal and Lamber's (1962) study, found that elementary school French-English bilinguals scored higher than monolinguals on test of verbal and non-verbal intelligence. Bialystok and Codd (1997) and Bialystok and Majurnmder's (1998) findings at the nonverbal problem-solving ability of bilinguals and monolinguals showed that bilinguals outperformed monolinguals in solving a problem that required higher level of intentional control.

Furthermore, findings from a number of empirical studies in the area of bilingualism supported the advantages of bilingual over monolingual children in metalinguistic ability (Bialystok 1988). Metalinguistic ability could help children improve the understanding that an action can be presented in different ways, and this understanding of meta-representation might influence children's ToM understanding.

It has also been suggested that bilingual children significantly outperformed their monolingual peers in the second sorting tasks. In a study by Bialystok (1999) sixty bilingual and monolingual preschooler's performance were tested in a card sort task. She asked the children to first sort a set of cart (blue and red circle and squares) according to their colors. Then, she asked them to sort the carts according to their shape. The results showed that bilinguals outperformed than monolingual children. Recently, Bialystok et al. (2006) and Bialystok (2006) observed small differences in dual task processing and in the magnitude of the Simon effect between bilingual and monolingual university undergraduate student. In another study, Bialystok et al. (2006) revealed a small advantage of bilinguals, in comparison to monolingual children in executive control system. In contrast, Jarvis et al. (1995) conducted a study on 3rd to 4th grade Mexican Spanish-English bilinguals, and found no relationship between the degree of bilingualism and nonverbal intelligence.

Some studies on the effect of different languages on ToM development (Anis and Harris 1991; Chen and Lin 1994; Viden 1996) have been conducted to investigate ToM development in bilingual children. For example, Goetz (2003) conducted a study to assess ToM and perspective-taking on three groups of children, Chinese monolingual, English monolingual, and Chinese-English bilingual children. The findings revealed that bilinguals outperformed by both monolingual groups at the first time but not at the second time.

Bialystok and Senman (2004) used appearance-reality task (the task to assess ToM) on bilingual and monolingual children, the results indicated that bilingual children out performed than monolingual children. On the other hand, bilingual children showed more advanced understanding of false belief. Bilinguals are more advanced in their cognitive tasks as well as ToM development. In a study by Chan (2004), ToM tasks and 3 cognitive tasks (1 reasoning task, namely Dimensional Change Card Sort and 2 metalinguistic awareness tasks such as Moving Word Task and Synonym Production) on 31 and 29 bilingual and monolingual preschoolers were administered. The results showed that bilinguals are more advanced in their cognitive tasks as well as ToM development**.** In other words, bilingual preschoolers are able to predict other's behavior by ascribing false beliefs in others. Thus, development of ToM provides young children with a better understanding of other's behaviors (Perner and Lang 2002).

To date, no study has compared ToM development in Kurdish-Persian bilingual and Persian monolingual children in Iran. This study aims to

fill this void in the literature. Kurdish-Persian bilingual users were selected for this study because of their representation in the population. The Persian community is a large non-Kurdish group in Kurdistan province. The second reason is a practical one. By recruiting Persian children, the researchers were able to communicate with them easily as it was a common language between them. Besides this, the researchers are bilinguals (Kurdish-Persian) and are able to administer the tests in Persian language easily.

The main purpose of the current study is to determine whether Kurdish-Persian bilinguals perform better than Persian monolingual children on a series of false belief tasks. The second aim was to determine the relationship between ToM, verbal ability, and age of the children. Since, bilingualism is difficult to categorize, for the purpose of the present study, the teachers and parent's report were used to identify children as bilinguals or monolinguals.

In line with the aim of the study, the research questions are:

- Is there any difference between bilingual and monolingual children on ToM development?
- Is there any relationship between ToM and verbal ability in preschool children?
- Is there any relationship between ToM and age in preschool children?
- To what extend bilingual children contribute to ToM development over and above age and verbal ability?

METHOD

Participants

Stratified simple random sampling method was used to select 163 (99 boys, 64 girls) typically developing bilingual and monolingual preschool children who were in kindergartens in Sanandaj city. (Sanandaj city is the capital of Kurdistan province located in the west of Iran). The children were from different socioeconomic classes. The mean age of children was 54.45 (S.D. = 5.75). Their ages ranged from 43 to 66 months. Sixty five (39%) of the children were monolingual and 98 (61%) were bilingual preschool children. Mean age of the monolinguals was 52.11 (SD = 4.85) and mean age of the bilingual children was 56.01 (SD = 5.79) months. The monolingual children comprised 45 males and 20 females, while the bilingual children were made up of 54 males and 44 females.

Research Design

We were interested in examining the difference between ToM development in Kurdish-Persian bilingual and Persian monolingual preschool years. Beside bilingualism, age and verbal ability were also considered as independent variables while ToM was our dependent variable.

Procedure

Prior to the administration of tests on the children, reliability of the false belief tasks and McCarthy scale was assessed. The test-retest coefficient of an interval of two weeks for false belief tasks and McCarthy scale of Children's Ability test was 7.41 and 8.92 respectively. The false belief tasks (Wimmer and Perner 1983) and verbal components of the McCarthy scales of Children's Ability tests (McCarthy 1972) were administered individually in a quiet room free of visual and auditory distractions in each kindergarten. The tests, which lasted up to 25 minutes, took eleven weeks to complete. During the process of testing, parents were allowed to enter the testing room, if the child had a problem sitting alone. However, if he or she could stay without the parent, then the child was left alone with the test administer in the room. Children's responses were recorded by the test administer. The tests were administered in a standard sequence designed from easiest to hardest, in order to increase the child's motivation. Between the tests and during the assessment sessions, ten-minute breaks were given for the children who were unable to stay focused for a long period of time. Children were allowed to discontinue the testing processes at any time and this happened to five of the children. In cases where the test was not completely administered in one session, a second testing session was scheduled within a week or two. At the end of testing session, all the children were given a small toy as a token for participating in the study.

Materials

In this study four instruments were used.

(a) Theory of Mind Tasks: Sally and Ann (Change of Location)

The first instrument used for assessing ToM was from Baron-Cohen et al. (1985) is the "Sally and Ann task". The instrument was adopted by changing the name Sally and Ann to Ahmad and Fatima. Besides this, in the original instrument a marble was used for the activity but in this study, the researcher replaced it with a ball. The test was administered in story form.

The child was presented the following scenario: *A boy named Ahmad has a ball. He plays with the ball for a while and he got tired. He puts the ball away in the box. He goes downstairs (disappears from view). While he has gone, his sister named Fatima takes the ball out of the box. Fatima plays with the ball for a while, and then she plays a trick on Ahmad. She puts the ball away in the basket and goes outside. Ahmad comes back. He wants to play with his ball again.* The children were then asked the false belief question, "*Where will Ahmad look for the ball*?" followed by memory question "*Where did he put the ball before he went downstairs*?" and "*Where is the ball really*?" Each correct false belief question response earned 1 point and 1 point for memory question. A maximum total of 2 points are scored for this task.

(b) Red / Blue Box (Change of Location)

A second instrument that was used is the Red/ Blue Box. In this false belief task, the previous scenario about Ahmad and Fatima was repeated using a new location. In this task, one red box, one blue box, and a piece of chocolate and two dolls were used. The test was administered in every form. The child was presented the following scenario: *One boy has a blue box and has some chocolate in it. He takes the chocolate from the blue box and eats some of it. He leaves the rest in the blue box. Then, he went downstairs. While he has gone, his sister takes the chocolate out of the blue box and puts it in the red box. Then, she went outside. The boy comes back. He wants to eat some chocolate.* The children were then asked the false belief question "*Where will the boy look for the chocolate*?" followed by memory question "*Where did he put the chocolate before he went out*?" and "*Where is the chocolate really*?" Each correct test question response earned 1 point and 1 point for memory question. A maximum total of 2 points are scored for this task.

(c) Crayon Box /Sticker or (Change of content

A third instrument was the Crayon Box/Sticker. This task was modeled on the version used by Gopnik and Astington (1988). The test was administered in practically format it means every action of the test was practically shown to the children. A child was shown a crayon box, which actually contained stickers. The child was initially shown the closed box and was asked to look at the box, "*What do you think is inside the box*?" Then the box was opened to reveal what was inside. He or she would find stickers, not crayon in it. Then, the box was closed again and the child was again asked, "*Now, what do you think is inside the box*?" Then, a false belief question was asked. The children were asked, "*What did you think is inside the box when you first saw it*?" The second false belief question concerned children's understanding of another person's false belief was then asked. For this question, the children were asked to name a best friend and then were asked, *"Imagine your friend (friend's name) comes in and see this box. What will (friend's name) think is inside the box*?" The correct false belief question response earned 1 point and 1 point for memory question. A maximum of 2 points are scored for this task.

False belief answers will be correct only if memory check answer is also correct. Consequently, if a child gets any memory check question incorrect then score of 0 will be given. If a child gets the memory check and false belief (FB) question correct then he will be given a score of 2 for each task. Children have to get false belief questions correct, along with the memory check to be given credit. Otherwise, they will score 0 on the false belief task. So, a score of 2 means they had passed both false belief task and memory check questions. A score of 0 meant that they either had the memory check question incorrect, or one of the two false belief questions incorrect. A child's total score could range from 0 to 6.

(d) McCarthy Scales of Children's Ability (MSCA)

A fourth instrument used in this study is the McCarthy Scales of Children's Ability (McCarthy

1972). This instrument was used to tab verbal ability of children and consists of five subscales. The child was asked to respond with one word answers, phrases, and sentences to a variety of items. The composite score of the five subscales are considered as verbal ability score of the children. The tests in the verbal scale are described below:

1. Pictorial Memory: The child was shown a card which had 6 colored pictures of familiar objects. The tests administer names the objects aloud during a 10-second exposure, after which the card was removed and the child tried to recall the objects. One point was given for each object correctly recalled.

2. Word Knowledge: Part 1of this test comprised a picture vocabulary required the child to demonstrate his understanding of the spoken language of others by pointing to 5 objects and naming 4 additional objects, all pictures on cards. So, 1 point was given for each card that the child gave an acceptable response. Part 2 was made up of oral vocabulary, which consisted of 10 words given in the usual manner. They were graded in difficulty and ranged from familiar to abstract concept. Scores for each word given ranged from 0 to two.

3. Verbal Memory: Part 1 of this test was a graded series of words and sentences to be repeated by the child. The first two items contained concrete concepts likely to be within the child normal vocabulary. The next two items contained 2-syllable words which were more abstract in meaning. The last two items comprised full sentences. One point was given for each word correctly repeated by the child and 1 point was deducted if the sequence of the words were changed. In Part two**,** the experimenter read a simple short story to the child, who was then requested to recall the story. He was not expected to repeat it verbatim, as long as the essential elements or ideas were present. The story was divided into 11 items. Each item was scored 0 for incorrect response or 1 for correct response.

4. Verbal Fluency: The test measured the child's ability to classify and think categorically. The child was to think quickly of words falling into each of 4 categories (things to eat, animals …) and named as many words as he or she could think within 20 seconds. One point was given for each acceptable response. A maximum of 9 points was allocated for each category.

5. Opposite Analogies: It required the child to provide the opposite of the key words in each of the 9 statements spoken by the examiner. One point was given for each correct response and 0 for incorrect response.

RESULTS

A large proportion of the children, 106 (64%) passed all control tasks. Seven (4%) could not pass any of the control questions. Thirty-five children (21%) obtained zero on the false belief tasks, thirty five (21%) of the children passed one of the false belief tasks while 37 (22%) of them passed two of the false belief tasks. Fifty-six children (34%) passed all false belief tasks. Of these, 53 (32%) children passed all false belief and control tasks, only 3 (2%) children did not pass any false belief and control questions.

Table 1 shows the means and standard deviations of the ToM, verbal ability, and age. The mean ToM score of the children in the present study was higher than those obtained by McAlister's (2007) study. And also the ToM performance of the present study was higher in compared to both time 1 and 2 by Goetz's (2003) study.

Table 1: Mean and standard deviation of ToM, verbal ability, age, in bilingual and monolingual children

	Mean (SD) *N = 163*	*Mean (SD)* *Bilingual n = 98*	*Mean (SD)* *Monolingual n = 65*
ToM*	4.27 (01.61)	4.76 (01.40)	3.53 (01.65)
Verbal ability	60.16 (12.78)	63.39 (11.84)	55.29 (12.68)
Age in month	54.45 (05.75)	56.01 (05.79)	52.11 (04.85)

ToM*= Total scores of Theory of Mind, Standard deviations are in the parenthesis

Table 2 shows the frequency and percentage of the bilingual and monolingual children who passed both the control and false belief questions correctly, and the children who passed none. A larger proportion of the bilingual children (45%) answered all questions correctly on false belief tasks, compared to monolingual children (14%). Only 4.6% of the monolingual children and 2% of the bilingual children obtained zero on ToM tests, which revealed a low rate of floor effect.

The first aim of the study was to determine the difference between ToM in bilinguals and monolingual children. The results showed that the performance of bilinguals on ToM development

(M = 4.76, SD = 1.39) was significantly different, t (161) = -5.1, p <.05, from the performance of the monolingual children (M = 3.53, SD =1.65).

Table 2: Theory of mind scores by language status

	All correct (6)		*All incorrect (0)*	
Variable	*%*	*N*	*%*	*N*
Language				
Bilingual (n = 98)	45	44	2	2
Monolingual (n=65)	14	9	4.6	3

The second aim was to determine the relationship between ToM, verbal ability, and age of the children. The results indicated that older children obtained higher scores on ToM (r = .292, p<.05). Children with more advanced verbal ability were likely to answer the false belief questions correctly (r = .502, p<.05). The relationship between verbal ability and ToM remains, when the effect of age is partialled out (see Table 3). Similarly, a positive relationships were also found between verbal ability and ToM in monolingual (r = .578, p<.05) and bilingual children (r = .320, p<.05).

Table 3: Correlations between ToM, verbal ability, and age

Variables	*ToM*	*Verbal ability*	*Age*
ToM	1.00	.502*	.290*
Verbal ability	-	-	.155*
Partial correlation after effect of age is partialled out			
ToM		.482*	

*p< .05

Table 4 (Inter-task Correlation for false belief tasks) reveals that only half of the children were able to pass each of the false belief tasks. It also indicates that children who passed on one false belief task were more likely to pass the other two tasks and vice versa.

In order to explore further, the links between ToM, verbal ability, language spoken, and age, a 2-step multiple linear hierarchical regression was conducted. Age and verbal ability were used as predictors in step 1 while language status (bilingual and monolingual) was entered in step 2. The results of this analysis showed that age and verbal ability explained 29.8% of the variance in ToM ($F_{2, 160 =}$ 33.917, p< .001). The summary of the hierarchical regression analysis is presented in table 5. The result revealed that a unit change in verbal ability brought about more change in ToM. When language status was added in the equation, it explained an additional 2.9% of the variance in ToM ($F_{1, 159}$ = 6.956, p<.05). Controlling for age and verbal ability, a unit change in language status brought about .189 changes in ToM, suggesting that the number of languages spoken by the child would make a difference in the child's acquisition of ToM**.**

Table 4: Inter-task correlation for false belief tasks (N=163)

	% pass	*Crayon Box/Sticker*	*Red/Blue Box*	*Box/ Basket*
Crayon Box/Sticker	53%	1.0	.329**	.253 **
Red/ Blue Box	55%			.435 **
Box/ Basket	57%			1.000

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

DISCUSSION

The findings of the present study indicated that the performance of bilingual children on ToM was significantly higher compared to the performance of monolingual peers. Hierarchical regression analysis revealed that over and above age and verbal ability, language status predicted ToM development significantly. This result is consistent with the study that was conducted by Goetz (2003) which demonstrated the influence of the number of language spoken in the develop-

Table 5: Summary of hierarchical regression analysis for variables predicting performance in ToM tasks (n=162).

	Unstandardized	*Standardized*					
Step/Variables	*B*	*Std. error*	*Beta*	*R*	*R^2*	*R^2 Inc*	*P*
Step1							
Age*	.061	.019	.217	.546	.289	.289	.001*
Verbal ability*	.059	.008	.467				
Step 2							
Age	.046	.019	.162	.572	318	.029	.009*
Verbal ability	.053	.009	.417				
Language status*	.623	.236	.189				

*P < .05

ment of ToM in children. The results also suggested that, bilinguals (Kurdish-Persian) are more advanced on ToM development as compared to monolinguals (Persian). Furthermore, the present results is consistent with Bialystok and Senman (2004) who found that four to five year old bilingual children performed better than monolingual children of the same age on appearance-reality false belief tasks, which these researchers interpreted as indicative of an advanced inhibitory control that comes with bilingualism.

Although there is some possible explanations for the advantage of bilingual children on ToM understanding, one possibility might be that all the children would know that the first language of the test administer is Kurdish language, thus the Kurdish-Persian bilingual children might feel free more than Persian monolingual children with the test administer, even though the test administer did not talk with the children in his first language in testing session. The other reason might be due to the higher mean age of the bilingual children. The third possibility might be that bilingual children have more metalinguistic abilities than monolingual children (Bialystok 2001; Goetz 2003). While bilingual children are frequently presented with objects that can be represented in two ways linguistically, they may easily recognize the arbitrariness of language, and it can help the bilinguals to recognize that one object or event can be named differently by different people and it can affect bilinguals ToM development.

Another possible explanation is that bilingual children have advanced inhibitory control. It is a factor which has been shown to be related to ToM performance (Henderson 2003; Hughes 1998). This possibility supports the suggestion of Bialystok (1992) that bilinguals need high level of inhibitory control on the selection attention. Thus, in false belief tasks, children must inhibit the unnecessary events or information to get the credit. As it was shown in the results, 44% of the bilingual children got the ceiling score as compared to 14% of the monolinguals. Therefore, it shows the possible sign of inhibitory control in bilingual children. Another possibility of the advantageous of bilinguals is the affects of culture, thus, the culture of bilingualism might have influence more than the culture of monolingualism.

Furthermore, some studies indicated that working memory facilitate the development of ToM in children (Artusa 1998; Davis and Pratt 1995; Gordon and Olson 1998; Keenan et al. 1998), and working memory capacity needs inhibitory control, so, the advantage of bilingual children in ToM might be due to better working memory. It would be fruitful for the next research to investigate working memory capacity in the bilingual and monolingual children.

The study found significant and positive links between age and ToM, as well as verbal ability and ToM. Furthermore, this study is consistent with Hughes and Ensor (2005) and Milligan et al. (2007) who found a correlation between ToM and verbal ability. Ensor and Hughes (2007) in three time points indicated that ToM and verbal ability was significantly correlated. Furthermore, the ToM development is a gradual process. Its development process is influenced by the child's maturity, level of language proficiency and experiences. The finding in this study suggest that thinking in two languages might indeed have a different impact on the children's mind and perspectives, compared to the skills acquired when they think and communicate in only one language.

However, the results indicate that learning a second language might have facilitated better ToM performance in children, and bilingual preschoolers are more able to predict other's behavior by ascribing false belief in others. However, future studies are needed to investigate the aspects of bilingualism that have major role for these advantages. The result of bilingual's advantage in ToM development is consistent with ToMM-SP model (Leslie and Thaisis 1992). The bilinguals are more advanced in cognitive development, especially when they are required to inhibit a proponent response to irrelevant information such as false belief tasks in this study.

CONCLUSION

The results of this study provided a strong evidence for the advanced performance of bilinguals on ToM development. The findings add further support to the argument that bilingualism plays an important role in ToM understanding.

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