



**UNIVERSITI PUTRA MALAYSIA**

**RELATIONSHIPS BETWEEN WORKING MEMORY, THEORY OF  
MIND, AND VERBAL ABILITY AMONG IRANIAN PRESCHOOL  
CHILDREN**

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FEM 2010 3**



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AND VERBAL ABILITY AMONG IRANIAN PRESCHOOL CHILDREN**

**By**

**MOKHTAR FARHADIAN**

**Thesis Submitted to the School of Graduate Studies, Universiti Putra Malasia, in  
Fulfilment of the Requirements for the Degree of Doctor of Philosophy**

**April 2010**



## **DEDICATION**

**To my dear mother, Haji Bobani and my late father, Ali Farhadian, who I will never forget him and to all my brothers for their true love, and encouragement, and most important to my beloved wife for all her understanding, patience, and support during all difficulties of my study and to my father- in- law, Ali Gazanizad and mother –in-law, Azizeh Faraji.**



Abstract of thesis presented to the Senate of Universiti Putra Malaysia in fulfilment  
of the requirement for the degree of Doctor of Philosophy

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**Chairman: Rohani Abdullah, PhD**

**Faculty: Faculty of Human Ecology**

A correlational study was carried out to investigate the relationship between working memory (WM), theory of mind (ToM), and verbal ability (VA) among Iranian preschool children. Stratified random sampling method was utilized to identify respondents for the study. One hundred and sixty-three preschool children were selected as respondents in this study. Ninety eight (62%) children were bilingual and 65 (38%) were monolingual children. Data were collected by using a questionnaire and three standardized instruments which included Automated Working Memory Assessment (AWMA), false beliefs tasks and McCarthy Scales of children's ability and a questionnaire. The result revealed that the mean scores of bilingual children in working memory, verbal ability, and theory of mind were significantly higher than those of monolingual children. Pearson Product Moment Correlation statistically significant positive correlation were found between working memory and theory of mind ( $r = .436, p < .05$ ), working memory and verbal ability ( $r = .426, p < .05$ ) as well as theory of mind and verbal ability ( $r = .578, p < .05$ ). The result supported a positive relationship between the working memory as well as verbal ability on children's



theory of mind. Hierarchical regression analysis showed that controlling for age, verbal ability, and working memory, language status did not explain the variance in children's theory of mind. The findings suggest that it would be vital for the teachers in preschool age group and also school age to screen working memory capacity among children and apply the appropriate methods to enhance working memory regardless of the kind of language that the children are speaking with.



Abstrak tesis yang dikemukakan kepada Senat Universiti Putra Malaysia sebagai memenuhi keperluan untuk ijazah Doktor Falsafah

**PERKAITAN ANTARAN INGATAN KERJA, KEUPAYAAN PERTUTURAN,  
DAN TEORI MINDA DI KALANGAN KANAK-KANAK PRASEKOLAH DI  
IRAN**

Oleh

**MOKHTAR FARHADIAN**

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Satu kajian korelasi telah dijalankan untuk menyelidik hubungan di antara Ingatan Kerja, Keupayaan Pertuturan dan Teori Minda di kalangan kanak-kanak prasekolah berbangsa Iran. Kaedah persampelan berlapis telah digunakan untuk mengenalpasti responden dalam kajian ini. Sejumlah 164 kanak-kanak prasekolah telah dipilih sebagai responden untuk kajian ini. Sebanyak 98 (62%) adalah kanak-kanak yang boleh bertutur dalam dwibahasa dan 65 (38%) adalah kanak-kanak yang hanya boleh bertutur dalam satu bahasa sahaja.

Data dikumpul dengan menggunakan soal selidik dan tiga instrumen berpiawaian, iaitu Penilaian Ingatan Kerja Automated (AWMA), Tugas Kepercayaan Palsu dan Skala kebolehan kanak-kanak oleh McCarthy. Keputusan menunjukkan bahawa skor Ingatan Kerja, Teori Minda dan Keupayaan Pertuturan bagi kanak-kanak dwibahasa adalah lebih tinggi berbanding dengan kanak-kanak yang bertutur satu bahasa sahaja. Korelasi Pearson mendapati bahawa terdapat perhubungan yang positif di

antara Ingatan Kerja dan Teori Minda ( $r = .436, p < .05$ ), Ingatan Kerja dan Keupayaan Pertuturan ( $r = .426, p < .05$ ) dan juga Teori Minda dan Keupayaan Pertuturan ( $r = .578, p < .05$ ).

Keputusan yang diperolehi menyokong perhubungan yang positif di antara Ingatan Kerja serta Keupayaan Pertuturan dengan Teori Minda kanak-kanak. Analisa regresi hirarki menunjukkan bahawa apabila umur, Keupayaan Pertuturan dan Ingatan Kerja dikawal, status bahasa tidak menyumbang kepada penerangan tentang varians dalam Teori Minda kanak-kanak. Hasil kajian mencadangkan bahawa adalah penting bagi guru-guru di kalangan kumpulan umur prasekolah dan sekolah untuk mengesan tahap keupayaan Ingatan Kerja di kalangan kanak-kanak dan menggunakan kaedah yang betul untuk memberikan penekanan kepada Ingatan Kerja tanpa mengira samaada kanak-kanak berkenaan bertutur dalam dwibahasa atau satu bahasa.

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## DECLARATION

I declare that the thesis is my original work except for quotations and citations which have been duly acknowledged. I also declare that it has not been previously, and is not concurrently, submitted for any other degree at Universiti Putra Malaysia or at any other institution.

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MOKHTAR FARHADIAN  
Date: 30 May 2010



## TABLE OF CONTENTS

	<b>Page</b>
<b>ABSTRACT</b>	ii
<b>ABSTRAK</b>	iv
<b>ACKNOWLEDGEMENTS</b>	vi
<b>APPROVAL</b>	vii
<b>DECLARATION</b>	ix
<b>LIST OF TABLES</b>	xiii
<b>LIST OF FIGURES</b>	xv
<b>LIST OF ABBREVIATIONS</b>	xvi
<b>CHAPTER</b>	
<b>I</b>	<b>INTRODUCTION</b>
1.1	Introduction 1
1.2	Problem statement 5
1.3	Significant of the study 8
1.4	Research objectives 10
	1.4.1 Specific objectives 10
1.5	Hypothesis 11
1.6	Definitions of the concept 12
	1.6.1 Definition of ToM 12
	1.6.2 Definition of WM 13
	1.6.3 Definition Bilingualism 13
	1.6.4 Definition of Monolingualism 14
	1.6.5 Definition of Verbal ability 14
1.7	Theoretical Framework 14
<b>2</b>	<b>LITERATURE REVIEW</b>
2.1	Introductions to ToM development 20
2.2	Children's performance in ToM tasks 23
2.3	ToM impairment 25
2.4	Early theories on ToM development 25
	2.4.1 Modular theory 26
	2.4.2 Stimulation theory 27
2.5	Theory of mind across other countries 28
2.6	Theory of mind and age 29
2.7	Theory of mind and siblings 30
2.8	Theory of mind and verbal ability 33
2.9	Working memory and short-term memory 37
2.10	Working memory and its background 38
2.11	Working memory and theory of mind 44
2.12	Bilingualism and other cognitive abilities 47
2.13	Theory of mind and bilingualism 53
2.14	Working Memory and Bilingual 56
2.15	Verbal ability and bilingualism 59



3	<b>METHODOLOGY</b>	60
	3.1 Research design	60
	3.2 Study location	61
	3.3 Study population	61
	3.4 Rational for choosing the participants	62
	3.5 Criteria for choosing the participants	63
	3.6 Sampling method	64
	3.7 Sampling size determination	64
	3.8 Procedure	66
	3.9 Tasks and Instruments	73
	3.9.1 Theory of mind tasks	73
	3.9.2 Scoring of false belief tasks	74
	3.9.3 Reliability of ToM tasks	75
	3.10 Working Memory test	77
	3.10.1 Reliability of the working memory	78
	3.11 McCarthy Scales of Children’s Ability	78
	3.11.1 Reliability of the McCarthy Scales of Children	79
	3.12 Parental background questionnaires	79
	3.13 Children’s background questionnaire	79
	3.14 Children’s language questionnaire	80
	3.15 Exploratory data analysis (EDA)	80
	3.16 Data analysis	84
4	<b>RESULTS AND DISCUSSION</b>	87
	4.1 Introductions	87
	4.2 The children’s background and parental demographic Characteristics	87
	4.2.1 Children’s Background	88
	4.2.2 Monolingual and bilingual children’s background	88
	4.2.3 Family Background of the bilingual and monolingual	
	4.3 The pattern of WM, ToM, and VA among the children	90
	4.3.1 Working memory and three different Components of it	91
	4.3.2 Pattern of ToM	95
	4.3.3 Children’s verbal ability	100
	4.4 The relationship between WM, VA, and ToM	100
	4.4.1 There is no significant relationship between WM and ToM	101
	4.4.2 There is no significant relationship between WM and VA	103
	4.4.3 There is no significant relationship between VA and ToM	104
	4.5 Comparison of VA, WM, and ToM between bilinguals and monolingual	107
	4.5.1 There is no significant difference in ToM between bilingual and monolingual preschool children	107
	4.5.2 There is no significant difference in WM between bilingual and monolingual preschool children	110
	4.5.3 There is no significant difference in VA between	112



	bilingual and monolingual preschool children	
4.5.4	Summing up of the comparison of WM, VA, and ToM	113
4.6	Relationship between WM, VA, and ToM controlling for language spoken	115
4.6.1	There is no significant relationship between WM and ToM controlling for language spoken	114
4.6.2	There is no significant relationship between WM and VA controlling for language spoken	116
4.6.3	There is no significant relationship between VA and ToM controlling for language spoken	116
4.7	Determining the extent to which WM explains the variation in ToM, controlling for age, VA and language spoken	117
4.7.1	Summing up	120
4.8	Limitations	121
5	<b>SUMMARY, CONCLUSION AND RECOMMENDATION FOR FUTURE STUDIES</b>	
5.1	Summary	124
5.2	Conclusion	124
5.3	Recommendations	127
5.3.1	Recommendations for future study	131
5.3.2	Recommendations for the instruments	133
5.3.3	Recommendations for education ministry	133
	<b>REFERENCES</b>	135
	<b>APPENDICES</b>	155
	<b>BIODATA OF STUDENT</b>	177
	<b>LIST OF PUBLICATION</b>	178



## LIST OF TABLES

<b>Table</b>		<b>Page</b>
3.1	Number of children by language spoken and the elected sample for the study	66
3.2	Leven test of Homogeneity of Variance for variables	83
3.3	Test for colinearity of the IVs	
3.4	Type of Analysis and the main statistical tests used	84
4.1	Frequency and percentage distribution of the children's demographic background	89
4.2	2 Frequency and percentage distribution of family income, father's education level, mother's education level, and mother's occupational status	90
4.3	Mean and standard scores for WM measures and three components, and proportions of children obtaining bands of standard scores	92
4.4	Mean and standard scores of WM measures and three components, and proportions of monolingual children obtaining bands of standard scores	93
4.5	Mean and standard scores for WM measures and three components, and proportions of bilingual children obtaining bands of standard scores	94
4.6	Means, standard deviations on ToM score for monolingual and bilingual children	96
4.7	Mean and Standard deviation for ToM tasks broken down by age group	97
4.8	Correct and incorrect ToM scores by age groups, language, and gender	98
4.9	Means, standard deviations of VA score for monolingual and bilingual children	100
4.10	Correlate between ToM, VA, WM, PL, VSSP, and CE	102
4.11	T-test on ToM between bilingual and monolingual children	108
4.12	T-test on WM between bilingual and monolingual children	110



4.13	T-test on VA between bilingual and monolingual children	112
4.14	Summary of hierarchical regression analysis for variables predicting performance in ToM tasks	118





## LIST OF FIGURES

<b>Figure</b>		<b>Page</b>
1	Conceptual framework of the study	19
2	Diagram for the procedure of determining the samples	72
3.1	Normal P-P Plots for WM	82
3.2	Normal P-P Plots for ToM	82
3.3	P-P Plot of VA	83

## LIST OF ABBREVIATIONS

ToM	Theory of mind
WM	Working memory
VA	Verbal ability
PL	Phonological Loop
VSSP	Visuo-spatial sketch pad
CE	Central Executive
DV	Dependent variable
IV	Independent variable
AWMA	Automated working memory assessment

## CHAPTER 1

### INTRODUCTION

The Kurds are a people of Indo-European stock who have lived in a geographically cohesive area that is called Kurdistan, and who make a nation with a distinct language and culture. The children are exposed to the second language (Persian language) from the birth and the language of education from kindergarten to higher education is Persian language and also in most of the time the language of media, is Persian language. First language of Kurdish children is Kurdish. The official language of Kurdish children is Persian. And the Kurdish children can talk in two languages as well.

All the kindergartens are under the supervision of welfare organization. Almost, the children are educated by the unique programs in the kindergarten of Kurdistan, but each kindergarten's manager can conduct their favorite programs as well. The fee for all the kindergarten is the same, but the extra activities. And also, various social backgrounds can be observed among parents of the children. For example, from lowers to highest monthly income and in terms of education attainment, the parents are ranging from low educational levels to higher education.

During the preschool years, young children make amazing progress in different aspects of development (Wellman, Cross, and Watson, 2001). They engage in cooperative play, enjoy responsibility, and can take the perspectives of others as well as manipulate others` action. They also use speech and language that can make a dramatic



transformation during the preschool years. There are some reasons why researchers are interested in the study of preschoolers. Firstly, this early stage of development set the foundation in child psychosocial development. Secondly, preschoolers can answer to the simple question, describe events and also follow the instructions (Chan, 2004). Cognitive development during preschool years is marked by significant advance in both meta-cognitive and social understanding. Perhaps one of the most intriguing ability that begins to emerge is children's capability to appreciate other individual as psychosocial agent; this developmental milestone is theory of mind (ToM).

Children learn to appreciate that everyday's behavior are motivated by internal states such as desires, beliefs and intentions (Premack & Woodruff, 1978). ToM allows us to recognize two important things about how mental states relate to the world. First, mental states can differ from true reality, for example, someone can think something that is not true. Second, two people can have different mental states with respect to the same situation.

The phrase ToM was first introduced by Premack and Woodruff (Premack & Woodruff, 1978). The development of ToM is a long process that has been reported from infancy to adulthood. Wellman, Cross, and Watson's (2001) meta analysis showed that most of the ToM researches have focused on the understanding of false belief that normally occurs between 3 to 5 years-old children. It is accepted that typically developing children by 4 years old can answer on false belief tasks correctly (Perner, Leekam, & Wimmer, 1987b; Surian & Leslie, 1999).



Baron- Cohen, Leslie and Frith (1985) stated that ToM is the understanding that persons have mental states, such as thought, desires and beliefs, that represent or misrepresent the phenomena of the world. ToM is also the ability to use these mental states to predict and explain people's behavior. Astington (2001) and Wellman (1993) argued that ToM is measured by standard false belief tests for crediting a child with ToM that require the children to predict what a protagonist will do.

Another cognitive ability that needs to be discussed is working memory (WM). WM refers to the processes or structures that have relationship with elaboration, storage, and transformation, and this process caused WM a fundamental and basic for cognitive psychology and also WM is a system for temporary holding and manipulation cognitive information such as learning, reasoning and comprehension Baddely (2003). Baddeley believed that WM is responsible for relationship between executive skills and other abilities such as ToM.

There are several conceptualization of WM, but the design of the present study is based on the widely accepted WM model developed by Baddeley and Hitch (1974). Baddeley (1996) and Baddeley and Hitch, (1974) stated that WM includes a system for temporary storage and manipulation of information and has three components such as central executive and two systems including phonological loop and Visuo-spatial sketchpad. This model of WM has been supported by evidence from studies of children (Alloway, Gathercole, Willis, & Adams, 2004) and adult participants, neuropsychological patients (Baddeley, 1996a) as well as neuroimaging investigations reported by Vallar and Papagno (as cited in Alloway, et al. 2005).



Furthermore, verbal ability (VA) may account for some of the improvement in ToM development with age. It has been consistently demonstrated that success on the majority of ToM tasks is closely related to verbal or linguistic ability (Happe, 1995). In another study, Sparrevojn and Howie (1995) revealed that two groups of children with autism matched in every dimension except verbal ability. Those with higher verbal ability were more likely to acknowledge false belief. According to the above studies, a minimum of VA level necessary for ToM tasks success

In the present study, however, two groups of the children are assigned; one consists of monolinguals and the other group bilingual preschool children. Researchers in multiple disciplines (education, psychology, and linguistics) are interested in investigating the impact of acquiring second language on various aspect of development (cognitive ability). Moreover, one of the most central and enduring issues in cognitive science concerns the impact of access to language on cognitive development (Bloom & Keil, 2001; Carruthers, 2002; L. Siegal & Surian, 2004). Children are exposed to a wide range of language environments. Some children such as deaf children with hearing parents may not be exposed to language until they enter into contact with users of a sign language. In contrast, bilingual children are exposed early to more than one spoken language. Thus, the bilingual children such as those in this study have been exposed to the second language (Persian) from the birth (The first language of the bilingual children was Kurdish language and their second language was Persian language, and the monolinguals just could talk in Persian). If bilingual children are aware that they must pay attention to the linguistic knowledge of other people because their interlocutor sometimes don't know the same language that they know, then bilingual children may



have advantage over monolingual children in understanding that other people have mental state that could differ from their own. Thus, the researcher realized that bilinguals are an interesting test case for this study.

Currently, there is much debate as to the role of cognitive ability in children's ToM development (Fry & Hale, 1996; Perner, Stummer, & Lang, 1999; Zelazo, Jacques, Burack, & Frye, 2002). The present study indicates a close association between certain aspect of cognitive development such as WM, VA and children's ToM development in bilingual and monolingual children. Since bilingualism is difficult to categorize, for the purposes of this study, the report of the parents and teachers were the basic criteria to determine the bilingualism and monolingualism children.

## **1.2 Problem statement**

When a common meeting was arranged for the parents in the kindergartens of the Sanandaj city, many of the preschooler`s parents were feeling worry that obtaining second language might have negative effects on children`s learning. And most of the parents were trying to make the children as monolingual and just speak with official language to their children. This concern is probably increased by the incorrect belief that children are confused if they acquire two languages at the same time. It is the main concern that makes the researcher to do the study. Perhaps because of the bad experiences that many Kurdish people have had in speaking in the second language with bad accent at the high school or university among the monolinguals (Persian language speakers), it seems difficult for the parents to accept that it is possible to be a good

bilingual without experiencing any negative cognitive effects. Such broad-based fears calls for sound research that can address the true effect of bilingualism on preschool children.

While a great deal of attention has recently been paid to the content and structure of what has come to be called children's ToM (Astington, 1993; Barresi & Morre, 1996), less attention has been given to the information processing mechanism that makes that acquisition possible (Fodor, 1992), while this research tries to make it. The children who acquire ToM, more effective communication, interaction, and social understanding become possible, and opportunity to engage conflict resolution and pretend play with peers, and using strategy in games are probably increased (Astington, 2003; Cutting & Dunn, 1999). And it might be accompanied by heightened sensitivity to criticism (Dunn, 1995) or capacities for antisocial deception (Repacholi, Slaughter, Pritchard, & Gibbs, 2003). Children with ToM problem cannot differentiate between the reality and mental events and they consider what they see as true that it may be false. Researchers believed that limitation in information processing ability (Fodor, 1992), particularly WM is one of the factors that might underlie children's development of an understanding of ToM and limitation in WM prevent children from understanding of false belief. However, it is hypothesized that if the ToM understanding was dependent upon the growth in WM capacity, then changes in ToM should be related directly to changes on WM performance.

Although, some studies have investigated the relationship between WM and ToM,





however, their findings are not unanimous (Davis & Pratt, 1995; Keenan, Olson, & Marini, 1998). Some researchers reported that there is a significant link between WM and ToM and others found no relationship. With such a mixed results were obtained on WM and ToM, the researcher tries to verify whether a significant link exists between WM and ToM. In addition, the researcher tries to clarify which subcomponents of WM have the highest link to ToM development. In addition, Keenan (2000) asserted that studies concerning WM and ToM are still limited, and more studies have to be done in this area.

Moreover, to the best knowledge of the author, no study has been done on WM and ToM on Iranian preschool bilingual and monolingual children. This study is the first study of its kind to examine the phenomena of WM and its subcomponents and the relationship of WM with ToM development in bilingual and monolingual preschool children. In the current study, the researcher seeks to uncover the link between WM and ToM development in bilingual and monolingual children. There is a knowledge gap in our understanding of the phenomena and several questions still remained to be answered such as, is there any significant relationship between WM and ToM between bilingual and monolinguals in the new population? Previous studies thus, have not provided a picture about the specifying the link between WM and ToM in bilinguals and monolinguals preschool children. This study, therefore, aims to investigate the phenomena. In addition, there is an urgent need to determine the relationship between the factors that might help to understand and clarify the phenomena and cover the gap of the previous studies.

